California Air Resources Board

Public Hearing to Consider Proposed Amendments to the Regulation on Methane Emissions from Municipal Solid Waste Landfills

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

Public Hearing Date: November 20, 2025
Agenda Item No.: 25-8-1.

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List of Acronyms and Abbreviations

15-Day Notice	Notice of Public Availability of Modified Text and Availability of Additional Documents and/or Information
15-Day Changes	The proposed regulatory text released on April 2, 2026
45-Day Notice	Notice of Public Hearing
45-Day Changes	The proposed regulatory text released on September 23, 2025
ACO	Alternative compliance option
APA	California Administrative Procedure Act
AQMD	Air Quality Management District
°C	Degrees Celsius
CalEPA	California Environmental Protection Agency
CAPCOA	California Air Pollution Control Officers Association
CARB (or Board)	California Air Resources Board
CDPHE	Colorado Department of Public Health and Environment
C.F.R.	Code of Federal Regulations
CLM	Component leak monitoring
CO	Carbon monoxide
EG	Emission Guidelines and Compliance Times for Municipal Solid Waste Landfills
°F	Degrees Fahrenheit
FSOR	Final Statement of Reasons
GCCS	Gas collection and control system
GHG	Greenhouse gas
GIS	Geographic information system
HIC	Heat input capacity
HOV	Higher operating value
ISOR (or Staff Report)	Initial Statement of Reasons
LFG	Landfill gas
LMOP	Landfill Methane Outreach Program

LMR (or Regulation)	Landfill Methane Regulation
MOU	Memorandum of understanding
MSW	Municipal solid waste
NESHAP	National Emission Standards for Hazardous Air Pollutants: Municipal Solid Waste Landfills
NOx	Nitrogen oxides
NSPS	New Source Performance Standards (Standards of Performance for Municipal Solid Waste Landfills That Commenced Construction, Reconstruction, or Modification After July 17, 2014)
ppmv	parts per million by volume
ppm-m	parts per million-meter
SEM	Surface emissions monitoring
SET	Subsurface elevated temperature
SSM	Startup, shutdown, and malfunction
TAC	Toxic air contaminants
TDLAS	Tunable diode laser absorption spectroscopy
U.S. EPA (or EPA)	United States Environmental Protection Agency
VOC	Volatile organic compounds

I. General

The Staff Report: Initial Statement of Reasons for Rulemaking (ISOR or Staff Report), entitled ”Public Hearing to Consider Proposed Amendments to the Regulation on Methane Emissions from Municipal Solid Waste Landfills” (Proposed Amendments), released September 23, 2025, is incorporated by reference herein. The Staff Report contained a description of the rationale for the Proposed Amendments. On September 23, 2025, all references relied upon and identified in the Staff Report were made available to the public.

The California Air Resources Board (CARB or Board) adopted the Regulation on Methane Emissions from Municipal Solid Waste Landfills (the Landfill Methane Regulation, LMR, or Regulation) in 2010 to reduce methane emissions from landfills. The LMR mandates that owners or operators of municipal solid waste (MSW) landfills meeting certain criteria install and properly manage gas collection and control systems (GCCS), monitor methane concentrations on landfill surfaces and GCCS equipment, address excess emissions and other performance issues, ensure a minimum 99% methane destruction efficiency by control devices, maintain records, and annually report data to the overseeing regulator. The LMR is among the nation’s most stringent regulations on landfill methane emissions, requiring the installation and operation of GCCS at landfills with significantly lower emissions than the threshold applied nationally and setting standards and procedures later followed by several states.

The Proposed Amendments are driven by the need to enhance methane emissions control from MSW landfills, a significant contributor to California’s greenhouse gas emissions. As described in the Introduction and Background of the Staff Report, California has statutory mandates to reduce greenhouse gas emissions at least 40% below 1990 by 2030—and to reduce methane emissions 40% below 2013 levels by 2030—which are a part of a broader goal of achieving carbon neutrality no later than 2045. The 2022 Scoping Plan included an analysis of the waste sector and concluded that while reducing disposal is the most effective means of achieving long-term methane reductions, reducing emissions from waste already in place at landfills is also critical to achieve near-term reductions.

The Proposed Amendments leverage research, technology, and implementation lessons to enhance the LMR’s stringency and enforceability. The Proposed Amendments strengthen the LMR’s ability to ensure safe and effective operation of landfill gas collection and control systems, reduce landfill methane emissions, support California’s climate goals, and reinforce California’s leadership in combating climate change through targeted, science-driven waste sector reforms. Specifically, the Proposed Amendments include changes in the areas described below.

Enhancing methane emissions monitoring and repair actions:

- Require inspection and repair when operators are notified of a remotely-detected methane emissions plume;
- Increase the stringency of landfill surface and component leak monitoring procedures, including increasing coverage by removing exemptions from monitoring, reducing corrective action timelines, and increasing frequency at certain landfills; and
- Establish a process to evaluate and approve emerging alternative technologies for leak detection, and require tools such as handheld or drone-mounted laser scanners to identify leaks in inaccessible areas that are currently excluded from monitoring.

Improving GCCS operations:

- Require earlier installation and operation of gas collection infrastructure in areas of new waste deposition;
- Limit periods of GCCS downtime and mitigate emissions from unavoidable downtime;
- Increase wellhead monitoring parameters and analysis, and require response actions for out-of-range values or large changes in values;
- Require more frequent monitoring, analysis, and mitigation measures, including cover improvements, and subsurface temperature, oxygen, and liquid level monitoring to support safe and effective operation; and
- Manage declining gas generation at closed landfills.

Clarifying regulatory applicability, standardizing reporting, and other miscellaneous changes:

- Clarify responsibilities of third-party gas control system owners and operators;
- Reduce barriers to using continuous wellhead monitoring technologies;
- Standardize, streamline, and digitize reporting to support compliance monitoring; and
- Miscellaneous clarifications, updates, and improvements to processes and enforceability.

The Proposed Amendments amend the California Code of Regulations, Title 17, sections 95462, 95463, 95464, 95465, 95467, 95468, 95469, 95470, 95471, 95475, and Appendix I, and repeal the California Code of Regulations, Title 17, section 95466.

On September 23, 2025, CARB released the Notice of Public Hearing (45-Day Notice) and Staff Report for public review. The formal comment period for the Proposed Amendments opened September 26, 2025, and closed November 10, 2025. CARB received 40 written comments during the 45-Day Notice comment period. The proposed regulatory text released on September 23, 2025, is referred to herein as the "45-Day Changes."

On November 20, 2025, CARB held a public hearing to consider the Proposed Amendments as described in the 45-Day Notice and Staff Report. At this hearing, 10 additional written comments were submitted and 49 oral comments were provided. Subsequently in the hearing, the Board approved for adoption the Proposed Amendments and directed the Executive Officer, through Resolution 25-14, to determine if additional conforming modifications to the regulation were appropriate and to make any proposed modified regulatory language available for public comment, with any additional supporting documents and information, for a period of at least 15 days in accordance with Government Code section 11346.8.

On April 2, 2026, additional proposed changes and supporting documents were made available for a 15-day comment period through a "Notice of Public Availability of Modified Text and Availability of Additional Documents and/or Information" (15-Day Notice). The 15-Day Notice and modified regulatory language were available for public review and comment through April 17, 2026. During the 15-day comment period, CARB received 25 additional written comments. CARB did not make any changes to the regulatory text based on comments received during the 15-day comment period. The proposed regulatory text released on April 2, 2026, is referred to herein as the "15-Day Changes."

This Final Statement of Reasons (FSOR) updates the Staff Report by identifying and providing the rationale for the modifications made to the originally proposed amendments to the regulatory text. The FSOR also contains a summary of the comments received by CARB during the formal rulemaking process on the Proposed Amendments or the process by which they were adopted, and CARB's responses to those comments.

A. Mandates and Fiscal Impacts to Local Governments and School Districts

The Board has determined that this regulatory action will result in a mandate to local agencies. However, the Board finds that that these costs are not reimbursable pursuant to Part 7 (commencing with section 17500), Division 4, Title 2 of the Government Code, because this action does not impose requirements that apply only to local agencies or school districts. In addition, this action does not compel local agencies to provide new governmental functions by providing new or additional governmental services to the public; it instead imposes regulatory requirements on various entities. Specifically, the requirements apply generally to all entities that own or operate landfills or equipment for the collection or control of landfill gas. Therefore, the regulation does not constitute a "Program" imposing any unique requirements on local agencies or school districts as set forth in Government Code section 17514. Additionally, the affected local government-owned landfills are operated as not-for-profit organizations and are able to recover compliance costs by increasing service fees.

B. Consideration of Alternatives

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. No small businesses are subject to the Proposed Amendments because exemptions provided in the LMR exclude any landfills that may be considered small businesses, as further described on pp. 130–131 of the ISOR.

The Executive Officer analyzed two alternatives to the Proposed Amendments. Alternative 1 would exclude the requirements related to remotely detected emission plumes in Section 95469(b) of the Proposed Amendments. Under this alternative, owners or operators would not be required to perform inspections, make repairs, and report information to CARB when notified of a remotely detected methane emission plume. Removing this provision would result in the loss of emission reduction benefits from faster response to large methane emission sources and loss of information regarding the sources and causes of large emission plumes. This alternative would reduce the estimated cost of the Proposed Amendments to regulated entities by $132,000 per year. In the ISOR, staff reasoned that for the relatively low cost compared to other provisions and the targeted nature of this provision to facilities experiencing an emission plume, the cost savings achieved by Alternative 1 would not justify the forgone benefits.

Alternative 2 would add a requirement to install and operate continuous wellhead monitoring with automated tuning on all wells at landfills that use an energy recovery control device. The continuous wellhead monitoring systems provide continuous measurement of wellhead parameters and the automated tuning is designed to improve gas collection efficiency. This alternative would add estimated costs of $80.4 million per year. In the ISOR, staff concluded that the approach in the Proposed Amendments to require more frequent wellhead monitoring only at wells that have persistent exceedances of wellhead parameters in monthly monitoring is more appropriate at this time than mandating the use of continuous wellhead monitoring with

automated well tuning given the uncertainties in collection efficiency gains and the high costs associated with these systems.

For more information regarding these alternatives, please see Chapter IX of the ISOR.

II. Modifications Made to the Original Proposal

A. Modifications Approved at the Board Hearing and Provided for in the 15-Day Comment Period

No modifications to the proposed regulatory language were provided at the November 20, 2025, public hearing. Through Resolution 25-14, the Board directed the Executive Officer to determine if additional conforming modifications to the regulation were appropriate and to make any proposed modified regulatory language available for public comment, with any additional supporting documents and information, for a period of at least 15 days in accordance with Government Code section 11346.8. The Board further directed the Executive Officer to present the proposed regulation to the Board for further consideration if warranted or take final action to adopt the regulation after addressing all appropriate modifications.

On April 2, 2026, CARB released a Notice of Public Availability of Modified Text (15-Day Notice)[1] for the Proposed Amendments along with modified regulatory text. The specific proposed modifications are detailed in the 15-Day Notice and companion underline/strikeout modified regulatory text. The 15-day modifications are also discussed, where appropriate, in the summary of comments and agency responses in Chapters IV and V of this FSOR. These modifications include:

- Provided greater flexibility for early gas collection in areas of new waste deposition, including generalizing the allowable collector types and providing up to 180 days before installation is required.
- Increased various action timelines, including installing a GCCS after approval of a design plan at an active landfill, monitoring in response to a remote plume detection notification, following up on a screening detection in unsafe-to-walk areas, and initiating surface exceedance repairs.
- Extended the downtime limit for GCCSs with lower gas collection.
- Allowed additional well downtime for well raising.
- Changed and simplified limit to number of wells that can be offline simultaneously.
- Allowed time to reduce high wellhead oxygen content before cover integrity and collection system assessments are invoked.
- Changed when downwell temperature monitoring and enhanced wellhead monitoring is required (invoked or can be stopped).
- Made several minor adjustments to wellhead gas parameter action thresholds and monitoring methods.
- Reduced frequency of liquid level monitoring in gas extraction wells.

[1] See CARB. (2026). “Notice of Public Availability of Modified Text and Availability of Additional Documents and/or Information: Proposed Amendments to the Regulation on Methane Emissions from Municipal Solid Waste Landfills.” Available April 2, 2026.

- Added enhanced wellhead monitoring, downwell temperature monitoring, and GCCS downtime to quarterly reporting.
- Added reporting of requests to other regulatory agencies and approvals/denials of higher operating values for well temperature.
- Added reporting of daily gas collection and system runtime for GCCSs operating semi-continuously.
- Removed annual reporting of time the GCCS was operating normally.
- Extended reporting deadlines for quarterly reports and responses to remote plume detection notifications.
- Clarified well decommissioning criteria and added an option to decommission a broken well.
- Specified how surface emissions exceedances found close together are counted.
- Reduced the area subject to increased surface emissions monitoring (SEM) frequency in response to recurring surface emissions exceedances.
- Removed the requirement to monitor oxygen content in engine and gas turbine exhaust.
- Modified applicability of cover integrity monitoring plans to areas of daily and intermediate cover (not areas of final cover).
- Allowed greater flexibility in how cover integrity and collection system assessments can be carried out, how deficiencies may be corrected, and when a new assessment or measurements are not required.
- Provided delayed effectiveness when revoking a previously approved alternative compliance option.
- Added or extended phase-in dates for several provisions, including component leak monitoring plans, cover integrity monitoring plans, submitting documentation of current alternative compliance options, reporting cause of a change in daily gas collection, reporting cause of wellhead parameter trends, and monitoring engine and gas turbine exhaust temperature.
- Minor additional changes for consistency, clarity, or cleanup.

III. Documents Incorporated by Reference

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

- ASTM International, 2025. D2487-17: Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System). Reapproved February 1, 2025. Copyrighted. **Section 95471(k).**
- Title 14, California Code of Regulations, Division 7, Chapter 9, Article 9.2, Section 18810.2 – Scales and Weighing Requirements at a Landfill. Effective January 1, 2006. **Section 95470(b)(6)(B)1.**
- Title 27, California Code of Regulations, Division 2, Subdivision 1, Chapter 3, Subchapter 4 – Criteria for Landfills and Disposal Sites. As it existed on July 18, 2025. **Section 95471(k).**
- Title 27, California Code of Regulations, Division 2, Subdivision 1, Chapter 3, Subchapter 5 – Closure and Post-Closure Maintenance. As it existed on July 18, 2025. **Section 95471(k).**
- Title 40, Code of Federal Regulations, Part 60, Appendix A-1 – Test Methods 1 through 2F. Effective May 30, 2023. **Sections 95471(m).**

- Title 40, Code of Federal Regulations, Part 60, Appendix A-2 – Test Methods 2G through 3C. Effective October 31, 2016. **Sections 95471(n)(2) and (3).**
- Title 40, Code of Federal Regulations, Part 60, Appendix A-4 – Test Methods 6 through 10B. Effective May 30, 2023. **Sections 95471(o)(4)(A) and (B).**
- Title 40, Code of Federal Regulations, Part 60, Appendix A-6 – Test Methods 16 through 18. Effective December 7, 2020. **Sections 95471(i)(1) and (n)(2).**
- Title 40, Code of Federal Regulations, Part 60, Appendix A-7 – Test Methods 19 through 25E. Effective May 30, 2023. **Sections 95471(a), (f)(1), and (i)(1).**
- Title 40, Code of Federal Regulations, Part 62 – Approval and Promulgation of State Plans for Designated Facilities and Pollutants, section 62.16722(a)(2). Effective June 21, 2021. **Section 95471(n)(1).**
- United States Environmental Protection Agency (U.S. EPA), October 6, 2021. ALT-144. Determination of Carbon Monoxide Concentration in Landfill Gas Wellheads – Gas Chromatographic Measurement (FID). **Section 95471(o)(5)(C).**
- United States Environmental Protection Agency (U.S. EPA), October 6, 2021. ALT-145. Determination of Carbon Monoxide Concentration in Landfill Gas Wellheads – Gas Chromatographic Measurement (TCD). **Section 95471(o)(5)(D).**

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. Also, the incorporated documents were made available by CARB 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 on the Original Proposal

Written comments were received during the 45-day comment period in response to the November 20, 2025, public hearing notice, and written and oral comments were presented at the Board Hearing. Listed below are the organizations and individuals that provided comments during the 45-day comment period.

Each comment reproduced in chapters IV and V is coded according to the comment period in which it was received and the name of the organization or individual commenting. Table 1 shows the abbreviation for each comment period. The format of the commenter code is the comment period abbreviation and the commenter name (either last name or abbreviation of organization name) with an underscore between these elements. Each commenter's submission is then subdivided into individual comments for each topic or concept expressed by the commenter. This is denoted by a dash and a number appended to the end of the commenter code. Figure 1 shows this coding structure using a fictitious organization with the

abbreviation “ABC.” The example represents the second sub-comment within the comment letter submitted by the organization “ABC” during the 45-day comment period.

Table 1. Comment Period Codes

Comment Period Code	Comment Period Received
OP, for original proposal	Comments received during the 45-day comment period for the original proposal, September 26 to November 10, 2025
B, for Board Hearing written comments	Comments received as written materials during the Board Hearing, November 20, 2025
T, for testimony at the Board Hearing	Comments received as oral testimony at the Board Hearing, November 20, 2025
F, for fifteen-day changes	Comments received during the 15-day comment period, April 2 to April 17, 2026

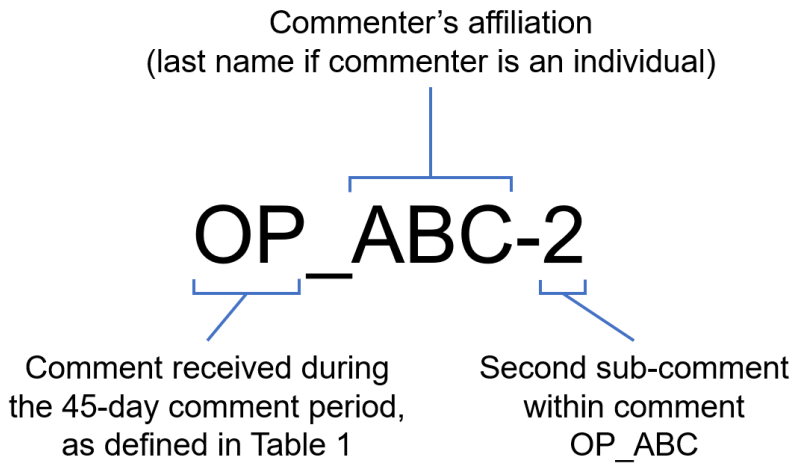

Figure 1. Comment code format example

Table 2 contains the list of written comments received during the 45-day comment period, including the name of the commenter, date the comment was received, affiliation of the commenter, and commenter code used in this FSOR. Table 3 contains the same information for written comments received at the Board Hearing and Table 4 contains the same information for oral comments presented at the Board Hearing.

Table 2. Written Comment Received During the 45-Day Comment Period

Commenter, Date	Affiliation	Commenter Code
Gavin Bruce, 10/28/2025	Individual	OP_Bruce
Kevin Rodgers, 11/6/2025	California Association of REALTORS	OP_CAR
Lisa Couch, 11/6/2025	Individual	OP_Couch
C Corliss, 11/7/2025	OC Waste & Recycling	OP_OCWR
Waqar Qureshi, 11/7/2025	Individual	OP_Qureshi
Ben Silton, 11/9/2025	TrelliSense	OP_TrelliSense
Lucinda Jackson, 11/9/2025	Individual	OP_Jackson
Jenna Roper, 11/10/2025	Central California Asthma Collaborative	OP_CCAC
David Ramirez, 11/10/2025	ReGen Monterey	OP_ReGen
Jordan Giaconia, 11/10/2025	Carbon Mapper	OP_Carbon Mapper
Suparna Chakladar, 11/10/2025	OPAL Fuels	OP_OPAL Fuels
Gael Ronnau, 11/10/2025	Individual	OP_Ronnau
Dylan Hoffman, 11/10/2025	SWANA California Chapters Legislative Task Force	OP_SWANA
McKenzie Wilson, 11/10/2025	Windfall Bio	OP_Windfall Bio
Jeffery Mills, 11/10/2025	L and D Landfill Limited Partnership	OP_L and D
Haley Lewis, 11/10/2025 [a]	Environmental Integrity Project	OP_EIP
Jason Aspell, 11/10/2025	South Coast Air Quality Management District	OP_South Coast AQMD
Mahiany Luther, 11/10/2025	San Diego County Air Pollution Control District	OP_SDAPCD

Scott Scholz, 11/10/2025	Western Placer Waste Management Authority	OP_WPWMA
John Borrego, 11/10/2025	Yolo County, Division of Integrated Waste Management	OP_YoloCo
John Kennedy, 11/10/2025	Rural County Representatives of California	OP_RCRC
Kathryn Chapman, 11/10/2025	Sacramento County Board of Supervisors	OP_SacCo
David Barron, 11/10/2025	Sniffer Robotics	OP_Sniffer
Marc Rodabaugh, 11/10/2025	San Bernardino County Solid Waste Management Division	OP_SWMD
Patrick Mathews, 11/10/2025	Salinas Valley Solid Waste Authority	OP_SVSWA
Christy Pestoni, 11/10/2025	Waste Connections	OP_WCN
Gregory Nudd, 11/10/2025	Bay Area Air District	OP_BAAD
Rania Serieh, 11/10/2025	El Dorado County Air Quality Management District	OP_EDCAQMD
Angela Thompson, 11/10/2025	Sacramento Metropolitan Air Quality Management District	OP_SMAQMD
Julia Mangin, 11/10/2025	Recology	OP_Recology
Todd Shibata, 11/10/2025	Riverside County Department of Waste Resources	OP_RIVCO
Dylan Hoffman, 11/10/2025	Representatives of the solid waste industry and local government	OP_Ind/Gov Coalition
Olivia Alves, 11/10/2025 [a]	RMI and Environmental Defense Fund	OP_RMI/EDF
Warisa Niizawa, 11/10/2025	Los Angeles County Sanitation Districts	OP_LACSD
Jason Lawler, 11/10/2025	San Joaquin Valley Air Pollution Control District	OP_SJVAPCD

Erica Parker, 11/10/2025	Californians Against Waste (CAW) and coalition of environmental and community-based organizations	OP_CAW
Jennifer Elkins, 11/10/2025	Val Verde Civic Association and supporting organizations: Valley Improvement Projects, Central California Environmental Justice Network representing communities impacted by the Avenal Regional Landfill, Full Circle Future	OP_VVCA
Paul Burke, 11/10/2025	Individual	OP_Burke
Britton Schwartz, 11/10/2025	International Human Rights Clinic at Santa Clara University School of Law	OP_IHRC
Christine Wolfe, 11/10/2025 [a]	WM	OP_WM

[a] These comments included attachments with previously-submitted feedback on pre-regulatory workshops, comment letters on non-CARB actions, reports, journal articles, news articles, or bibliographies. Where not excerpted in this chapter, these attachments are out of scope of the rulemaking because they are not specifically directed at the proposed CARB action or the procedures followed by CARB in proposing or adopting the action.

Table 3. Written Comment Received at the Board Hearing

Commenter, Date	Affiliation	Commenter Code
U.S. Representatives Brownly, Whitesides, Waters, Barragán, Lieu, Cisneros, and Matsui, 11/20/2025	United States House of Representatives	B_US Reps
Assemblymember Jacqui Irwin, 11/20/2025	California State Assembly	B_Irwin
Gina McCarthy, 11/20/2025	Former White House National Climate Advisor; 13th U.S. Environmental Protection Agency Administrator	B_McCarthy
Laila Sharpe, 11/20/2025	Environment California	B_Env CA
Brian Kolodji, 11/20/2025 [a]	Kolodji Corporation	B_Kolodji
Charles Davidson, 11/20/2025	Sunflower Alliance; California Environmental Justice Coalition	B_Sunflower

Commenter, Date	Affiliation	Commenter Code
Maria Elena Gutierrez, 11/20/2025	Individual	B_Gutierrez
Jaime Calderon, 11/20/2025	Individual	B_Calderon
Heidy Mascoso, 11/20/2025	Individual	B_Mascoso
Luz M. Rios, 11/20/2025	Individual	B_Rios

[a] This comment included attachments with a manuscript, a patent, and slide presentations. These attachments are out of scope of the rulemaking because they are not specifically directed at the proposed CARB action or the procedures followed by CARB in proposing or adopting the action.

Table 4. Oral Comment Presented at the Board Hearing

Commenter, Date	Affiliation	Commenter Code
Assemblymember Pilar Schiavo, 11/20/2025	California State Assembly	T_Schiavo
Erica Parker, 11/20/2025	Californians Against Waste	T_CAW
Jane Williams, 11/20/2025	California Communities Against Toxics	T_CCAT
Michael Mulligan, 11/20/25	Climate Action California	T_Mulligan
Chris Shimoda, 11/20/2025	WM	T_WM
Mike Caprio, 11/20/2025	Republic Services	T_RS
Evan Edgar, 11/20/2025	Edgar Associates	T_Edgar
Gracyna Mohabir 11/20/25	California Environmental Voters	T_CEV
Kevin Ruano, 11/20/25	Richmond Shoreline Alliance	T_Ruano
John Kennedy, 11/20/25	Rural County Representatives of California	T_RCRC
Oshea Orchid, 11/20/25	Individual	T_Orchid
Jennifer Elkins, 11/20/25	Val Verde Community	T_VVCA
Raul Engle, 11/20/25	Val Verde Community	T_Engle

Commenter, Date	Affiliation	Commenter Code
Kerry Frohling, 11/20/25	Castaic Residents	T_Frohling
Bianca Lopez, 11/20/25	Valley Improvement Projects	T_VIP1
John X. Mataka, 11/20/25	Grayson Neighborhood Council	T_GNC
Bill Murphy, 11/20/25	Elders Climate Action and Climate Action California	T_ECA/CAC
Brandi Howse, 11/20/25	Val Verde Community	T_Howse, B.
Alicia Acevedo, 11/20/25	Individual	T_Acevedo
Maria Ramos, 11/20/25	Individual	T_Ramos
Darcy Stinson, 11/20/25	Castaic Community	T_Stinson
Steven Howse, 11/20/25	Individual	T_Howse, S.
Gavin Bruce, 11/20/25	Valley Improvement Project	T_VIP2
Bill Magavern, 11/20/25	Coalition for Clean Air	T_CCA
Cher Arobalo, 11/20/25	Castaic Resident	T_Arobalo
Teresa Bui, 11/20/25	Pacific Environment	T_Pac Env
Laila Sharpe, 11/20/25	Individual	T_Env CA
Veronica Aguirre, 11/20/25	Individual	T_GHEJ
Leticia Luna, 11/20/25	Individual	T_Luna
Maribel Villegas, 11/20/25	Individual	T_Villegas
Thomas Helme, 11/20/25	Valley Improvement Projects, California Environmental Justice Coalition	T_VIP3/CEJC
Socorro Revolledo, 11/20/25	Individual	T_Revolledo
Matt Holmes, 11/20/25	California Environmental Justice Coalition	T_CEJC

Commenter, Date	Affiliation	Commenter Code
Maria Torres, 11/20/25	Individual	T_Torres
Lee Helfend, 11/20/25	Full Circle Future	T_Helfend
Gabriela Facio, 11/20/25	Sierra Club California	T_Sierra Club CA
Lim Cheung, 11/20/25	Individual	T_Cheung
Brian Kolodji, 11/20/2025	Kolodji Corporation	T_Kolodji
Emily Thompson, 11/20/2025	American Lung Association	T_ALA
Julia Levin, 11/20/2025	Bioenergy Association of California	T_BAC
Kimberly Burr, 11/20/2025	Individual	T_Burr
Abigail DeSesa, 11/20/2025	Individual	T_DeSesa
Ileana Navarro, 11/20/2025	Central California Environmental Justice Network	T_CCEJN1
Katy Webb, 11/20/2025	The Climate Center	T_CC
Christian Bisher, 11/20/2025	Central California Environmental Justice Network	T_CCEJN2
Olivia Alves, 11/20/2025	RMI	T_RMI
Brian Loma, 11/20/2025	Green Latinos	T_GL
LaDonna Williams, 11/20/2025	Individual	T_Williams
Chrissy Thomas Brewer, 11/20/2025	Individual	T_Brewer

The comments received during the 45-day comment period and at the Board hearing are reproduced and organized thematically in chapter IV (this chapter). The comments received during the 15-day comment period are reproduced and organized thematically in chapter V.

The following information will help with understanding how the comments are structured and labeled in chapters IV and V:

- Repetitive comments are listed together and responded to holistically. These comment groupings are signified by headers with a code and a brief title (e.g., “B.1-1 Request changes to technology approval criteria”).
- Comments are excerpted verbatim unless otherwise noted and are presented without quotation marks. Instances where CARB has added or summarized information are provided in curly braces starting with the text “CARB note:”. Transition words (e.g., “additionally”) at the beginning of comments were generally excluded from the excerpts and the new first word capitalized.
- The formatting of comment excerpts may differ from the formatting of the original comment (e.g., removing bolding, italics, bullet point symbols, or indentations; capitalizing the first word of a comment that begins in the middle of a sentence; removing section numbers in headers).
- In verbatim comment excerpts, CARB has generally not corrected or noted errors in the original (for example, by adding “[sic]”).
- Ellipses are used to bridge between portions of a submission that are part of the same individual comment or necessary for understanding the content of the comment. This sometimes results in the same introductory text being reproduced in multiple comment excerpts.
- Footnotes in comments are treated based on the nature of the footnote. Those that provide context are included with the text of the footnote inside curly braces (i.e., {Footnote: footnote text here}). Those that are simply references or website links are not included.
- In general, CARB has noted where it made changes in response to the comment. CARB has also noted where it either did not make changes or the comment was outside the scope of the rulemaking and therefore not subject to response pursuant to Government Code section 11346.9(a)(3).

A. General Comments

1. General Statements of Support

A.1-1 General support

Comment: I want to first acknowledge CARB staff's tremendous work to develop and improve upon these proposed amendments. We appreciate the commitment to proactive emissions management and greater transparency. (T_CEV-2)

Comment: In my work as an MD and in public health, I'm well aware of the negative health risks to environmental exposures, whether that be living near a freeway, a refinery, or a landfill. Epidemiologic evidence shows increased risks of asthma, other respiratory illnesses, and cancers. We know these negative health outcomes also are more often in -- with people of color, who live in sites located closer to their communities, who site -- where the sites are closer to their communities.

So I want to thank CARB for embracing the technology of satellites and drones, allowing industry and regulators to see these leaks faster. I want to thank CARB for embracing transparency in reporting, so that these communities and citizens can have information on what they're being exposed to, and agency in advocating for their own health. (T_Mulligan-1)

Comment: I support the proposed landfill methane Amendment Title 17. It goes a long way towards mitigating landfill methane leaks, which is a win for climate. (OP_Couch-1)

Comment: I support this proposed rule and endorse the intent because it strengthens monitoring, requires faster response to problems and requires better collection of methane from landfills. (OP_Qureshi-1)

Comment: I fully support and would like you to support the proposed landfill amendment in California. This is very important and can "move the needle" on landfill methane leaks. In 2010, California mandated that certain landfills install gas collection systems to collect and dispose of methane, so it was not emitted to the environment. Since then, leak detection technology of methane has greatly improved, so this amendment deploys new technologies to provide faster detection and reduce gas collection downtime. This is a win for the climate since California is such a significant source and is the second largest emitter of landfill methane and landfills are the second largest source of methane emissions in California. (OP_Jackson-1)

Comment: Importantly, control strategies to reduce methane emissions will also reduce co-polluted hazardous air pollutants, volatile organic compounds, and the non-methane organic compounds that contribute to ozone formation. Thus, landfill methane controls will provide additional benefits to Californians through improved air quality and public health, as these classes of pollutants are known to cause serious health issues.

The health impacts of landfill pollution and landfill fire risk emerged as pressing concerns for community members during CARB's workshops. We commend the Board for their dedication to community engagement throughout the rulemaking process, and we urge CARB to maintain a transparent, community-focused approach to landfill emissions regulation. (OP_RMI/EDF-4)

Comment: Thank you for this opportunity to comment on the proposed amendments to the Landfill Methane Regulation (LMR). The requirement to repair remotely detected methane leaks, the strengthening of onsite methane monitoring standards, and the additional requirements for landfill gas (LFG) collection and control systems (GCCS) will help improve controls at these sites. Additionally, enhanced recordkeeping requirements will help ensure operators document best management practices and unexpected changes that justify investigation. The new requirements will assist in reducing health impacts caused by exposure to toxic air contaminant (TAC) emissions, reduce public nuisance caused by emissions of odorous substances, help the Bay Area reach and maintain the federal and State ambient air quality standards, and continue moving us in the right direction for achieving needed greenhouse gas (GHG) reductions. The Bay Area Air District (Air District) has a number of landfills within our jurisdiction, including 13 permitted active landfills, 24 permitted inactive/closed landfills, and several other unpermitted closed sites, and as such, Air District staff strongly supports these proposed amendments and urges the Board to adopt them. (OP_BAAD-1)

Comment: TrelliSense would like to commend CARB for the overall thoughtfully designed updates proposed under the Landfill Methane Regulation (LMR). The new rule represents a meaningful step toward aligning landfill operations with California's broader greenhouse gas reduction goals. In particular, the integration of remote emissions plume detection and expanded monitoring flexibility demonstrates CARB's commitment to data-driven regulation and supporting innovation in methane abatement. (OP_TrelliSense-2)

Comment: Landfill Gas Collection and Control System Operation

Air District staff also supports the suite of proposed measures to improve GCCS operations. Proactive gas collection system (GCS) expansion at the working face and expedited timelines for corrective actions will help operators collect landfill gas sooner and reduce emissions, expanded wellhead monitoring and recordkeeping requirements will improve GCCS reliability and help identify potential issues early, and the new liquid level standards will improve LFG extraction. The Air District is pleased to see that the standards will apply to non-landfill entities that receive and process or burn landfill gas. (OP_BAAD-3)

Comment: CARB's proposed rule is an important milestone in advancing the state of the art of landfill methane mitigation, and TrelliSense appreciates the agency's collaborative engagement and evidence-based approach. We look forward to supporting CARB in the implementation phase and contributing to the broader adoption of continuous monitoring technologies that balance compliance assurance, emissions reductions, and operational feasibility. (OP_TrelliSense-13)

Comment: We broadly support CARB's Proposed Amendments and reiterate the technical recommendations provided by RMI, Environmental Integrity Project, Californians Against Waste, and Industrious Labs in January 2025 in response to CARB's Public Workshop: Potential Updates to the Landfill Methane Regulation. We are pleased to see CARB address many of the suggestions made in these joint comments submitted in January of this year. (OP_RMI/EDF-1)

Comment: We strongly support the proposed remote monitoring program, improvements to surface emissions and component monitoring, earlier Gas Collection and Control System (GCCS) installation and expansion, limits on GCCS downtime, enhanced wellfield monitoring, working face and cover improvements, and the additional mitigation requirements at landfills with persistent issues. We urge the Board to swiftly finalize these vital protections at the hearing on November 20, 2025. (OP_RMI/EDF-2)

Comment:

The following are areas of strength RMI and EDF urge CARB to maintain throughout the rule finalization process:

- Requiring the inspection and repair of remotely-detected plumes reported to CARB.
- Requiring earlier GCCS installation/operation in new waste areas for landfills accepting more than 200,000 tons of waste per year.
- Limiting GCCS downtime and setting prompt timelines for corrective action.
- Increasing the stringency of landfill surface and component leak monitoring, including expanding coverage to the working face and addressing hotspots in unsafe-to-walk areas.
- Establishing a process to evaluate and approve use of alternative technologies for leak detection that achieve at least equivalent emissions reductions.
- Expanding wellhead monitoring parameters and response requirements for exceedances.
- Creating a robust cover integrity assessment process to monitor and reduce fugitive emissions.
- Requiring more comprehensive reporting and record keeping requirements including standardized electronic reporting. (OP_RMI/EDF-5)

Comment: The Sanitation Districts commend CARB staff for their proactive approach in strengthening the Landfill Methane Regulation (LMR). The Sanitation Districts strongly support CARB's initiatives to protect public health and the environment by reducing methane emissions and promoting safe, effective landfill operations. (OP_LACSD-20)

Comment: Remote Methane Sensing & Enhanced Methane Monitoring

We commend the California Air Resources Board (CARB) for incorporating existing technologies for remote detection of methane emission plumes into the LMR. We further commend CARB for strengthening requirements for onsite monitoring of methane emissions, including in areas of the landfill which operators previously claimed exemptions from monitoring. New surface monitoring techniques like drone and rover surveys have shown the potential to be more cost effective for operators in the long run, and widespread adoption of a variety of monitoring technologies can help inform future operational and regulatory efforts. These proposed changes will be essential for identifying and reducing short-term GHG emissions that have previously been difficult to quantify and address. We anticipate collaborating with CARB and continuing to be active partners in identifying methane plumes from landfills in our air basin through monitoring, remote sensing, and knowledge sharing and training. (OP_BAAD-2)

Comment: What makes this proposal particularly compelling is how it balances stronger oversight with practical implementation, focused on the greatest opportunities to make a meaningful difference in emissions reductions without overburdening the sector.

Clear statewide standards also create consistency and accountability. Most landfill operators work hard to manage their facilities responsibly. Strong rules give them certainty, level the playing field, and build public confidence that everyone is doing their part. These amendments will bring about meaningful health benefits, modernize an outdated system, and drive down emissions at precisely the moment when rapid action matters most. (B_McCarthy-2)

Comment: California has an opportunity to show the country what constructive, effective climate leadership looks like. I encourage CARB to adopt the proposed amendments without delay. The longer we wait, the more methane we allow into our atmosphere — and the harder it becomes to meet our climate goals. Let's get this right, and let's get it done. (B_McCarthy-3)

Comment: Stronger methane rules will reaffirm California's role as a national model for integrating climate action and public health. As federal policymakers, we have been working to address methane emissions at the national level, and secured significant investments in the Inflation Reduction Act to fund financial and technical assistance to reduce methane emissions from the oil and gas sector. We were disappointed that the so-called 'One Big Beautiful Bill Act' rescinded unobligated balances from the methane reduction program and delayed implementation of the methane emissions fee. While President Trump and Congressional Republicans are taking us backwards, continued state leadership is critical to demonstrating the feasibility and impact of ambitious climate action, delivering swift and comprehensive protections for communities living near landfills.

We applaud CARB's progress and urge the Board to adopt the strongest possible landfill methane regulations. Doing so will safeguard public health, lower healthcare and insurance costs, and protect our most vulnerable communities, all while cementing California's leadership in responsible climate action. Thank you for your leadership and your full and fair consideration of our comments, consistent with applicable statues and regulations. (B_US Reps-6)

Comment: At a time when climate change is accelerating, California must continue to lead. Stronger landfill methane standards are an innovative, science-based approach to reducing greenhouse gases, protecting public health, and helping the state achieve its climate goals.

We urge CARB to adopt these amendments and ensure local air districts have the resources to enforce them. Thank you for your leadership and for the opportunity to provide my comments. (B_Env CA-4)

Comment: We especially support the improvements that will reduce emissions during gas system downtime and require earlier action when new waste is placed. These steps are essential to prevent avoidable methane leaks, protect surrounding ecosystems, and reduce greenhouse gas emissions. (B_Env CA-2)

Comment: The proposed amendments have undeniable benefits to community members who will experience cleaner air due to reduced co-pollutants and to the state as a whole, as we cut down on one of the most potent greenhouse gases. And this will be achieved in a cost-effective manner. We urge consideration of these changes and support for these amendments. Thank you for your leadership on this issue. (T_CEV-5)

Comment: I feel good about this regulation. My organizations thank the LMR staff for your savvy and the Board for its leadership. I really want to see this body of knowledge scaled to other states and other nations. (T_ECA/CAC-3)

Comment: So I want to urge the Board to pass. Chair Sanchez, I know you were just in Brazil for COP30 with the Governor. And the Governor's office has put out statements about the urgency to deal with methane as a climate pollutant to combat climate change. And so, I want to just reiterate that and say that this is an opportunity to protect our communities here in California and show the rest of the country and the rest of the world that we're serious about doing what's needed to address climate change and reduce methane. (T_VIP2-4)

Comment: Board members, the vote that you're taking on this will actually be the most important action that the Board is taking this year. And we thank the Board members and staff who have taken the time to meet with our coalition. Approving this rule will have both global and local impact. Globally, the Chair spoke eloquently about the importance of reducing methane. We know it's a short-lived climate pollutant, an important lever that we have to get a handle on this runaway climate change that we're experiencing.

And California can't claim to continue to be a leader on reducing methane emissions, unless we update this rule. And also, you're hearing from so many folks who are affected by landfills in their communities. And we know CARB can't fix all of the problems that they're facing from these landfills, but what you can do is to make sure that leaks are caught sooner and fixed sooner. And that is going to not only reduce the methane, but a lot of these other toxins that are affecting people's health. (T_CCA-1)

Comment: Environment California supports the proposed amendment to support methane monitoring, shortening repair timelines, and requiring use of better leak detection, such as drones and laser scanners. These updates will move California towards cleaner air, stronger enforcement, and more transparency. We especially support the improvements that reduce emissions during gas system downtime and require earlier action when new waste is placed. These steps are essential to prevent avoidable methane leaks, protect surrounding ecosystems, and reduce greenhouse gas emissions. (T_Env CA-1)

Comment: At this time, climate change is accelerating, and California must continue to lead. Stronger landfill methane standards are innovative, science-based, approachable in reducing greenhouse gases and protecting public health, and helping the State achieve its climate goals. We urge CARB to adopt these amendments and ensure local air districts have the resources to enforce them. (T_Env CA-3)

Comment: We urge the Board to maintain the following: … enhance monitoring and reporting (T_RMI-3)

Comment: California's Landfill Methane Rule, first adopted in 2010, was a critical step forward, but 15 years later, we know more and we can do better. The proposed amendments are a step forward reflecting years of research, technological improvements, and lessons learned from landfill fires, including the underground smoldering events that have exposed communities to harmful pollution in California. During a landfill fire, air pollutants such, as volatile organic compounds, and carcinogens like benzene are released alongside methane causing severe health risks for communities.

Strengthening these methane protections means strengthening public health and safety and we encourage the Board to consider further strengthening opportunities to identify leaks and make community data more accessible. Communities living near landfills deserve to know what they are breathing. (T_ALA-2)

Comment: I'm here to speak in strong support of the proposed Landfill Methane Regulations and thank the staff that has been working diligently on delivering impactful regulations. California has committed to leading the world on climate action, but we cannot meet our climate targets or protect our communities without confronting one of the largest and most preventable sources of methane emissions in the state, our landfills.

The great news is the solution is already in our hands. Because methane is a potent yet short-lived climate pollutant, every ton of this greenhouse gas we can prevent from escaping into the atmosphere delivers near-term climate benefits. The kind of near-term action Californians need in the face of worsening heat waves, floods, fire and beyond.

The proposed regulations are practical, science-based, and achievable. We specifically support amendments such as the enhanced wellhead monitoring and response protocols, strengthen gas collection and control systems requirements, the establishment of a Super Emitter Response Program, and the improved data collection and reporting requirements. We also support additional measures to further improve surface emissions monitoring, including more frequent monitoring, the notification for local communities of super emitter response events and shifting financial responsibility for third-party remote sensing data collection to landfill operators with CARB approved vendors providing data directly to CARB operators in local air districts.

California has never shied away from ambitious environmental leadership. By adopting strong landfill methane rules, CARB can deliver one of the fastest, most cost effective climate wins available, while also protecting public health and advancing environmental justice. I strongly urge you to adopt the strongest possible version of these regulations. Methane reductions at landfills are not a burden. They are an opportunity and California cannot afford to leave that opportunity on the table. (T_CC-1)

Comment: Yeah. So as you are already -- while you often hear from me talking about shipping, Pacific Environment, our focus is on combating climate change. And as you probably

know, methane is a climate super villain hiding in plain sight. It is responsible for 30 percent of global warming. And you've heard from community members today on the impacts of their health and their family's health.

So I just want to thank you to all -- the staff for all your hard work and the stakeholder engagement. The proposed amendments have made significant progress in improving data rigor, temperature response, and trend monitoring of landfill data. (T_Pac Env-1)

Comment: These -- taken as a whole, these are common sense improvements and updates in this rule. The benefits outweigh the costs by almost 3 to 1. That's using conservative methodology. (T_CCA-4)

Comment: We're pleased to see ARB update the Landfill Methane Regulation. We like trying to integrate newer technologies. We're strongly supportive of efforts to reduce emissions and reduce emissions faster and especially trying to detect problems earlier in the process to prevent what happened at Chiquita Canyon. (T_RCRC-1)

Comment: I support the Methane Rule and reducing the time frames to -- for which these things need to be accomplished. (T_Burr-2)

Agency Response to Combined Comments:

No changes were made in response to these comments. CARB appreciates the comments and thanks the commenters.

A.1-2 Support; and amendments are overdue

Comment: If these rules were already updated, maybe my family wouldn't be sick, my house wouldn't be for sale, my close friend and neighbor would still live next door to me, I wouldn't be pleading with you right now to make these amendments and implement them right now. You all have the power to change this. I ask you to act now. Don't delay. We can't have anymore time delayed on this. Protect the communities that are dealing with what we're dealing with as well. (T_Howse, S.-3)

Comment: As we continue to educate community members and work with our jurisdictions to keep those green waste out of the landfill, we are here also advocating and in support of the updates for the LMR. We need to be very strict with protections for our communities. We can't wait. Our community is not going to wait to become a Chiquita -- or La Chiquita. We're not going to experience that before we come to you. We're looking to you to make sure that you increase protections to our communities and that you do not delay. A 10-year update is too long to wait. (T_VIP1-2)

Comment: I've been asking for your guys's help for a decade. So I think it's taken way too long to get here, but we're here, so I want to say thank you. And for the future, I would like to see if maybe you guys can look at topics like this much more frequently, especially with the way that advancements, how quickly they are coming now via before. (T_Stinson-1)

Comment: I was here in 2010 with Dr. Balmes and others when the original rule was approved. We knew then that it would need to be strengthened an updated. Now is the time to do that. (T_CCA-5)

Comment: We're very familiar with the history of waste, especially in California and these environmental justice communities and where things like landfills and incinerators were placed.

The last trash incinerator in California was in Stanislaus County and we are here to support communities in the San Joaquin Valley like in West Stanislaus, Crows Landing, the other communities that were near that incinerator and continue to be near the landfill.

Other communities like in the Manteca Landfill, which is actually very close to South Stockton, and in Avenal, which you heard community members speak about today, and also the others from Richmond, and Val Verde, and the other communities you heard from.

I know in the San Joaquin Valley many of these communities, they aren't just near a landfill, but they're near the 5 freeway, the 99, they're near, you know, old biomass incinerators or trash incinerators. They're near communities that are sprayed with pesticides and in the Southern Valley near oil and gas operations. And these landfills just add on to that with more particulate matter, and VOCs, and NOx, and benzene.

So these landfill regulations are obviously overdue and I'm here in support with the other community members that are in favor of strong regulations on landfill methane. (T_VIP3/CEJC-1)

Comment: (THROUGH INTERPRETER): Good morning. My name is Maria Torres. I'm here for Avenal. And I'm here really sad, because I'm looking at so many people. You are so many and you don't do anything for our community for our people. You don't have to wake up every morning with the bad smell, with the pest, with the problems that we have. You don't see our way, our kids, or future generations. I'm old. We are -- at least a lot of people that they are old, but still we need to do something. We need to -- your help to make a change.

Sometimes we call and report the bad smells in our community and somebody goes to check on it two days after. You think those smells are going to be there two days after. Please take action. Work for us. You are our voice. You are the only voice that we can have. Help our kids, the old people like me. We cannot defend ourselves sometimes. We are in beds, as my peers said.

We are waiting for somebody to go there to check, to do rules that really work. Please do everything you can for our community. Thank you. (T_Torres-1)

Comment: The need to amend these regulations has become more apparent over the years, as California drills down on our greenhouse gas reduction strategies, as better technology becomes available to aid in these goals, and as we have a greater understanding of how communities will be harmed if these issues are not addressed proactively and quickly. (T_CEV-1)

Comment: [O]n behalf of our half a million members and supporters statewide, I did want to align our recommendations with those that have been made before me by Assemblymember Schiavo, our partner organizations at CAW, VIP, Pacific Environment, and many others here today, along with the community members that made the long trip to be here and make their voices and experiences heard to support a strong LMR, for a firm review schedule to accelerate adoption of methane leak detection technologies, and to reject bogus industry cost arguments.

We have already heard enough and seen how detrimental the impacts are on front-line communities. These impacts have and will continue to be preventable. Climate damages are already costing our state billions annually. These unreported long-term public health and quality of life costs we oft -- very often don't account for, individuals will continue to pay for. We

have enough of an affordability crisis to be punting yet another preventable cost onto Californians. We need to aim higher than the national standard. I urge CARB to adopt a stronger LMR. (T_Sierra Club CA-1)

Agency Response to Combined Comments:

No changes were made in response to these comments. CARB appreciates the comments and acknowledges the requests for more frequent future updates. In Resolution 25-14, the Board directed the Executive Officer to report on an "evaluation of monitoring technologies as well as the feasibility of other alternative technologies for methane detection" by mid-2028, and to bring proposed amendments to incorporate alternative procedures for surface emissions monitoring "within 24 months of determination that these technologies can be scaled and cost-effectively integrated into monitoring of the entire landfill surface."

2. General or Wide-ranging Comments Regarding Stringency and Flexibility

A.2-1 Adopt stronger landfill methane protections generally

Comment: I would challenge CARB to require greater transparency, more stringent monitoring, and faster response times than currently proposed in this new rule. (OP_Qureshi-2)

Comment: Santa Clara Law School's International Human Rights Clinic (IHRC) supports the proposed landfill methane regulation amendments because the amended regulation will benefit communities disproportionately impacted by methane pollution from landfills, like Avenal and other overburdened environmental justice communities. More effective landfill gas control not only helps the state achieve its methane emissions reduction targets but also reduces emissions of co-pollutants like volatile organic compounds, odorous compounds, and other toxic air contaminants of concern, directly improving local air quality in nearby communities. It should also meaningfully reduce the risk of subterranean fires and associated public health harms. Given the history of ongoing violations in landfill-impacted communities like Avenal, we particularly encourage the California Air Resources Board (CARB) to strengthen the amended Landfill Methane Regulation (LMR) by eliminating exemptions and exclusions, increasing monitoring and enforcement requirements, and ensuring rapid and transparent remediation, repair, and closure when problems arise. Accordingly, we advise CARB to adopt the amended regulation with additional requirements to protect vulnerable communities, as detailed below.

Santa Clara IHRC has a number of recommendations and general comments for CARB about the amended regulation. First, IHRC recommends that CARB ensure that the amendments address the impacts of landfill methane emissions on disadvantaged and overburdened communities like Avenal. Second, CARB should amend the regulation in a manner that responds to the serious risks that landfill methane emissions pose, as demonstrated by examples like the Chiquita Canyon Landfill fire. Third, we recommend that CARB give particular weight to the voices of those impacted most by methane emissions. Fourth, we suggest CARB apply the precautionary principle in face of scientific uncertainty about emissions levels and err on the side of stronger regulation where the available technology does not yet allow for precise monitoring of methane emissions. Fifth, CARB must strengthen the LMR in a manner that is consistent with international commitments made by the United

States and California to reduce methane emissions. Sixth, we recommend CARB abide by the advisory opinions issued by the International Court of Justice and the Inter-American Court of Human Rights on climate change that countries are obliged to reduce methane pollution and have the duty to inform the public and affected communities of information regarding climate change, including methane pollution. Lastly, we re-emphasize that CARB should ensure the LMR requirements are strong enough to protect vulnerable communities affected by landfills, like Avenal, by ensuring quick and transparent remediation, repair, and closure when problems arise. (OP_IHRC-1)

Comment:

Methane Emissions Have Significant Negative Impacts on Avenal and Other Landfill-Adjacent Communities

Communities situated next to large landfills like Avenal continue to suffer due to inadequate regulation of methane emissions from landfills, and disadvantaged communities are particularly vulnerable to these harms. In Avenal, for example, the landfill has placed a weighty burden on its residents. Situated near the community's high school and residential neighborhoods, the landfill negatively affects quality of life, public health, and the ability of residents to meet basic needs and live a dignified life. Beyond residents' complaints of noxious odors that interrupt community activities like high school football games, residents also must live with the serious concerns of increased rates of asthma and other respiratory illnesses, the unknown health effects of living in proximity to decomposing dead animals and industrial sludge, and dangers posed by unaddressed subterranean fires within the landfill. Previous responses to these concerns have been inadequate.

By strengthening and enacting the proposed amendments, CARB could be helping communities address these concerns by removing exceptions to methane monitoring, control, and leak repair requirements, leveraging technology to improve the effectiveness of methane emissions monitoring and speed up response and repair times when issues arise, and improving the effectiveness of methane gas collection and control systems while strictly limiting downtime. Above all, affected communities deserve heightened protections, special attention to their concerns, and rapid and transparent communication and action in response to methane emissions issues. Communities adjacent to landfills cannot be permitted to become unlivable environmental sacrifice zones.

The subterranean fire in the now closed Chiquita Canyon Landfill demonstrates the need for a much stronger LMR. Stronger regulation, particularly through improved methane monitoring and more rapid responses to methane emissions at Chiquita Canyon Landfill may have prevented, or at least provided a timely warning of, the fire and severe air, water, and soil contamination that resulted. Similarly situated communities living adjacent to landfills, like Avenal, need CARB to act to regulate, monitor, and prevent excess methane pollution that could lead to disastrous fires and other serious environmental and health impacts.

The existing regulation has failed to adequately address the concerns of communities like Avenal. Therefore, CARB should give particular weight to the comments of communities affected by landfills in finalizing the proposed amendments to the Landfill Methane Regulation. The people most impacted by the amended regulation – those that have to live with the methane pollution and other associated emissions from landfills in their daily lives – have the most urgent insights into what needs to change. (OP_IHRC-2)

Comment: This approach takes into account the uncertainties generated by the fact that more

advanced monitoring technologies of methane emissions, including drones, are still developing and those that are widely available may not yet be able to accurately measure total methane emissions from a particular landfill over time {Footnote: *See* D. Fosco, et. al, "Progress in monitoring methane emissions from landfills using drones: an overview of the last ten years" in *Science of the Total Environment*, *1 October 2024*. "The uncertainty associated with the [Unmanned Aerial Vehicle]-based methods discussed in this paper is as broad as it is difficult to determine and compare, because each step of any method introduces a source of uncertainty and specific studies in this regard are limited." pg. 14.}. In the face of scientific uncertainty, CARB should apply the precautionary principle throughout this revised regulation. This means that even when there is scientific uncertainty about the adverse health effects of landfill emissions, CARB should enact regulations that are protective of public health {Footnote: For example, there may not yet be strong data to demonstrate the cumulative and synergistic effects of the various landfill gases, including methane, VOCs, HAPs, and criteria air pollutants, upon human health. Regulation in the face of such uncertainty must err on the side of protecting vulnerable residents.}. Therefore, for known climate pollutants like methane, the precautionary principle directs CARB to implement more stringent monitoring requirements and reduce areas of the landfill that are excluded from compliance, GCCS downtime, and other opportunities for methane emissions to go undetected and unremediated. This is also in line with California's increasingly ambitious targets to reduce GHGs in the state, as outlined in CARB's 2022 Scoping Plan. (OP_IHRC-5)

Comment: CARB's efforts to strengthen the LMR are also critical to fulfilling climate commitments made by the United States and by California, particularly given that methane is a powerful greenhouse gas and that landfills represent the second largest source of methane emissions in California. The United States is a signatory to the Global Methane Pledge, where countries have committed to working to reduce methane emissions by taking domestic action and "focusing on standards to achieve all feasible reductions in the energy and waste sectors." Additionally, California itself has gone even further by launching the Subnational Methane Action Initiative, where CARB plays an integral role in achieving these emissions reduction goals. By enacting the proposed amendments and adding the stricter requirements outlined here, CARB will be directly fulfilling its responsibilities in this regard.

In the International Court of Justice's Advisory Opinion on Climate Change, the Court stated that countries have duties under customary international law to prevent environmental harm and use due diligence as the standard for preventing such harm. This means that appropriate rules and measures must be put in place that regulate polluters and create effective enforcement and monitoring systems. Additionally, regulatory bodies must apply the precautionary principle to mitigate potential harm in the face of scientific uncertainty. CARB can contribute to California's obligations to reduce environmental harm by amending the LMR to promote effective enforcement and monitoring.

The Inter-American Court of Human Rights also stated in its Advisory Opinion on the Climate Emergency and Human Rights that governments have obligations to "eliminate [short-lived climate pollutants] as quickly as possible." Here, CARB should take this to mean that it should not delay in adopting the strongest possible LMR amendments and undertaking continued regulatory action to help eliminate short-lived pollutants like methane to the greatest extent possible. Governments also have an obligation to provide government-held information relating to the causes and impacts of climate change, including that of methane emissions, to the public and particularly to affected communities; this helps the public participate in environmental protection goals, access justice in relation to it, enables effective protection of

rights, and guides environmental and social impact assessments. (OP_IHRC-7)

Comment: Furthermore, the Inter-American Court found that governments must closely supervise and monitor public and private activities generating greenhouse gas emissions and evaluate their compliance with environmental regulations in relation to the risk they pose. To effectively do so, governments must create strong mechanisms to monitor these activities and make necessary recommendations to ensure mitigation targets are met. The government must inform the public about these targets and the strategies in place to achieve them in a timely and effective manner. CARB should implement similar risk assessments into its existing mitigation and monitoring framework and prioritize transparency to ensure Californians are adequately informed about polluting actors. (OP_IHRC-9)

Comment: Above all, CARB should ensure that the amended Landfill Methane Regulation's requirements are strong enough to protect vulnerable communities that live in proximity to municipal landfills, particularly those that accept high volumes of waste and types of waste that are likely to produce high volumes of methane emissions, like Avenal. To do this, CARB should close loopholes in the existing LMR by making it harder for landfill operators in such communities to obtain waivers or otherwise exempt portions of their operations for monitoring and gas control measures, particularly on the working face. CARB should also ensure that the process of remediation, repair, and closure due to emissions problems is quick and transparent when problems arise to ensure that landfill operators cannot ignore the health and safety of affected communities. (OP_IHRC-10)

Comment: CARB's Proposed Amendments represent a strong and necessary step forward in reducing methane emissions from California landfills. The proposed integration of remote sensing, improved working-face monitoring, earlier gas collection, and comprehensive reporting will make California a national leader in landfill oversight. To fully realize this potential, however, CARB should strengthen the rule by lowering the surface methane threshold to 200 ppmv, increasing monitoring frequency and phasing in mandatory use of advanced technologies, adding fenceline monitoring for community protection, adopting automated wellhead tuning, and ensuring easy public access to all landfill performance data. These enhancements would ensure the updated rule achieves durable, verifiable methane reductions, improves transparency, and protects the health of nearby communities while maintaining California's leadership on climate policy. (OP_RMI/EDF-29)

Comment: Lastly, this is a systemic issue and we really need to address, you know, the communities that this is affecting. And it's my hope that this Board will pass the strongest Landfill Regulation possible today to protect California communities and the climate. (T_VVCA-4)

Comment: We urge the Board to adopt the strongest possible version of this rule and move swiftly towards implementation. (T_RMI-12)

Comment: As Members of Congress committed to addressing the climate crisis and protecting the health of Californians, we urge the California Air Resources Board (CARB) to strengthen its regulations on landfill methane emissions and prioritize the wellbeing of frontline communities. While CARB's proposed rules are a step in the right direction, they can go further particularly in landfill data transparency, reducing temperature thresholds, and adoption of the best available technology.

By implementing the nation's most comprehensive methane standards, CARB can protect more than 30 million Californians living near landfills from harmful air pollution, reduce costly health impacts, and help slow the pace of global warming. (B_US Reps-1)

Comment: A recent report created by your organization highlighted the single biggest cause of methane loss, GCCS downtime. Improvement of the monitoring of GCCS systems and addressing outages in a timely fashion would seem to be a great first step. Other areas of major concern are damaged flaring systems, insufficient land fill coverage allowing methane leakage, and the size and improper management of the open face of the facility also need all to be addressed. (OP_Ronnau-1)

Agency Response to Combined Comments:

CARB thanks the commenters for their remarks. No direct changes were made to the regulation in response to these comments, because these comments speak more broadly to the need for ongoing methane reductions and community protections and do not reference specific regulatory changes.

Overall, the Proposed Amendments are expected to reduce methane emissions and deliver improved air quality and public health benefits through a number of strategies designed to reduce landfill gas emissions and allow for more effective oversight and greater data transparency. The proposal reflects the latest research and technology advancements and addresses gaps identified through implementation and enforcement experience by CARB and air district staff.

As part of regulatory implementation, CARB and local air districts will continue to oversee compliance and enforce the Regulation, and the improved reporting requirements will help identify potential compliance issues more quickly and improve information accessibility to the public and affected communities. For more information on these topics, see CARB's responses to comments in section IV.M.

Where these commenters provided specific recommendations, those are responded to elsewhere in this chapter of the FSOR.

A.2-2 Provide flexibility, revise regulatory approach, and focus on compliance efforts

Comment: While we support many of the proposals included in the regulatory package, we believe a number of revisions are required to make it implementable, avoid unnecessary burdens, and provide the flexibility that public facility owners/operators need. (OP_RCRC-1)

Comment: Our coalition is concerned that the proposed revisions may place landfills in a situation of perpetual non-compliance. This would not occur due to a lack of good faith effort on the part of landfill owners and operators. However, it may occur as a result of regulatory and market infrastructure not existing to support the level of prescriptiveness and immediacy proposed. This is not a suitable outcome for landfill operators or the greater solid waste system that relies on these facilities to manage California's waste. (OP_Ind/Gov Coalition-6)

Comment: The proposed amendments to the LMR are extensive, expensive, and in many instances, may be ineffective in further reducing methane. The efforts to amend the LMR should focus on general clean-up and establishing requirements on landfills and practices that have been found to be generating excess methane emissions beyond what was original

envisioned in the original LMR. In many cases, these are the “bad actor” landfills. (OP_SWANA-3)

Comment:

Focus of the Proposed Amendments to the LMR

As currently proposed to be written, the updated LMR attempts to enhance efforts established in the original, as well as adding a remote sensing component to the regulation. However, CARB’s focus should be to identify practical and cost-effective strategies for further reducing methane emissions from landfills in achieving its short-lived climate pollutant methane reduction goals. The original LMR’s goal was a reduction of 1.5 MTCO2E over a 10-year period, which we believe has been achieved. The LTF believes that most efforts to reduce methane in the waste sector should be focused on organics diversion from landfills through SB 1383. The efforts of the current proposal to amend the LMR should be general clean-up and requirements on landfills and practices that have been found to be generating excess methane emissions beyond what was envisioned in the original LMR. This was demonstrated by CARB, working with NASA’s Jet Propulsion Laboratory (JPL), in its remote sensing program. The remote monitoring effort examined 436 landfills with only 30 large landfills showing methane plumes, and the remaining 406 landfills were operating in compliance with the original LMR requirements. As such, we question the appropriateness of imposing enhanced LMR regulations on the remaining 406 landfills. Our comments address areas of the amended LMR that we believe can be modified to address landfills that may be considered “bad actors”. (OP_SWANA-11)

Comment:

Prescriptive Standards Do Not Always Yield Optimal Results

Sections affected: §95464(c)(2), §95464(e)(3), §95469(f), §95469(g)

While ReGen recognizes the importance of uniform standards, certain situations would be better served by performance-based standards that allow operators to apply site-specific expertise rather than one-size-fits-all prescriptive requirements. (OP_ReGen-2)

Comment: ReGen respectfully requests that CARB consider these comments to ensure the amended LMR achieves its environmental objectives while remaining technically feasible, cost-effective, and operationally safe for California's landfill operators. ReGen fully supports emission reduction strategies and continues working actively toward that end.

The proposed changes to the LMR are increasingly restrictive and cover a wide range of operational topics. As an operator with decades of experience, ReGen requests that these regulations receive further consideration and, at minimum, that a phased implementation approach be adopted to transition the industry into these new requirements in a manageable way. The burden to comply with prescriptive umbrella solutions, compressed timelines, and costly monitoring and data analytics requirements will ultimately be passed to the public who pays for waste disposal services. We welcome continued collaboration with CARB staff to refine implementation details and support California's leadership in methane mitigation while ensuring regulations remain achievable in practice. (OP_ReGen-20)

Comment: The County generally prefers this type of regulation to be goal and standard driven, rather than proscriptive requirement driven. Another County preference in regulation is a

general ability for an alternative compliance program. While this does place additional burden on the regulatory agencies to review alternative requests, the site-specific nature of landfills warrants a general ability to propose a program that meets the goals of the regulation, while maybe not each of the proscriptive specifics. (OP_YoloCo-3)

Comment: While L and D is supportive of these goals, they need to be achieved in a manner that allows us to safely and efficiently manage the changes without undo economic and operational hardships. L and D is a small, privately held facility which is approaching the end of its site life. Many of the proposed changes will pose significant challenges to achieve under end of life site closure and post closure economic limitations. (OP_L and D-0)

Comment: I want to thank staff and all of you for your hard work on the LMR update, a very complicated topic and has involved many stakeholders. We believe that updating the LMR at this time is appropriate to incorporate current technologies and finding of remote imagery, gather more predictive and meaningful data, incorporate more immediacy into the response to changes in key metrics, and provide host communities with greater transparency.

However, these goals need to be achieved with the following in mind. The facilities need to be operated in a safe and efficient manner. There needs to be focus on efficient collection of meaningful and significant data. The corrective action measures need to be targeted along with the mitigation measures. And we need to avoid unintended consequences of unidimensional mitigation measures. There certainly needs to be attention to cost of implementation and impacts on race. (T_RS-1)

Comment: We support the intent of the LMR and regulatory changes to make the program more effective and efficient. With this in mind, we believe the goals of the LMR are best served through fair, workable regulations that consider the operational intricacies and significant costs faced by entities operating in this sector. CARB should view the efforts undertaken by individual landfills in totality and avoid a one-size-fits-all approach for landfills. (OP_Recology-1)

Comment: The SDAPCD remains committed to supporting California's climate goals and further reducing methane emissions. We recognize the importance of strengthening the Landfill Methane Regulation; however, successful implementation will depend on practical timelines, proven technologies, and sufficient local resources. We respectfully request that CARB consider these factors and incorporate these considerations before finalizing the rule, including allowing additional time for public review and input. (OP_SDAPCD-4)

Comment: As all compliance requirements also correspond with an increase in coordination, reporting, and record-keeping, the likelihood of meeting all of the requirements becomes exponentially more difficult to obtain. Additionally, as an industry already struggling to find, train, and retain qualified staff, multiplying the burden also will lead to inability to perform. (OP_SacCo-24)

Comment: Our comments are intended to:

- Support sensible, durable regulation that reliably reduces methane emissions.
- Enable cost-optimized compliance, particularly through the responsible use of automation and remote monitoring where it is safe and appropriate.
- Avoid regulatory loopholes and method-shopping, ensuring all approved monitoring methods produce high-quality, auditable, and reproducible data.

- Reduce downside risk by tightening certain provisions in the draft rule to maintain alignment with federal SIP requirements and prevent weakening of detection effectiveness over time.

We believe the LMR has the potential to substantially reduce emissions while lowering operator burden through modern monitoring technologies, provided that regulatory guardrails are clearly defined at adoption — not after unintended consequences emerge. (OP_Sniffer-1)

Agency Response to Combined Comments:

CARB made changes in response to the comments. In the 15-Day Changes, staff proposed modifications to several provisions intended to improve flexibility and aid in maintaining compliance with regulatory requirements, while also maintaining timely action by operators to protect public health and minimize emissions. These commenters also request CARB target regulatory requirements to areas of biggest concern and avoid one-size-fits all approaches. Staff notes that many of the changes in the Proposed Amendments do target landfills or areas of landfills where measurable performance issues are detected and areas where research and implementation experience indicate potential for excess emissions. Consistent with the current Regulation, the Proposed Amendments specify performance standards and provide the owner or operator flexibility in how they meet those standards.

For additional details on how the regulatory proposal is targeted towards areas of largest concerns and the performance-based approach to compliance included in the current Regulation and Proposed Amendments, refer to the ISOR, chapter III., purpose and rationale for sections 95469(a), 95469(a)(4), 95469(b), 95469(e), and 95464(b)(1)(A); ISOR section IX.D; and item 16 in the 15-Day Notice "Summary of Proposed Modifications."

See agency response in section IV.L.1-1 for further information on pass-through compliance costs. See agency responses in sections IV.C.5-9, IV.C.5-11, IV.C.6-7, and IV.C.6-12 for further information about alternative monitoring technologies.

B. Remotely-Detected Methane Emission Plumes

1. Technology Approval Criteria

B.1-1 Request changes to technology approval criteria

Comment: Use of satellite detections should be limited to a find-and-fix program that sets forth technology standards and corrective action timeframes that ensure that detections are accurate and addressable.

WM agrees with CARB on limiting application of satellite detections to high level screening for potential landfill emissions given the current accuracy and reliability of its detection capabilities. Use of satellite data for leak detection purposes is directionally acceptable, but we encourage CARB to re-consider the field validation and reporting requirements and timelines. The Draft Regulation should strengthen the entrance criteria for remote sensing technology under 95469(b) to ensure that emissions detections are accurate. The barrier is low in the proposed rules; only spatial resolution, data availability and plume visualization are considered. The technology should have proven point of detection for landfill application of 90% or better based

on participation in a controlled release study for use as a regulatory compliance requirement. We understand CARB has conducted its own studies and WM participates in CARB's voluntary "find and fix" landfill program. We encourage CARB to work with industry stakeholders on a reasonable and workable solution as we transition from a voluntary program to incorporating remote sensing in the LMR. (OP_WM-45)

Comment:

Remote Monitoring Technology Providers – Criteria for Program Entry

CARB must also increase the stringency of capabilities required of remote sensing technologies. While Section 95469(b)(1)(A) would require (1) spatial resolution of at least 30x30 meters; (2) transmission of data to CARB within 72 hours of detection; and (3) the ability to create a visualization of the plume, these requirements are not enough. CARB should instead require the following in order for a technology to be approved:

- Ability to provide latitude and longitude coordinates where emissions appear to be originating from.
- Ability to identify and localize methane emissions that originate from a specific location or area at an MSW landfill.
- Demonstrated past performance of methane emissions detection from MSW landfills with accessible data in the public domain.
- Ability to quantify methane emission rates and their uncertainties using established methodologies and publicly available quality assurance and quality control protocols.
- Ability to detect methane emissions without physical access to the MSW landfill.
- Evaluation of the accuracy and performance of a technology through controlled release testing at an MSW landfill. (OP_WM-54)

Comment: We appreciate the CARB's inclusion of more specific considerations they will take into account when approving third party remote sensing technologies. Data validation is essential to ensure scientific rigor and avoid false detections, however we do have some concerns around the language included in § 95469.

We recommend amending the language to allow for additional forms of validation beyond the current prescribed criteria. While the listed requirements for remote monitoring technology—spatial resolution, data availability, and visualization of plumes—are all important, we recommend that the validation requirements be expanded to better balance both rigor and flexibility. Given the evolving nature of emissions detection technologies and validation methodologies, it is critical that approvals also focus on whether a technology has demonstrated sufficient validation and capability to detect and attribute methane emissions under this rule.

For example, inter-comparison with methodologically different monitoring technologies, and demonstrated previous use in a tiered approach where follow-up investigation was able to verify emissions detected by point source imagers can be another valuable validation tool. For airborne monitoring, Carbon Mapper compared hyperspectral imaging to other methods and for satellites, we utilized aircraft under flights using the same instrument but at a lower elevation. Both of these were provided as evidence of validation in applications to EPA's Super Emitter Program, and are well suited to demonstrating validation for the purposes of this regulation.

That being said, these are just a couple of ways one can approach data validation and it is important not to limit validation avenues to a prescribed set of approaches. Given the ever-changing nature of emissions detection technologies and data validation methods, the goal should not be to issue standards for approval, but rather outline opportunities to demonstrate that validation has occurred and that the technology is capable of fulfilling its intended purpose under this specific rule. (OP_Carbon Mapper-2)

Agency Response to Combined Comments:

CARB made changes in response to the comments. In the 15-Day Changes, the definition of "remote monitoring data" was changed to include that the data must be collected "without physical access to a facility." No other changes were made in response to these comments. The proposed requirements—spatial resolution of at least 30x30 meters, transmission of data within 72 hours, and visualization of the plume—ensure technologies provide actionable data for timely follow-up and mitigation.

B.1-2 General concern about setting technology approval criteria

Comment:

Section 95469(b) - Remotely Detected Emission Plumes

CARB appropriately recognizes the limitations of satellite technology for detecting emissions. The use of satellite technology for high level screening of potential emissions is generally acceptable. However, given the complexity and uncertainty inherent in characterizing landfill emissions, CARB should re-evaluate the proposed validation, remediation and reporting requirements. Also, technology will continue to advance over time so establishing hard criteria for acceptable technology and investigation in the rule today will likely render these methods obsolete and no longer appropriate over time. (OP_Ind/Gov Coalition-14)

Agency Response:

No changes were made in response to this comment. Staff agrees with the commenter that technology will likely continue to advance, and therefore established the criteria in section 95469(b)(1)(A) as minimum qualifications that ensure detection capability and data quality while allowing for innovation.

For more information on the proposed validation, remediation, and reporting requirements, see agency responses in section IV.B.3.

B.1-3 Define "methane emission plume"

Comment:

§95469(b)(1) – Remotely Detected Emissions Plumes
TrelliSense recommends defining what constitutes a "methane emission plume", either in terms of ppmv observed or kg/hr estimated. Defining this threshold will help guide operators towards meeting such a standard and avoiding violations. (OP_TrelliSense-9)

Agency Response:

No changes were made in response to this comment. Methane plume concentrations can be affected by wind speed, wind direction, topography, and other nearby sources of

methane. As such, the determination of whether a plume is present in remote detection data is not based solely on a concentration metric, rather it is based on expert review of all the remote sensing data. Receiving a remote methane plume detection notification is not a violation; please refer to the agency response in section IV.B.4-3 for more information.

2. Notification Requirements

B.2-1 Data receipt and notification timelines

Comment: CARB proposes to send notification of the detection to operators within seven business days of CARB's receipt. However, CARB does not require certified remote technology vendors to notify CARB of a detection within any timeframe. Operators must be notified as soon as possible of a detection and be given sufficient time to investigate and correct leaks, as needed. This lack of timeframe may render operators unable to fix, or even detect, the relevant emissions. By the time the operator receives the notice, the emissions event may have ended. Even hours after a monitoring campaign is complete, there may be no evidence of an emissions release through the cover in the detected area. This proposed framework is likely to result in significant wasted time and effort with no environmental benefit. CARB should be notified within one business day of a detection, and CARB should then provide notice to the operator within one business day, in order to facilitate operators' meaningful investigation. (OP_WM-51)

Agency Response:

No changes were made in response to this comment. CARB staff agrees that timely notification of remotely detected plumes is important for addressing methane leaks. As, such the Proposed Amendments require any technology used for section 95469(b) to be able to provide remote monitoring data to CARB within 72 hours of collection, and for CARB to send any notifications within seven business days of receiving the data. The seven business day regulatory timelines for CARB to send notifications are an upper bound and may be shorter as CARB implements the Proposed Amendments.

B.2-2 Do not rely on email for plume notifications

Comment:

Notification Method for Remotely Detected Plumes Is Inadequate and Must Be Supplemented with Traditional Notice

Section 95469(b) inappropriately allows the Executive Officer to notify an owner/operator of a remotely detected methane emission plume by e-mail, which will trigger response and remedial actions.

To be clear, RCRC does not dispute expanding the LMR to integrate remote plume monitoring or requiring response and remedial actions when those exceedances are verified by the system owner/operator. RCRC appreciates and supports the utilization of newer technology to better identify and focus response and remedial actions. That being said, RCRC strongly objects to the method of notification in the proposed regulations.

An e-mailed notification does not provide sufficient notice, standing alone, to require owners/operators to perform expedited monitoring and mitigation. While e-mail notification may

be helpful to prompt quick action, an e-mailed notice cannot and should not trigger a requirement to perform surface emissions and component leak monitoring within five days of receiving the e-mail. Local governments have high staff turnover and are often subject to electronic attacks. There is an unacceptably high risk that an official email from ARB would either go to an old e-mail, be caught in a spam filter, or otherwise go unnoticed. These risks are unique to e-mail notifications and are easily avoided with official mailed notifications. To provide adequate notice, the Executive Officer's e-mail must be sent in conjunction with an official mailed notice of the detection and instructions for required follow-up monitoring and remediation.

RCRC urges ARB to modify the proposed regulations to provide owners/operators at least 14 calendar days after an official notice is mailed to perform any required monitoring and remedial actions. An e-mail may be helpful to provide early notice so the facility can expedite monitoring and remediation, but must be supplemented by an official, mailed notice. (OP_RCRC-13)

Comment: Section 95469 (b)(1)(B): It is proposed to notify a landfill operator of a remotely detected emission plume by an email address supplied in required reports. If a person with that email address is no longer employed, or for other reasons the email does not reach the appropriate individuals, the landfill operator can be found out of compliance. It is recommended that additional means, such as phone or mailing address be utilized. (OP_SWANA-30)

Agency Response to Combined Comments:

No changes were made in response to these comments. CARB has successfully used email as the notification method for other programs with successful response rates. CARB's plume notification program allows operators to designate multiple email addresses for plume notifications, including shared inboxes. It is up to each landfill operator to ensure that information is current.

B.2-3 Build out more program details and escalation steps

Comment: RMI and EDF applaud CARB's proposed adoption of a super-emitter response program requiring inspection and repair of remotely-detected plumes. CARB's proposal takes advantage of readily available remote sensing observations to address large methane plumes that were often missed and unaddressed with quarterly monitoring.

The technology is proven, and this model is already delivering emissions reductions in California and other states. Aerial remote sensing instruments have surveyed more than 300 landfills across the United States to date and identified large methane emissions sources at over 200 of these sites. Overflights conducted by Carbon Mapper in coordination with the California Air Resources Board and the Pennsylvania Department of Environmental Protection (DEP) found large methane releases, often referred to as super-emitters, at multiple landfills. Operators were alerted and took voluntary actions that resulted in successful emissions reductions.

We strongly support CARB's proposal to make investigation and mitigation of large methane plumes mandatory instead of voluntary. However, we encourage CARB to build out programmatic details and operational timelines to include more escalation steps and notification systems, as found in the oil and gas sector. A strong remotely-detected plume response system should feature publicly available data and include notification requirements

for relevant local air quality management districts and local enforcement agencies. Including air districts and local education agencies in the notification process will enhance transparency, improve response times, and facilitate a unified approach to addressing emissions that may have regional and community impacts. (OP_RMI/EDF-13)

Agency Response:

No changes were made in response to this comment. CARB appreciates the support for the regulatory modifications and agrees that timely action on remotely detected plumes is important for addressing methane leaks. We also agree that local air districts are key regulatory and enforcement partners in successfully addressing landfill methane emissions. CARB has been investing in automated systems to support staff's plume analysis as well as timely operator and air district notifications of remotely detected plumes. We expect these systems will aid CARB and local air district regulatory implementation and will also support public transparency on remotely detected plumes.

For more information on publicly available plume information, refer to the agency response in section IV.M.1-1.

3. Owner/Operator Monitoring and Reporting Requirements

B.3-1 Allow additional time for monitoring

Comment: The rule should include provisions for requesting additional time to complete the investigation due to weather conditions, labor availability and access to dangerous areas. (OP_Ind/Gov Coalition-18)

Comment: The timeline for completing the remote sensing field validation in 95469(b)(2)(A) should be extended from the proposed 5 days to at least 30 days and the re-monitoring requirement should be removed to instead rely on the routine quarterly SEM and leak component checks. (OP_Ind/Gov Coalition-16)

Comment: We find that the stipulated response time for corrective actions may not adequately consider challenges such as site access limitations or contractor availability. (OP_Recology-13)

Comment: We request additional time to initiate corrective actions after receiving a notification. The timeline for completing the remote sensing field validation should be extended from the proposed 5 days to at least 20 days and the re-monitoring requirement should be removed to instead rely on the routine quarterly SEM and leak component checks. (OP_Recology-15)

Comment:

§95469(b)(2)(A) – 5-Day Plume Monitoring Requirement

This section requires operators to perform plume area monitoring within 5 days of receipt. Meeting this requirement will create competition among landfills for limited consultant monitoring services, potentially making timely compliance impossible. Visual inspection of the area with monitoring during the next scheduled SEM event would be more feasible given the other accelerated schedules proposed in this regulation. As noted previously, field technician

and consultant monitoring teams are limited in California and may not be available on demand. (OP_ReGen-12)

Comment: CARB should consider limitations to investigate detections that are outside of operators' control, including weather conditions, labor availability, and unsafe areas. (OP_WM-53)

Comment:

- Section: 95469(b)(2)(A) – Time limit to perform SEM after remote monitoring plume notification
- Current: Take actions within 5 calendar days
- Proposed: Take actions within 10 calendar days
- Rationale: Align with other monitoring methods. (OP_WM-7)

Comment: CARB should also revise the timeline for operators to complete the remote sensing field validation in 95469(b)(2)(A) from 5 days to at least 30 days and remove the re-monitoring requirement to instead rely on the routine quarterly SEM and leak component checks. CARB should also consolidate the remote sensing reporting under Section 95470 (b)(7) with quarterly reporting under Section 95470(b)(4) to streamline the reporting process without limiting the data submitted. This would also allow sites more reasonable time to investigate and remediate, where applicable, without distraction of multiple monitoring and reporting steps and timelines. (OP_WM-52)

Comment:

- Section: 95470(b)(7)(A-B)
- Current: Specified actions within 8 days of notification and 5 days of re-monitoring.
- Proposed: Consolidate all reporting in a 30 day report.
- Rationale: Timelines are too tight and will distract from corrective actions. Allow for summary of actions taken within 30 calendar days. (OP_WM-17)

Comment: We also recommend CARB consolidate the remote sensing reporting in 95470 (b)(7) with quarterly reporting per 95470(b)(4). This allows sites more reasonable time to investigate and remediate, where applicable without distraction of multiple monitoring and reporting steps and timelines. (OP_Ind/Gov Coalition-17)

Agency Response to Combined Comments:

CARB made changes in response to the comments. In the 15-Day Changes, CARB extended the timeline to perform surface emissions and component leak monitoring in response to a remotely-detected plume notification from 5 days to 10 days, and extended the timeline to report the outcomes of monitoring in response to a remote plume detection from 10 days to 15 days after the notification. Regarding unsafe areas, under section 95469(b)(1)(A), owners or operators are allowed to use the screening procedures for unsafe-to-walk areas and can exclude the working face for up to 180 days after waste placement so long as filling and compacting operations are ongoing.

No changes were made regarding re-monitoring requirements. Re-monitoring is necessary to confirm the corrective action was effective.

B.3-2 Reduce monitoring response area

Comment: Due to the extent of monitoring required for each remote sensing investigation and likely reliance on third party vendor availability to conduct the monitoring, CARB should limit the area of investigation consistent with industry experience during the voluntary remote sensing campaign. Typically, the site can locate the source of the emissions within a short distance from the plume coordinates and should not be required for all observations to monitor over 8 acres of surface area (600 x 600 feet). (OP_Ind/Gov Coalition-15)

Comment:

- Section: 95469(b)(2)(A)(1) – Plume detection monitoring area
- Current: Monitor 600ftx600ft square centered on plume origin
- Proposed: Monitor 50ftx50ft square centered on plume origin
- Rationale: Proposed 600ftx600ft monitoring area is 8.26 acres (roughly eight football fields). (OP_WM-8)

Comment: The proposed 600-foot by 600-foot (roughly 8.3 acres) field validation area and timeline to respond to the agency for each observation is excessive, especially when the site is required to follow 25-foot spacing for SEM and also perform component leak monitoring.

Where an exceedance of the SEM and/or component leak threshold is monitored, then the site must initiate corrective action and re-monitor within 10 days. The timing of implementing and completing corrective actions under the existing regulatory schemes is already variable and complex—to add another layer monitoring and multiple tiers of reporting as it relates to these types of events would further delay response efforts and should therefore be carefully contemplated.

Due to the extent of monitoring required for each remote sensing investigation, and likely reliance on third party vendor availability to conduct the initial and/or follow-up monitoring, CARB should limit the area of investigation to no more than 100-meter radius. (OP_WM-50)

Comment:

Section 95469(b) – Remotely Detected Emission Plumes

The proposed rule introduces new obligations for owners and operators when a methane emission plume is detected. Historically, CARB encouraged landfills to perform these assessments on a voluntary basis. While the inclusion of this requirement is understandable, the area of investigation is too broad and there are no exceptions for unsafe-to-walk areas. (OP_Recology-12)

Agency Response to Combined Comments:

No changes were made in response to these comments. The monitoring area was chosen to account for both pixel resolution as well as pixel geolocation accuracy. Staff proposed the 600-foot by 600-foot (ft) monitoring area dimensions based on review of satellite plume images from California landfills to constrain the monitoring to areas where plumes could reasonably originate in most plume images based on the maximum 30-meter by 30-meter (or approximately 98-ft by 98-ft) pixel size. The 600-ft x 600-ft monitoring area is similar to the area that must be investigated for remote methane

plume detections under the Oil and Gas Methane Regulation.[2] Staff's experience interpreting imagery from airplane-mounted instruments reveals that the source location is not always constrained to a single pixel. There may be multiple adjacent pixels with similar concentrations, depending on the source location and factors such as wind speed and direction. The estimated plume origin should therefore not be treated as the precise location of the emission source.

The Proposed Amendments allow operators to utilize the monitoring procedures in section 95471(d) in unsafe-to-walk areas and to exclude the working face area while filling and compacting operations are ongoing for the first 180 days after waste placement, as stated in sections 95469(b)(2)(A)2. and 1., respectively.

B.3-3 Exclude working face from monitoring response area

Comment:

§95471(c)(1)(A) – Monitoring Area
TrelliSense supports the 180-day exclusion for working face monitoring, but suggests assuring landfill operators that these grid cells will not be subject to remote plume detection violations during this grace period. This will require the use of remote detection technologies that are proven capable of distinguishing between 50,000-square-foot-grids. (OP_TrelliSense-11)

Agency Response

No changes were made in response to this comment. The Proposed Amendments provide for the exclusion of the working face from monitoring conducted in response to a plume notification during the initial 180 days of filling, as stated in section 95469(b)(2)(A)1. Receiving a remote plume notification is not a violation; please refer to the agency response in section IV.B.4-3 for more information.

B.3-4 Exclude unsafe-to-walk areas from monitoring response area

Comment:

We request CARB limit the area of investigation and provide an allowance for unsafe walking areas, which would allow flexibility for operators to investigate in a way that is consistent with industry experience and ensures employee safety. (OP_Recology-14)

Comment: The draft rule adds a completely new requirement for Remotely Detected Emission Plumes (Sections 95469(b)(2)-(4)). Previously, CARB had been requesting that landfills conduct this assessment on a voluntary basis. The new rule would make this a requirement. In general, we find this condition acceptable; however, we would request an allowance, as described above, for unsafe to walk areas, which would allow flexibility if the area in question from the remote monitoring data is also in an unsafe to walk area. (OP_L and D-37)

Agency Response to Combined Comments:

No changes were made in response to these comments. The Proposed Amendments allow the use of the surface emissions screening procedures for unsafe-to-walk areas

[2] Title 17, California Code of Regulations, *§ 95669.1. Remotely Detected Emission Plumes.*

(in section 95471(d)) when responding to a remotely-detected plume notification, as stated in section 95469(b)(2)(A)2.

B.3-5 Limit monitoring to the permitted waste footprint

Comment:

§ 95469(b)(2)(A) – Monitoring Area for Remote Sensing Follow-Up

Issue:

The required 600 ft × 600 ft follow-up monitoring area is not currently constrained to the permitted waste footprint. Surface Emission Monitoring (SEM) is a method for detecting cover failures and GCCS deficiencies on landfill surfaces. Outside of the waste footprint, methane occurrences are governed by 27 CCR §20921 and perimeter probe requirements, not SEM. Requiring SEM outside the waste footprint would not produce actionable repair targets, would confuse enforcement responsibilities, and would create inconsistencies with existing methane migration controls.

Recommendation:

Clarify the remote-sensing follow-up SEM area is limited to the permitted waste footprint, with subsurface methane migration outside that footprint addressed under the existing perimeter monitoring program.

Suggested Regulatory Language:

(modify § 95469(b)(2)(A))

"…centered on the coordinates provided by CARB as the estimated plume origin, limited to the permitted waste footprint." (OP_Sniffer-6)

Agency Response

No changes were made in response to this comment. The Proposed Amendments define the landfill surface as the area of the landfill under which decomposable solid waste has been placed. Further, section 95469(b)(2)(A)1. specifies that the area to be monitored in response to a remotely detected plume notification excludes areas described in section 95471(c)(1), which in turn states that the monitoring area does not include "areas of undisturbed native soil where no waste has been disposed."

B.3-6 Limit components subject to leak monitoring

Comment:

- Section: 95469(b)(2)(A)(3) – Component leak monitoring
- Current: Component leak monitoring whether components expected to be under positive or negative pressure
- Proposed: Negative pressure only (OP_WM-9)

Agency Response:

No changes were made in response to this comment. Staff interprets that the commenter intended to propose monitoring components under *positive* pressure only,

consistent with the quarterly component leak monitoring requirement in both the current regulation section 95469(b)(3) and the Proposed Amendments section 95469(c).

CARB staff described the reasoning for monitoring all components in the ISOR (pp. 53-54) as quoted below in italics, and the commenter has not provided any further reasoning for their request.

> *Monitoring all components, rather than just those under positive pressure, is appropriate because the remote plume detection represents a strong likelihood that a component emission source is present. Leaks have been detected from components during compliance inspections in portions of the GCCS that would not be expected to be at positive pressure, so staff has reason to believe that these are potential leak sources.*

Please note that a disconnected gas collection well, and any component that has the capability to store gas and which is not under vacuum, is a component containing landfill gas under positive pressure.

B.3-7 Keep remotely detected emission plume program voluntary

Comment: The draft rule adds a completely new requirement for Remotely Detected Emission Plumes (Sections 95469(b)(2)-(4)). Previously, CARB had been requesting that landfills conduct this assessment on a voluntary basis. The new rule would make this a requirement. In general, we request that this remains a voluntary task. (OP_OPAL Fuels-11)

Agency Response:

No changes were made in response to this comment. Notifying landfill operators of remotely detected methane plume has demonstrated significant utility in finding and fixing methane leaks.[3] However, not all operators that receive notifications for voluntary action respond to CARB, and the actions taken by operators to investigate remote plume detections vary significantly. Adding a regulatory requirement to respond to remote plume detection notifications ensures that all operators have a duty to respond, and sets clear, consistent, and enforceable requirements for how to conduct monitoring, what information to report, and how quickly actions must occur.

B.3-8 Recognize that leaks will not always be located

Comment: In promulgating a remote detection program that is practicable and feasible, CARB must recognize the complexity of accurately and reliably identifying actionable emissions from MSW landfills. Many of these challenges including differences from oil and gas facilities are outlined in WM's comments on EPA's Request for Information (2024).

In summary, landfill gas is highly variable in its generation rate and characteristics, depending on the operational phase of the landfill. This is exacerbated by the fact that construction is nearly constant during the course of a landfill's existence. To provide uninterrupted essential

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[3] CARB. (2024, April). *Summary Report of the 2020, 2021, and 2023 Airborne Methane Plume Mapping Studies*. *https://ww2.arb.ca.gov/sites/default/files/2024-04/2020-2021-2023%20Airborne%20Summary%20Report_FINAL.pdf*.

public services, new cells must be built to accommodate expected waste, while existing cells must be filled, and older cells must be closed. As a result, topography is constantly changing, rendering the circumstances under which landfill gas may be released or escape at MSW landfills likewise variable and complex. Unlike oil and gas facilities, topographic challenges may create above-the-surface fugitive gas migration features that are not well understood or identified via remote satellite measurement, and may not necessarily reflect acute operational releases. Unlike a leak at an oil and gas facility, the possible sources of methane at a landfill are difficult to pinpoint with accuracy, and are affected greatly by diurnal and atmospheric factors, which limits the ability to "find and fix" such emissions on a contemporaneous basis.

Accordingly, given that landfill emissions can be highly complex and variable in site-specific weather conditions and topography, detection location and magnitude can be equally complex and uncertain. In WM's experience with remote sensing over past several years, we cannot always accurately pinpoint or even locate the source of the plume detection. Where a leak cannot be validated, there will be no corrective action deployable and this should be an acceptable compliant response to the agency. (OP_WM-46)

Agency Response:

No changes were made in response to this comment. CARB recognizes that plumes may be caused by short-term operational activities and some methane sources may be intermittent. The provisions in section 95469(b) of the Proposed Amendments are designed to ensure an adequate process of investigation and reporting is conducted, even though not all methane plume notifications will result in the owner or operator identifying the source of the emissions. If no surface methane exceedances or component leaks are located, no corrective actions are required.

B.3-9 Add more data to reporting requirements

Comment: Based on our experience in the field, providing landfill operators with clear, actionable data - and requesting contextual information in return - is essential to effectively interpret and follow up on landfill methane emissions events. Unlike acute infrastructure leaks like those seen in the oil and gas sector, landfills can have complex and multi-source emissions which can change in time, so additional information about site activities at the time of observation help contextualize monitoring data.

To improve interpretation and foster collaboration with landfill operators, we recommend CARB amend § 95469 to specifically collect the following information from landfill operators when responding to a detected plume

- In order to assess if potential sources detected by remote monitoring were also found in the most recent regulatory required monitoring survey, we recommend the operator report whether or not the SEM survey path previously covered the detect location, within a distance specified by CARB that accounts for geolocation accuracy of the instrument, and if so, report the methane concentrations found.
- We also recommend that the operator should note if wind speed and direction were similar (within uncertainties of wind measurement) or different between the day of the remote monitoring detect and the last regulatory required monitoring survey. If the operator has wind speed data available for the day of the remote detect, they should provide this information per the existing language.

- The current language requests that operators provide “a brief description of any activities that may have contributed to the plume” without any additional guidance on how close an activity has to be to be considered the cause of an emissions event. We recommend CARB clarify this reporting requirement, specifying guidelines for when to consider an activity to have contributed to a plume (e.g., how far away from the detect can the activity be).
- We recommend collection of data on the historical context of a plume detection when available. This would include any monitoring that detected leaks or methane emissions in the area previously, and if so, when those emissions occurred and what was the believed cause at the time. This would also include contextual information on operations in the area of the detection like new waste placement, construction or maintenance, or challenges with gas collection in the area. If the identified operations are temporary events, the expected end date of the event should be shared.
- Additional operational data that may assist in determining the cause of emissions (such as equipment maintenance schedules, wellhead pressure trends or gas flow rates, etc)

Collecting ample operational information will help CARB and facility operators in connecting emissions to cause. Creating inroads for operators to contribute valuable, site-specific information ensures that emissions detections lead to more productive discussions, clarify whether an emissions event constitutes a meaningful exceedance, and inform targeted mitigation and best practices. (OP_Carbon Mapper-3)

Agency Response:

No changes were made in response to this comment. CARB agrees that contextual information is useful for better understanding the sources of remotely-detected emission plumes and for designing more effective technology and policy to reduce such sources. Staff expects that sufficient information and operational data will be available through other reporting (including quarterly monitoring data reports, annual reports, and other notifications and requests) to provide historical context. This contextual information is useful for research insights and potentially informing future policy design, but it is not needed immediately to understand what the emission source may be, that the notification was appropriately responded to, or that the emission source was addressed.

Reporting the previous SEM pathway is already required in quarterly monitoring data reports. Wind speed and direction are required to be recorded on-site while SEM is performed. However, requiring the operator to report the wind speed and direction during a remote plume detection would require the operator to monitor that continuously, as operators are not aware of when observations are being made by a remote instrument.

The requirement to report on activities that may have contributed to the plume is not spatially-bounded because the nature of the activity, shape of plume, size of potential methane release, and other site-specific factors could affect how likely it is that any activity may have contributed to the plume.

B.3-10 Make plume investigation requirements less specific

Comment:

{CARB staff note: Commenter quoted 45-Day Changes text of section 95469(b).}

In section (2)(A) the requirement should be changed to investigate the plume source, which may include surface emissions monitoring, component monitoring, cover assessment or other activities. The required area of investigation required in (2)(A)(1) is very large. Based on results that we have received from these remote reports, the reports are not specific enough to warrant the prescriptive investigation identified here. (OP_YoloCo-22)

Agency Response:

No changes were made in response to this comment. The monitoring area is appropriately-sized considering the maximum pixel resolution of technologies that can be used, geolocation accuracy, and other sources of uncertainty about the estimated plume origin. Per the Proposed Amendments section 95469(b)(1)(B), notifications contain specific information including the plume image, date and time, and estimated origin point that sets the center of the monitoring area.

4. Other Remotely-Detected Methane Emission Plume Comments

B.4-1 General support

Comment:

Remotely Detected Emission Plumes - § 95469(b)

We strongly support CARB's inclusion of a notification and response framework for remotely detected emission plumes. This framework, (hereinafter referred to as the Super Emitter Response Program or SERP) is an important shift from voluntary response to super emitter events to mandatory follow-up and mitigation. The requirement for controlled landfill operators to conduct follow-up surface emissions monitoring (SEM) and component leak inspections within 5 calendar days of CARB notification and reporting within 8 days on findings and mitigation actions is a valuable mechanism that will help ensure prompt corrective action when large plumes are detected. (OP_CAW-12)

Comment: We urge the Board to maintain the following: the requirement to inspect and repair remotely detected plumes. (T_RMI-2)

Comment: So, you know, we -- more than that, I think CARB really must ensure that landfills are required to use modern technology to track temperatures and look at methane and other gas leaks. Satellite systems can quickly detect plumes, but drones can look even more locally and targeted. And it's essential that we're using up-to-date technology, because our community's safety truly depends on it. (T_Schiavo-3)

Comment: California has long led on environmental policy, but its landfill methane rules are outdated and allow significant fugitive emissions. The issue is not a lack of solutions, but a lack of action. Proven, effective measures already exist and California can again lead by deploying them. We encourage CARB to pursue comprehensive methane reduction standards that employ current detection and mitigation technologies. Requiring advanced monitoring tools such as satellite and remote-sensing systems would significantly cut emissions, improve public health, and reduce climate-related costs borne by Californians in the form of higher medical bills, lost workdays, and rising insurance premiums. (B_US Reps-2)

Comment: I write to express my gratitude to the California Air Resources Board (CARB) for the recent proposed updates to the Landfill Methane Regulation (LMR). California must

continue to lead the fight against climate change through its efforts to reduce harmful methane emissions.

In 2010, the adoption of CARB's LMR set a strict standard for landfill operators to reduce methane emissions by collecting gas, controlling leaks, and monitoring surface emissions. While this standard has set a national model for methane emissions monitoring, it must also reflect updates in science and technology. Since 2010, several advances in methane monitoring technology have allowed CARB and landfill operators to detect leaks. Using this technology to its fullest extent will protect Californians from benzene, hydrogen sulfide, and other harmful gases that may go undetected. In 2023, I introduced AB 1534, which would have required CARB to consider the application of remote sensors such as drones to find and help landfill operators more accurately target methane leaks and prevent subsurface fires. This update is timely as Californians witness the effects of the smoldering landfill in Chiquita Canyon.

CARB's updates to the LMR are also a welcome change in the face of federal headwinds. With reduced greenhouse gas monitoring and reporting at the federal level, California's role is as important as ever. Updating the LMR to require action by the landfill operator once they are notified of a remotely-detected methane plume effectively maximizes the state's investments in drone and satellite technologies. As shown by CARB's recently published data, remote monitoring is effective, helping to stop 10 large methane leaks. The improved monitoring of gas collection and control will keep communities safe by ensuring that both operating and closed landfills control methane leaks. As 40 percent of the state's landfills are closed the LMR will play an outsized role in managing declining gas generation at these facilities. Thank you for your continued work on this issue. (B_Irwin-1)

Comment: I write to you with great excitement about the opportunity before the California Air Resources Board to immediately improve air quality for landfill workers and nearby communities and cement the State of California's legacy as a national and international leader on climate and technology.

At a time when federal policymaking is absent and speed is essential, we need CARB to quickly approve the amendments to its landfill regulations to ensure that Californians benefit from new technology that finds and fixes methane leaks. These amendments will be some of the most straightforward and significant policy actions available at the state level to reduce methane emissions.

Methane is responsible for roughly a third of today's global warming, and because it is so potent over the short term, reducing methane leaks can slow climate change much more quickly than carbon dioxide reductions alone.

Over the past decade, methane levels in California have remained largely unchanged, but with rapid advances in detection technology, California can now address a major source of methane emissions at landfills.

The state's proposed amendments reflect a solid understanding of evolving science and technology. They strengthen gas-collection requirements, expand surface monitoring, and require earlier installation of controls in new waste areas. Crucially, they also allow the use of modern detection tools — including satellites — that can identify leaks far more effectively than traditional methods and help detect early signs of subsurface heating events like those at Chiquita Canyon. (B_McCarthy-1)

Agency Response to Combined Comments:

No changes were made in response to these comments. However, staff notes that the timelines referenced in OP_CAW-12 were extended in the 15-Day Changes, while maintaining the mandatory follow-up and mitigation requirements in response to remotely-detected plume notifications.

CARB thanks the commenters for their supportive comments and agrees that remote methane plume detection technologies enable prompt identification of methane leaks and will support California's ongoing efforts to reduce methane emissions.

B.4-2 Provide more guidance and ensure data transparency

Comment: The utility and interpretation of methane remote sensing data can differ based on the emitting source. Landfill methane emissions are complex with multiple potential sources including the working face, intermediate cover, and gas collection infrastructure. In some cases, landfill emissions are from identifiable pieces of equipment, but in other cases landfill emissions may be more diffuse from a wider-region of the site, and in many cases there is a mixture of both point and diffuse sources. Thus detection programs need to account for the unique nature of these sources and the most beneficial way that data can be used to support mitigation.

With these variable and complex emission sources, monitoring data is both useful in the 'find-and-fix' paradigm but also as a vehicle for collecting needed information to contextualize emissions, improve gas collection, and guide best practices. In service of these goals, Carbon Mapper is writing to offer the following suggestions-

- Provide more specific guidance and reporting requirements for operators responding to remote methane monitoring notifications in order to further contextualize emissions and maximize the value of this data.
- Provide more guidance for technology providers seeking CARB approval.
- Enhance data transparency by publicly sharing data and follow-up actions through a more centralized, user-friendly platform.

These changes are intended to further strengthen the Rule's implementation and ensure the state takes full advantage of a suite of greenhouse monitoring technologies and ensures compliance, public awareness, scientific rigor, and data-informed best practices. (OP_Carbon Mapper-1)

Agency Response:

No changes were made in response to this comment. The Proposed Amendments provide specific requirements for follow-up monitoring, including the types of monitoring that must be conducted, the area over which that monitoring is required, and detailed reporting requirements. For more information about reporting requirements, please see the agency response in section IV.B.3-9.

Regarding guidance for technology providers, section 95469(b)(1)(A) of the Proposed Amendments establishes minimum criteria for remote monitoring technologies.

As part of ongoing implementation CARB will publicly display information about plume detections and the status of operators' monitoring and repair actions.

B.4-3 Remote plume detections should not be a violation

Comment: Remotely detected emissions in this subpart should not constitute a violation or the basis for enforcement action. Instead, the remote sensing program should be part of the effort to assist landfill owners and operators in the early identification and corrective of potential sources of methane emissions. (OP_Ind/Gov Coalition-19) (OP_Recology-16)

Agency Response to Combined Comments:

No changes were made in response to these comments. Receiving a remote methane plume detection notification is not a violation of the Proposed Amendments; the operator's follow-up monitoring determines whether there is an exceedance that needs to be repaired. Failure to perform the required follow-up monitoring, repairs (where an exceedance or leak is found), and reporting within the timelines prescribed may result in enforcement action.

B.4-4 Produce a report on outcomes of plume notifications

Comment: The LTF supports the promising approach of notifying landfills of remotely detected methane plumes, however, CARB should produce a separate report within three years evaluating the effectiveness, as well as potential recommendations for improvements to the program. (OP_SWANA-9)

Comment: CARB is proposing that landfill operators be notified of methane plumes measured by CARB, and actions be taken as a result.

The LTF generally supports this action but suggest that CARB provide a written report within three years detailing the effectiveness of this approach, as well as suggestions for further regulatory modifications to make the program more effective. (OP_SWANA-19)

Agency Response to Combined Comments:

No changes were made in response to these comments. CARB shares the goals of evaluating the effectiveness of remote methane plume detection and notification efforts and identifying opportunities for improvement over time. Through Resolution 25-14, the Board directed the Executive Officer to report on LMR implementation by mid-2028, including evaluation of monitoring technologies and the feasibility of alternative technologies for methane detection.

B.4-5 Enforcement/implementation clarifications

Comment:

- §95469(b) Remotely Detected Plumes:
  - Introduces new enforcement trigger; follow-up monitoring required.
  - Monitoring frequency and procedures may significantly increase workload depending on MOU.
  - Estimated coordinates provided by CARB may not reflect exact source; guidance needed on monitoring when source is uncertain.
  - Environmental conditions (rain, high wind) may affect monitoring; guidance needed on alternative methods.

- Alternative monitoring procedures for plume follow-up require clear approval process.
- Follow-up results must be reported to CARB per §95470(b)(7).
- Controlled landfills: 5-day follow-up; uncontrolled: 30-day follow-up; clarify enforcement/reporting expectations. (OP_SMAQMD-23)

Agency Response:

No changes were made in response to this comment. However, in the 15-Day Notice, the additional costs to local air districts that implement and enforce the LMR through memoranda of understanding were reanalyzed. This updated analysis included costs for air districts to review responses to remotely detected plume notifications and perform inspections as necessary.

CARB acknowledges that there is some uncertainty in the estimated plume origin point for remotely detected plumes and so the proposed regulatory changes include requirements for follow-up monitoring over a 600-ft by 600-ft area in response to a remotely detected plume notification. Please see the agency response in section IV.B.3-2 for more details on remote detection spatial accuracy.

The allowable methods for SEM in response to a remotely detected plume notification are clearly specified in sections 95469(b)(2)(A)2. and (3)(A). Surface emissions monitoring in response to remote methane plume detections is not subject to the same weather-related limitations (i.e., wind speed, precipitation or liquid application) that apply to quarterly SEM. Reporting requirements are clearly identified in the Proposed Amendments in section 95470(b)(7).

B.4-6 Establish a consistent schedule for satellite observations

Comment: To ensure timely detection and response to emissions, the Amendments should establish a clear and consistent schedule for satellite monitoring of landfill sites. CARB's ability to identify, track, and report methane plumes in near-real time through the California Satellite Methane Project (CalSMP) provides an opportunity to set predictable monitoring intervals and to increase observation frequency when significant emissions are detected.

Establishing such a schedule would strengthen accountability, improve data transparency, and ensure that both regulators and communities have reliable, up-to-date information about landfill emissions. (OP_CCAC-2)

Agency Response:

No changes were made in response to this comment. The timing and frequency of satellite detection of plumes is subject to the specific tasking and location of individual satellites as well as weather conditions. Setting defined intervals for satellite detection and notifications with the regulation is beyond the scope of the rulemaking and therefore, CARB is not required to respond.

B.4-7 Adopt rapid response protocols for high-priority emission plumes

Comment: Given CalSMP's demonstrated capacity to frequently observe and rapidly identify methane plumes, CARB should leverage this technology to enhance transparency and community safety. CalSMP protocols for high-priority methane detections around oil and gas

sites already include notification of local air districts and relevant agencies (CalOES, CalEPA, CalGem) within 48 hours, followed by community notifications within 72 hours. In fact, recent examples suggest this timeline can be further expedited to include notification of operators and communities within 24 hours of plume detection. We urge CARB to adopt a similar framework for landfill methane detections that include timely community notifications when CalSMP identifies a proximal methane plume. (OP_CCAC-3)

Agency Response:

No changes were made in response to this comment. Including additional regulatory requirements for notifying entities (e.g., emergency management agencies, specific communities, or other entities) that are not subject to the LMR or supporting LMR enforcement is beyond the scope of the Proposed Amendments. However, if plumes are detected near communities, CARB will follow an expedited procedure to inform air districts, first responders, operators, and community members. Further, we expect the technology CARB is implementing to detect plumes will support CARB and local air district regulatory implementation and will also support public transparency on remotely detected plumes. CARB remains committed to working with communities. Please see CARB's "*Community Focused Enforcement*" webpage for more information.

B.4-8 Require operators to pay for remote monitoring data

Comment: Shift the burden of data purchasing agreements to landfill operators. CARB's current approach of purchasing third-party remote sensing data has been essential in identifying high-emitters within the Oil & Gas sector and will be critical in mitigating super-emitter events in the waste sector. However, this model depends on uncertain state funding and may not be financially sustainable in the long term. To ensure program continuity and equity, we recommend that CARB require landfill operators to fund ongoing third-party methane monitoring, with data transmitted directly to CARB, the landfill operator or owner, and the Air District.

Under this model, CARB would:

- Approve or accredit third-party monitoring vendors to ensure data quality and consistency.
- Receive emissions data directly from vendors alongside operators, preserving regulatory oversight.
- Implement public transparency measures for events reported under the SERP.

This approach would reduce reliance on public funds while maintaining CARB's oversight and ensuring data remains accurate, standardized, and publicly accessible. (OP_CAW-15)

Comment: Shift financial responsibility for third-party remote sensing data collection to landfill operators, with CARB-approved vendors providing data directly to CARB, operators, and local Air Districts. (OP_CAW-19)

Agency Response to Combined Comments:

No changes were made in response to these comments. Funding for remote methane emissions plume data is outside the scope of the Proposed Amendments and CARB is not required to respond.

B.4-9 Concerns about reliability and practicality of remote plume detection

Comment: Kiefer Landfill has responded to approximately 10 remote plume notifications to date, none of which were detectable through field monitoring at the indicated locations. These "plume" detections have been investigated by field staff, independent consultants and regulators, with no discernable correlation. This raises concerns about the reliability and practicality of remote plume detection. (OP_SacCo-13)

Comment: In a recently published study by Krause et al., the quantification capabilities of satellite technologies were evaluated across 60 of WM's largest active MSW landfills from 2022 to 2024. See Krause et al., *A High Resolution Satellite Survey of Methane Emissions from 60 North American Municipal Solid Waste Landfills*, Envt'l Sci. & Tech. (July 15, 2025). As a result, *Krause* found that the emissions quantified using satellite technologies in conjunction with site-specific factors aligned least closely with the subpart HH quantification methodologies, which were finalized in April 2024 in reliance on the alleged quantification capabilities of satellites. The results of this study provide further support for the contention that additional review and procedures are necessary to ensure that emerging measurement technologies are appropriate tools for the detection and quantification of emissions, and that remotely measured data can be interpreted reliably and consistently. (OP_WM-28)

Agency Response to Combined Comments:

No changes were made in response to these comments. Nearly a decade of remote sensing research has demonstrated the capability of plume imaging technology to identify large leaks, and subsequent notification campaigns have shown that actionable data could be rapidly supplied to operators who could locate the source on the ground to address leaks promptly.[4,5] Plume notifications advise operators that the estimated plume origin coordinates provided should not be treated as a precise location, and staff proposed the required monitoring area based on factors as explained in the ISOR and the agency response in section IV.B.3-2.

B.4-10 Provide greater flexibility and compliance phase-in

Comment:

Satellite-Detected Emission Plumes

OCWR supports CARB's efforts to utilize recent advancements in remote sensing and satellite imaging technologies to monitor and control landfill surface methane emissions. However, while these emerging technologies could be valuable tools for identifying large methane emission sources, they are not yet reliable for pinpointing emissions from discrete point sources.

High-altitude methane plume mapping, such as satellite-detected methane plumes, can only

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[4] Duren, R. M., Thorpe, A.K., Foster, K.T., Rafiq, T., Hopkins, F.M., Yadav, V., … & Miller, C.E. (2019). California's Methane Super-Emitters. *Nature, (575)*, 180–184. *https://doi.org/10.1038/s41586-019-1720-3*.

[5] CARB. (2024, April). *Summary Report of the 2020, 2021, and 2023 Airborne Methane Plume Mapping Studies*. *https://ww2.arb.ca.gov/sites/default/files/2024-04/2020-2021-2023%20Airborne%20Summary%20Report_FINAL.pdf*.

provide sufficient data for screening purposes. Hence, additional ground surveying is needed to pinpoint emission sources. OCWR recommends that CARB consider providing adequate compliance flexibility and a phase-in approach so that the effectiveness and efficiency of real-world applications of these advanced technologies can be thoroughly evaluated and refined. (OP_OCWR-3)

Agency Response:

No changes were made in response to this comment. CARB agrees that high-altitude plume mapping is an effective screening tool for identifying large methane plumes and that ground-based surveying is a necessary follow-up step to determine the precise location and cause of emissions. The provisions in section 95469(b) were designed with this sequencing in mind and ensures that ground-based measurements are used to determine whether a surface exceedance or component leak exists that requires repair.

Regarding the request to phase-in this provision, CARB has already been successfully sending notifications to landfill operators for voluntary action – and to oil and gas operators for regulatorily-required action – since May 2025. Additional phase-in time is not necessary and would risk losing some of the emissions mitigation benefits that will come from these provisions.

C. Surface Emissions Monitoring and Component Leak Monitoring

1. Surface Emission Exceedance Level

C.1-1 General support

Comment: Structured corrective action and re-monitoring framework - § 95469(a): We commend CARB for establishing clear timelines and escalation procedures for addressing SEM exceedances. The proposed structure – requiring corrective action with 3 calendar days, re-monitoring within 10 calendar days, and escalating responses for repeated exceedances – provides essential clarity and consistency and will promote more timely and effective mitigation responses to emissions exceedances. (OP_CAW-25)

Agency Response:

No changes were made in response to this comment. However, please note that in the 15-Day Changes the requirement to initiate corrective action to repair a surface methane exceedance was adjusted from 3 to 5 calendar days. CARB appreciates the supportive comment and thanks the commenter.

C.1-2 Redefine integrated exceedances for continuous monitoring data

Comment:

- §95465(a)(2) – Average Concentration Limits
  TrelliSense strongly recommends time-restricting and/or raising the specified average concentration limit of 25 ppmv. TrelliSense's sensors on landfills (including in California) regularly observe path-averaged methane concentrations well into the 100s of ppmv, although such high levels are typically only observed at night when methane tends to "pool" during periods of falling atmospheric pressure and when the winds tend to be

calmer. Therefore, as written, we expect that this provision will be regularly violated by any landfill with 24/7 data collection, even those with normal and otherwise compliant operations. TrelliSense hopes that CARB agrees that it is important to avoid placing this barrier to the adoption of continuous monitoring. Our specific suggestions are as follows:

- TrelliSense suggests calling an exception for sites with continuous 24/7 monitoring by (a) raising the average limit to 50 ppmv, (b) excluding measurements taken outside of site operating hours, and (c) allowing a full operating day's worth of data to be included in average calculations (i.e. expanding temporal bounds). TrelliSense believes that any truly problematic leaks will still violate such a limit, fulfilling the intent of this regulation by helping to identify and rectify issues promptly, while reducing "false positive" actions required of landfill operators.
- In fact, Section §95469(e)(8)(a) contains language on wellhead parameters which provides a useful structural analogy for limiting pertinent observations subject to triggering violations when monitored more frequently than weekly. TrelliSense recommends applying this precedent language to surface emissions monitoring, with the parameters suggested above (or similar) so as to avoid disincentivizing continuous monitoring. (OP_TrelliSense-6)

Agency Response:

No changes were made in response to this comment. Section 95465(a)(2) specifies that compliance with the average methane concentration limit of 25 parts per million by volume (ppmv) is "as determined by integrated surface emissions monitoring." The procedure for integrated surface emissions monitoring is specified in section 95471(c)(3), using a hydrocarbon detector meeting the requirements of section 95471(a). Integrated surface methane exceedances are therefore not established based on continuous monitoring technologies. To the extent that the commenter is referring to approval of alternative surface emissions monitoring procedures under section 95471(e), the conditions that trigger follow-up SEM (to establish where there is a surface methane exceedance requiring repair and re-monitoring) are proposed by the applicant pursuant to section 95471(e)(3)(A). Thus, they could include a different threshold, time limitations, or other conditions to ensure appropriate use of continuous monitoring data.

C.1-3 Add increased meter reading requirements

Comment:

§ 95471(c)(1)(B) – Method 21 Increased Meter Reading vs Maximum Meter Reading

Issue:

§ 95471(c)(1)(B) currently requires the operator to traverse the landfill surface with the probe held within 3 inches of the ground. However, it does not describe the required procedure for identifying the maximum meter reading, which is the basis for determining whether a surface emission exceedance exists under both state and federal law.

Under U.S. EPA Method 21 § 8.3.1, leak detection requires:

- Sampling until detecting an increased meter reading,
- Slowing and searching to identify the maximum meter reading, and
- Holding the probe at the point of maximum reading for a duration equal to 2 × the instrument response time (T90).

Today, many operators conflate the exceedance definition with an increased meter reading – many SEM training instructors will tell SEM operators: “If you see 499ppm, keep walking”. This is not consistent with the spirit, intent or letter of the regulation.

Recommendation:

CARB should explicitly reference Method 21 § 8.3.1 procedures and fix the gap in the federal regulations of not explicitly defining increased meter reading as ≥ 200 ppm. This will ensure consistency and prevent operator discretion from eroding leak detection sensitivity.

Proposed Regulatory Language:

(modification to § 95471(c)(1)(B))

“(B) Testing shall be performed by holding the hydrocarbon detector's probe within 3 inches of the landfill surface while traversing the grid.

When an increased meter reading of ≥ 200 ppm is observed, the operator shall slow and sample the surrounding area to identify the maximum meter reading. The probe shall then be held at the point of maximum meter reading for a duration twice the instrument response time to determine whether the 500 ppm surface emission standard is exceeded.” (OP_Sniffer-8)

Agency Response:

No changes were made in response to this comment. Staff identified several other opportunities to improve leak detection and chose to focus efforts on provisions that target larger emission sources, as discussed further in the agency response in section IV.C.1-4. New reporting data available under the Proposed Amendments will also provide new opportunities to evaluate how SEM is being conducted and whether there are opportunities to improve the procedure.

C.1-4 Lower instantaneous surface exceedance level to 200 ppmv

Comment: Accordingly, we respectfully encourage CARB to set the surface methane emissions standard for instantaneous monitoring at 200 ppmv as initially proposed, rather than maintaining the 500 ppmv level from the current LMR. (OP_IHRC-6)

Comment: Methane concentration and landfills gas temperature thresholds must reflect the lessons learned and technological improvements since these standards were first established. The surface emissions methane threshold should be reduced from 500 ppmv to 200 ppmv, as stakeholders advocated for in the 2010 rulemaking and has been proposed as a staff concept in LMR workshops since 2023. At the very least, numerous methane concentrations greater than 200 ppmv found in a single grid should trigger further inspection for cover integrity or other issues. (OP_CAW-6)

Comment: Methane mitigation threshold - § 95465(a)(1): While we appreciate the requirement for operators to record all concentration readings during SEM, maintaining the 500 ppmv exceedance threshold limits the ability to identify and address smaller but persistent emissions

that cumulatively contribute to methane output at landfills.

We encourage CARB to revisit its earlier proposal to lower the mitigation threshold to 200 ppmv. Alternatively, CARB could require targeted follow-up actions when a grid shows multiple readings above 200 ppmv. This could include mandatory cover integrity and gas collection system assessments for grids with repeated detection of leaks over 200 ppmv, or increasing SEM frequency, similar to the framework outlined for "Recurring Surface Exceedances" in § 95469(e)(2). This would ensure that excessive, smaller leaks are investigated in a structured and consistent way while addressing concerns that lowering the mitigation threshold could increase the likelihood of overpulling, resulting in oxygen intrusion and potentially creating the conditions conducive to subsurface fires. (OP_CAW-28)

Comment: Reduce the methane mitigation threshold from 500 ppmv to 200 ppmv, or at minimum require cover integrity and gas collection system checks for grids with multiple identified leaks over 200 ppmv. (OP_CAW-32)

Comment: Lower the methane exceedance threshold from 500 ppmv to 200 ppmv. While CARB has proposed using 200 ppmv (or 50 ppm-m) as a hotspot screening trigger for unsafe-to-walk areas, this instantaneous exceedance threshold should be expanded to all areas of the landfill. (OP_RMI/EDF-8)

Comment: We also recommend CARB set an instantaneous surface methane concentration of 200 ppmv as a methane mitigation exceedance threshold for corrective action across the landfill.

We urge CARB to revisit its earlier proposal to lower the mitigation threshold to 200 ppmv across the landfill, instead of just for unsafe-to-walk areas. Alternatively, CARB could require targeted follow-up actions when a grid shows multiple readings above 200 ppm. As noted in prior comments, this threshold was originally proposed in 2009; it is feasible and would unlock further emissions reductions. (OP_RMI/EDF-18)

Agency Response to Combined Comments:

No changes were made in response to these comments. As the commenters note, CARB staff considered potentially lowering the instantaneous surface emissions limit to 200 ppmv during pre-rulemaking periods in 2009 and 2023–2024. LMR reporting data presented at pre-rulemaking workshops showed that most landfills achieve below 200 ppmv over most of the landfill surface and that most exceedances of the 500 ppmv standard are repaired to below 200 ppmv. Some stakeholders provided written feedback following those workshops raising concerns that setting the leak threshold to 200 ppmv may encourage operators to overdraw the gas collection system causing air intrusion, which can compromise the ability of the gas collection system to work effectively, harm electricity generation equipment, disrupt normal biological activity under anaerobic conditions, and can cause or exacerbate elevated temperatures that can in turn damage the collection system.

As discussed in the ISOR, operators must carefully balance the need to maximize gas collection in order to minimize surface emissions and odors without inducing air intrusion. Increasing the vacuum is not the only way to achieve those low leaks – more effective covers are another solution that avoids the risk of air intrusion. Therefore, staff chose to instead achieve the objective of reducing methane concentrations through

requirements for cover monitoring, and targeted assessments and repairs to improve cover integrity.

Stakeholder feedback also suggested that mitigating leaks in the 200 ppmv to 500 ppmv range may not amount to meaningful reductions. Therefore, staff chose to focus efforts on provisions that target larger emission sources such as complementing ground-based monitoring with remote plume detection technology to rapidly identify the largest leaks, expanding coverage of leak monitoring by removing SEM exemptions, requiring earlier gas collection at the working face, and reducing GCCS downtime.

In response to the proposal in OP_CAW-32 to require assessments for grids with multiple identified leaks over 200 ppmv, this is unnecessary as grids with a significant number of locations over 200 ppmv are likely to result in exceedance of the integrated methane emission limit (25 ppmv average concentration across the grid) and thus already require corrective action.

C.1-5 Redefine "non-repeatable momentary readings"

Comment: "Non-repeatable Momentary Readings" in § 95475(a)(28) on p. 69, used on pp.9, 16, 66, need to be based on non-detection by continuous or closely repeated sampling for 5 minutes, not a single repeat. (OP_Burke-7)

Agency Response:

No changes were made in response to this comment. This comment is out of scope because it refers to an existing definition in the current LMR and no changes were made to how a detection is defined.

2. Monitoring Spacing and Frequency

C.2-1 Tighten spacing and/or increase frequency

Comment: The rules for surface emissions monitoring are insufficient to properly detect methane leaks. Monitoring should be required on at least a monthly basis, if not a weekly basis and the grid distancing needs to be reduced from every 25 feet to 5 or 10 feet at least. (OP_Bruce-1)

Comment: Our work depends on frequent and continuous methane monitoring to quantify abatement performance and identify emissions patterns over time. We strongly support CARB's intent to expand monitoring under the LMR and encourage the review team to ensure that regulatory design promotes, not discourages, more frequent measurement. Even with strong gas collection systems, diffuse surface emissions and operational variability limit gas capture efficiency. More frequent or continuous monitoring provides the real-time insight needed to locate leaks, optimize wellhead performance, and verify the performance of cover and oxidation systems. In this way, frequent measurement directly advances CARB's goals of improving collection efficiency and reducing methane faster. We are therefore supportive of CARB's inclusion of flexible remote sensing allowances, including continuous monitoring.

We recommend that CARB explicitly encourage monitoring monthly or more frequently to capture the temporal pattern of landfill emissions and to support proactive management. We also recommend encouraging more frequent remonitoring, which should allow for the use of

continuous monitoring, to confirm whether an observed emissions is temporary or persistent. We believe that explicitly encouraging continuous, daily, weekly or more frequent monitoring will encourage operators to adopt these practices that will support more accurate methane emissions reporting and proactive mitigation efforts. (OP_Windfall Bio-1)

Comment: The Proposed Amendments do not adjust the SEM frequency or path spacing requirements to reflect the improved capabilities of these technologies. Maintaining the existing quarterly monitoring schedule and 25-foot spacing fails to leverage the technologies' inherent advantages and makes compliance easier without improving emissions detection. (OP_CAW-9)

Comment: To address these issues, we recommend that CARB:

…

- Reduce the SEM path spacing to less than 25 feet and increase the monitoring frequency to monthly across all procedures to enhance emissions detection and encourage utilization of advanced technologies while under the voluntary standard. Furthermore, we recommend increasing the frequency of SEM to bi-weekly (twice a month) for alternative SEM procedures. (OP_CAW-11)

Comment: Reduce SEM path spacing below 25 feet and increase monitoring frequency to monthly across all methods; require bi-weekly monitoring for alternative SEM procedures. (OP_CAW-81)

Comment: Monitoring frequency and path spacing: As discussed above in Issue Area I, we continue to recommend reducing SEM path spacing to less than 25 feet (ideally 10 - 15 feet), and increasing the monitoring frequency to monthly. Additionally, for Alternative SEM Procedures, CARB should consider requiring more frequent monitoring for technologies capable of covering the whole surface of the landfill efficiently – we recommend bi-weekly (every two weeks) SEM. These updates would substantially improve emissions detection and serve as an effective transition mechanism towards utilizations of more efficient, remote sensing technologies. (OP_CAW-27)

Comment: Reduce SEM path spacing to less than 25 feet and increase monitoring frequency to monthly, with bi-weekly monitoring for approved alternative SEM technologies. (OP_CAW-82)

Comment: While we support the framework as proposed, we emphasize that it should complement—not substitute for—broader increases in baseline SEM frequency. Increasing the frequency of SEM across all landfill surfaces remains one of the most effective tools for identifying and mitigating methane emissions early and preventing recurring exceedances from developing in the first place. (OP_CAW-31)

Comment: Ensure the recurring exceedance framework complements, rather than replaces, frequent baseline SEM monitoring. (OP_CAW-36)

Comment: Inspections by walking a path 100 feet away from the previous path are not thorough, in § 95471(c)(1)(C) on p. 55. The idea that 3, 6 and 9 months later other paths will be walked, so that, over a year, inspection paths are 25 feet apart, leaves too light an inspection. (OP_Burke-4)

Comment: We urge the Board to also adopt several enhancements. This includes: … increase monitoring frequency to biweekly; (T_RMI-8)

Comment: Primero, monitorear la superficie del vertedero para detectar fugas de metano cada 3 meses no es lo suficientemente frecuente para identificar fugas a tiempo. Esto debe hacerse con mucha más frecuencia, como de manera mensual.

English translation:

First, monitoring the surface of the landfill to detect methane leaks every three months is not frequent enough to identify leaks in time. This should be done much more often, such as monthly.

(B_Gutierrez-1) (B_Calderon-1) (B_Mascoso-1) (B_Rios-1)

Agency Response to Combined Comments:

No changes were made in response to these comments. The Proposed Amendments are designed to increase monitoring frequency and spatial coverage in a targeted way, focusing more intensive monitoring in areas with measurable deviations. Areas where the Proposed Amendments increase monitoring frequency or tighten the spacing interval include: monthly SEM in grids with recurring exceedances; increasing to a five-foot spacing interval around an exceedance; and more stringent criteria to qualify for reduced spacing and frequency. For landfills or areas of landfills that qualify under the current Regulation for annual SEM frequency and 100-foot spacing, the Proposed Amendments increase this frequency from annually to every three quarters, and improve spatial coverage by requiring a 25-foot offset in each SEM event.

Targeting these changes best harnesses the advantages of increased monitoring frequency and tighter spacing intervals in the situations where the most benefit can be derived from the associated cost increases. CARB also notes that the default spacing interval in the LMR (25 feet) is substantially tighter than in federal rules (30 meters or approximately 98 feet).[6] Additionally, under the existing and proposed quarterly SEM requirements, monitoring occurs up to three additional times per quarter in areas where exceedances are found.

Some commenters request a higher frequency for monitoring when using alternative SEM procedures. The applicant must propose the frequency of monitoring events under an approved alternative monitoring procedure in section 95471(e) and demonstrate that it achieves at least equivalent emission reductions as the default SEM procedures. This flexibility is important because different technologies have different sensitivity and spatial coverage which can affect how frequently measurements are needed to achieve equivalent emission reductions. Setting a specific frequency would limit the ability of the applicant to design an effective and efficient monitoring approach specific to the technologies being used.

C.2-2 Phrasing of SEM frequency relaxation allowance

Comment: § 95469(a)(1) on p. 24 says some areas “may be monitored every three quarters”.

[6] 40 C.F.R. § 63.1958(d)(1); 40 C.F.R. § 60.763(d); and 40 C.F.R. § 60.36f(c)(1).

There needs to be a requirement. (OP_Burke-10)

Agency Response:

No changes were made in response to this comment. The commenter appears to be suggesting that the use of "may" could allow the owner or operator to perform no monitoring. The phrase "may be monitored every three quarters" is a modification of the requirement that the owner or operator "shall" monitor quarterly. The relaxed frequency is available as an option to the owner or operator, but if they do not choose to use the relaxed frequency option available under section 95469(a)(1)(C) and 95469(a)(2)(C), they would be required to monitor quarterly instead under section 95469(a).The relaxed frequency is available as an option to the owner or operator, but if they do not choose to use the relaxed frequency option available under section 95469(a)(1)(C) and 95469(a)(2)(C), they would be required to monitor quarterly instead under section 95469(a).

C.2-3 Revert every-three-quarters frequency to annual

Comment:

- Section: 95469(a)(1)(C) & (a)(2)(cC)– Final cover monitoring
- Current: If year with no exceedances, final cover may be monitored every 3 quarters.
- Proposed: Annual monitoring.
- Rationale: Align with federal rules. Requiring monitoring every three quarters impractical from an operator budgeting and planning standpoint and would impose separate state and federal timelines. (OP_WM-3)

Agency Response:

No changes were made in response to this comment. CARB respectfully disagrees that monitoring every three quarters is impractical. The quarters in which surface emissions monitoring will be required are known as soon as the owner or operator qualifies for and elects to move to the lower frequency.

Additionally, CARB respectfully disagrees that there is a conflict with federal requirements. Landfills that qualify for annual monitoring under federal rules can still comply with those requirements through the every-three-quarters monitoring – they will simply need to perform an additional monitoring event once every three years.

C.2-4 Revert to allowing inactive areas to have SEM relaxations

Comment: We recommend that there should be no changes made to the inactive landfill/area SEM requirements, as CARB has not provided an adequate basis to justify this change. (OP_OPAL Fuels-4)

Comment:

Section 95469(a)(1&2) – Instantaneous Surface Monitoring and Integrated Surface Monitoring Requirements

CARB has not provided a quantitative basis for making the surface emissions monitoring (SEM) requirements for inactive landfills or inactive landfill areas more stringent. The proposed

rule introduces new provisions, including a requirement that inactive landfills/areas have final cover, changing the monitoring frequency from annual to every three quarters, and removing the option to remediate an exceedance within the first 10 days without losing the annual or 100-foot spacing monitoring options.

The original LMR rulemaking included a 10-day remediation allowance to address situations where a large landfill or landfill area might otherwise lose reduced monitoring due to a single event-related exceedance, particularly when it could be resolved within 10 days. This allowance was intended to prevent any unnecessary financial or operational burden and should remain.

Recommendation: We strongly recommend that there be no changes made to the inactive landfill/area SEM requirements until sufficient justification for changes is presented by CARB. (OP_Recology-11)

Comment: CARB has provided no quantitative basis that the surface emissions monitoring (SEM) requirements for inactive landfills or inactive landfill areas should be made more stringent (Section 95469(a)(1) and (2)). In the proposed rule, CARB has added a requirement that the inactive landfills/areas must have final cover, changed the monitoring allowance from annual to every three quarters, and taken away the ability to remediate an exceedance in the first 10 days, which would not cause the landfill to lose its annual or 100-foot spacing options.

The type of cover in an inactive landfill/area should not matter as long as the landfill/area meets the SEM requirements for obtaining the reduced monitoring options. The 10-day allowance was negotiated in the original LMR rulemaking because it was felt to be unreasonable that a large landfill or landfill area, possibly hundreds of acres, should lose its reduced monitoring option because of one exceedance in one location during one event, especially when that exceedance could be easily remedied in 10 days. We recommend that there should be no changes made to the inactive landfill/area SEM requirements, as CARB has not provided an adequate basis to justify this change. (OP_L and D-15)

Comment:

{CARB staff note: Commenter quoted 45-Day Changes text of section 95471(c)(1).}

In Section C, for grids that are not in final cover but have had a minimum of four consecutive quarters without active landfilling and been without an exceedance at the 25ft spacing, reduced monitoring of spacing to 100 ft at quarterly intervals should be allowed. (OP_YoloCo-35)

Comment:

- Section: 95469(a)(1)(D) & (a)(2)(D) – Exceedances detected during compliance inspections.
- Current: Automatic return to quarterly inspections.
- Proposed: Allow 10 day repairs and remonitoring.
- Rationale: Operator should have opportunity to correct prior to imposing quarterly testing. (OP_WM-4)

Agency Response to Combined Comments:

No changes were made in response to these comments. CARB respectfully disagrees on the adequacy and quality of the justification. As discussed in the ISOR, limiting the

ability to relax SEM spacing and frequency to areas under final cover reflects an improved understanding from research, which has shown that cover type has a strong influence on the emissions rate, with final cover systems significantly more effective in limiting methane emissions (Hanson et al., 2020).[7] Final cover is installed when an area reaches final grade and no further waste will be placed. Existing regulations specify the thickness (more than one meter) and detailed specifications for each layer comprising the final cover. Inactive areas may still be undergoing construction and other activities to place final cover, and thus these areas are at a greater risk of developing surface emissions between SEM events. CARB also notes that there is no specific definition of an "inactive area" in the current Regulation, which may lead to inconsistent application of the allowance to reduce SEM frequency if relaxations were maintained for inactive areas.

Reversion to quarterly monitoring and 25-foot spacing upon finding a surface exceedance is necessary to ensure that landfills that have demonstrated the presence of a surface exceedance continue to monitor frequently for additional surface exceedances. Repairing a discovered surface exceedance within 10 days remediates that particular exceedance, but less frequent monitoring and wider spacing would allow any other exceedances to continue for a longer period before being detected. Reverting to quarterly frequency immediately upon detecting an exceedance is also consistent with federal rules.[8,9]

C.2-5 Explicitly allow daily or continuous SEM

Comment:

- §95469(a)(4)(B) – Surface Emissions Monitoring Frequency
  TrelliSense recommends allowing operators to perform surface emissions monitoring "monthly or more frequently" to meet the standard. Explicitly allowing daily or continuous monitoring here, rather than specifically requiring monthly surveys, could incentivize proactive site management while aligning with the capabilities of new monitoring technologies and methods that may operate continuously. (OP_TrelliSense-7)

Agency Response:

No changes were made in response to this comment. The monthly monitoring frequency following recurring surface emissions established by section 95469(a)(4)(B) sets the minimum requirement, but does not prohibit owners or operators from performing more frequent monitoring.

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[7] Hanson, J.L., Yesiller, N., & Manheim, D.C. (2020, March 25). *Estimation and Comparison of Methane, Nitrous Oxide, and Trace Volatile Organic Compound Emissions and Gas Collection System Efficiencies in California Landfills: Final Report*. California Polytechnic State University. *https://ww2.arb.ca.gov/sites/default/files/2020-12/CalPoly_LFG_Study_03-30-20.pdf*.

[8] 40 C.F.R. § 60.766(f); 40 C.F.R. § 63.1961(f); and 40 C.F.R. § 60.37f(f).

[9] Federal rules use a 30-meter (98-foot) spacing interval by default and have no provisions to relax spacing.

If an operator wishes to use a continuous monitoring technology, the Proposed Amendments establish a process for approving alternative procedures in section 95471(e).

C.2-6 Clarify exceedances found after plume notifications revert SEM relaxations

Comment: Monitoring frequency for closed areas - § 95469(a)(1)(C): CARB's revisions to the monitoring frequency for closed areas under final cover (reducing the relaxed schedule from annual to every three quarters) represent an improvement. CARB should clarify that any exceedance, including those identified through follow-up monitoring prompted by the SERP, would trigger a return to quarterly monitoring. Explicitly including SERP-related exceedances in this provision would close a potential oversight gap and ensure consistent treatment of emissions data, regardless of how it was detected. (OP_CAW-29)

Comment: Clarify that any exceedance in closed areas, including SERP-related exceedances, triggers a return to quarterly SEM. (OP_CAW-33)

Agency Response to Combined Comments:

No changes were made in response to these comments. Section 95469(a)(1)(C) of the Proposed Amendments says "any exceedances of the limit" result in return to quarterly monitoring. Therefore, it is clear that detecting an exceedance of the limit in monitoring as follow-up to a remotely detected plume notification (in the area being monitored every three quarters) would return the landfill to quarterly monitoring.

C.2-7 Clarify "entire landfill surface" for SEM relaxations

Comment:

{CARB staff note: Commenter quoted 45-Day Changes text of section 95469(a)(1) (instantaneous SEM).}

In section C, there needs to be come clarification of 'entire landfill surface'. We have areas of final closure that are not contiguous with other areas of the landfill. The regulation should make clear that these types of areas should be treated individually as 'entire landfill surface' for the purposes of reduced monitoring and returns to regular monitoring after an exceedance. (OP_YoloCo-14)

Comment:

{CARB staff note: Commenter quoted 45-Day Changes text of section 95469(a)(2) (integrated SEM).}

In section C, there needs to be come clarification of 'entire landfill surface'. We have areas of final closure that are not contiguous with other areas of the landfill. The regulation should make clear that these types of areas should be treated individually as 'entire landfill surface' for the purposes of reduced monitoring and returns to regular monitoring after an exceedance. (OP_YoloCo-18)

Agency Response to Combined Comments:

No changes were made in response to these comments. CARB is aware that some owners or operators have interpreted the current Regulation to mean that relaxed

frequency (and return to quarterly frequency) can be applied at the individual grid level. The addition of “entire” and “surface” when describing the return to quarterly frequency was meant simply as a clarification that this provision is not applicable at an individual grid level, as evidenced by the current Regulation’s wording “return to quarterly monitoring of the landfill.” This is an appropriate standard because surface exceedances found in areas under final cover may signal potential deficiencies in the maintenance of the cover or operation of the GCCS that are not necessarily confined to a single grid, cell, or area.

3. Repairing and Re-monitoring Surface Emissions

C.3-1 Support process for reviewing alternative corrective actions

Comment:

- Defined process for alternative corrective actions - § 95469(a)(3): CARB’s establishment of specific application, approval, and disapproval timelines for alternative corrective actions is a welcome improvement that ensures timely, effective responses to recurring emissions exceedances and prevents prolonged emissions while operators await CARB approval. (OP_CAW-26)

  Agency Response:

  No changes were made in response to this comment. CARB appreciates the comment and thanks the commenter.

C.3-2 Extend time or eliminate requirement to initiate corrective action

Comment: SEM corrective action timeframes should align with existing response timeframes that account for operational realities.

The Draft Regulation would require operators, upon detecting surface emissions above the instantaneous or integrated thresholds, to initiate corrective action within 3 calendar days and complete corrective action within 10 calendar days. The location of the measured exceedance must be re-monitored within 10 calendar days—if a second detection above the threshold is apparent, the same timeline for corrective action applies. If a third detection above the threshold is detected, operators must install a new or replacement gas collection well or device within 120 calendar days of the initial exceedance or utilize an approved alternative under Section 95469(a)(3). See Sections 95469(a)(1) and(a)(2).

The Draft Regulation should be revised to be consistent with the federal rules. The federal rules require that “[c]over maintenance or adjustments to the vacuum or the adjacent wells to increase the gas collection in the vicinity of each exceedance must be made and the location must be re-monitored within 10 calendars days[.]” {Footnote: 40 CFR § 60.765 (c)(4)(iv); 40 C.F.R. § 60.36f(c)(4)(iii).} The requirement to “initiate” corrective actions within 3 calendar days is unnecessary and confusing, and detracts from operators’ ability to correct detections with site-specific considerations in mind. (OP_WM-60)

Comment:

- Section: 95469(a)(1)(B) – Instantaneous Surface Monitoring Corrective Actions & 95469(a)(2)(B) – Integrated Surface Monitoring Corrective Actions
- Current: Corrective action in 3 calendar days, re-monitor by 10 days.
- Proposed: Corrective action and re-monitor within 10 days.
- Rationale: Align with federal rules, reduce administrative burden and focus on correcting exceedances by allowing operator to identify, correct and re-monitor within a single timeframe. (OP_WM-2)

Comment:

§95469(a)(1)(B) and §95469(a)(2)(B) – 3-Day Response Requirement

These sections mandate response within 3 calendar days, a rapid timeframe that becomes particularly challenging when multiple exceedances are measured on the same day. Meeting this requirement will necessitate significant overtime for staff to retune or remediate areas with exceedances.

Under current regulations, re-testing is scheduled within 10 days (pending consultant availability), and responses are mobilized within that 10-day window in preparation for re-testing. The proposed re-monitoring frequency, even after an area has been cleared, will likely force demand for monitoring crews earlier in each quarter so facilities can complete all re-monitoring requirements within one quarter. Scheduling contracted field crews is already challenging under current regulations due to limited availability. The new regulations will exacerbate this shortage significantly. (OP_ReGen-10)

Comment:

{CARB staff note: Commenter quoted 45-Day Changes text of section 95469(a)(1) (instantaneous SEM).}

The requirement in (B) to initiate corrective action within three calendar days should be changed to three working days, Monday through Friday. Depending on the time of day an exceedance is found on a Friday (example late afternoon), this would only allow for one business day (Monday) to initiate repairs and if there is a holiday then the three days might pass before staff to conduct corrective action or repairs are available. (OP_YoloCo-11)

Comment:

{CARB staff note: Commenter quoted 45-Day Changes text of section 95469(a)(2) (integrated SEM).}

The requirement in (B) to initiate corrective action within three calendar days should be changed to three working days, Monday through Friday. Depending on the time of day an exceedance is found on a Friday (example late afternoon), this would only allow for one business day (Monday) to initiate repairs and if there is a holiday then the three days might pass before staff to conduct corrective action or repairs are available. (OP_YoloCo-15)

Comment: Under Section 95469(a), CARB has made various components of the SEM requirements more stringent. This includes:

…

- Shortened the period to begin correction action to three days. (OP_OPAL Fuels-15)

Comment:

Section 95469 (a)(1)(B)

Requiring corrective action within three calendar days effectively means initiation within one business day in some instances, which may not be feasible given staff, equipment, or material availability. RCDWR recommends the timeframe be expanded to three business days. (OP_RIVCO-5)

Comment:

Section 95469 (a)(1)(B): Corrective Action Initiation and 10-Day Remediation Period

The proposed amendments under this subsection would require landfill operators to initiate corrective action within three days. While immediate measures, such as localized vacuum adjustments, can often be implemented quickly, other actions may require planning and coordination, necessitating additional time to initiate. Furthermore, for instances where there are multiple exceedances, facilities may not be able to comply with the three-day remedial initiation requirement.

The Sanitation Districts recommend that CARB consider revising the proposed LMR amendments to allow operators to initiate and complete corrective actions within the 10-day period, rather than requiring initiation within three days, provided emissions are controlled in the interim. Furthermore, to streamline the requirement, the Sanitation Districts recommends that the corrective action timelines should be aligned with existing federal and local standards (USEPA NESHAP Subpart AAAA and SCAQMD Rule 1150.1), which emphasize prompt action and re-monitoring rather than rigid initiation deadlines. (OP_LACSD-6)

Agency Response to Combined Comments:

CARB made changes in response to the comments. In the 15-Day Changes, the timeline for initiating corrective action to repair a surface methane exceedance was extended to five calendar days. CARB notes that the Proposed Amendments maintain the 10-day timeline to complete the repair and re-monitor the location or grid.

CARB respectfully disagrees that the requirements are inconsistent with federal requirements as regulated entities can comply with both. Taking action within a faster timeline is important to minimize the time that methane is emitted. Most corrective actions consist of simple measures like adding and compacting soil, or adjusting well vacuum, which can often be performed by onsite personnel on the same day an initial exceedance is measured. Even if a final repair is more complex and takes more time, initiating action within five days may help to quickly minimize the size of the leak or move toward the final repair action more quickly.

Specifying a number of days to initiate action – rather than simply emphasizing prompt action as OP_LACSD-6 suggests – ensures a clear and enforceable standard for operators to establish procedures to meet.

Re-monitoring requirements are based on calendar days after detection or prior re-monitoring and do not need to occur within the same quarter. Thus, new requirements

for initiating corrective action or additional re-monitoring (e.g., one-month re-monitoring) will not require crews to be scheduled earlier in the quarter.

C.3-3 Define "initiate" corrective action and require recordkeeping

Comment: §95469(a)(2)(B) Corrective Action Timeline: Define "initiated" and require documentation in a log for enforceability. (OP_SMAQMD-20)

Comment:

Timeframe and Requirements for Initiating Corrective Actions Must be Clarified

Sections 95469(a)(1)(B) and (2)(B) require owners/operators to initiate corrective actions triggered by surface emission monitoring within three calendar days of detecting the exceedance. Existing law simply requires correction and re-monitoring to occur within ten days of detecting the exceedance.

While we understand and support ARB's intent to expedite the timeframe in which corrective actions are taken, we are concerned about what "initiate" means in light of the three calendar day window. Three calendar days may simply not be enough time to get a consultant or contractor out to landfills located in rural areas. While owners/operators can certainly reach out to consultants and contractors within three days to schedule diagnostic and remedial actions, it may be very difficult to have the actual response action begun within three calendar days of detection.

For this reason, RCRC suggests that ARB clarify in the Final Statement of Reasons that "initiate" may include the process of reaching out to an individual to perform the remedial action. This would not change the existing requirement that actions be completed and re-monitored within ten days of detecting the exceedance, but would instead recognize the operational realities and challenges of operating facilities in rural areas. (OP_RCRC-7)

Agency Response to Combined Comments:

CARB made changes in response to these comments. In the 15-Day Changes, CARB added documentation of the date and action taken to initiate repair in section 95470(a)(1)(G). No other changes were made in response to these comments.

Staff did not define or prescribe specific steps that qualify as "initiating" corrective action, as the plain meaning of the term (i.e., to facilitate the beginning of) adequately captures the intended meaning and the need for operators to follow site-specific procedures for diagnosing, planning, coordinating, and implementing a corrective action. With the extension to five days in the 15-Day Changes (see the agency response in section IV.C.3-2 for more information), the Proposed Amendments provide sufficient time to implement the types of actions listed as examples in sections 95469(a)(1)(B) and (2)(B) of the Proposed Amendments.

C.3-4 Remove windspeed and precipitation restrictions from re-monitoring

Comment: Moreover, CARB would impose the same windspeed and precipitation requirements as quarterly SEM events on SEM re-monitoring events—specifically, an average windspeed limit of 5 mph or instantaneous limit of 10 mph and allowing SEM only where there has not been measurable precipitation in the preceding 72 hours. See Section 95471(c)(1)(D).

It is difficult for operators to ensure that third-party consultants are available for SEM remonitoring especially if CARB is to impose additional requirements such as windspeed and precipitation that are outside of the operators' control. CARB should therefore remove windspeed and precipitation requirements from re-monitoring obligations. (OP_WM-61)

Agency Response:

No changes were made in response to this comment. The comment refers to an existing provision in the current LMR and no substantive changes were made to this provision in the Proposed Amendments. High winds or precipitation can affect measurement accuracy, potentially making a repair appear effective when it was not. CARB understands that some landfills consistently experience high winds or precipitation; those landfills can apply for an alternative compliance option to address this as needed.

C.3-5 Various timelines may not be feasible

Comment:

Proposed Timeframes Are Too Short and May Not Be Achievable

Sections affected: §95469(a)(1)(B), §95469(a)(2)(B), §95469(a)(4)(B), §95469(b)(2)(A), §95469(e)(1)(B)

ReGen understands that prompt response to observed exceedances is essential to limit surface emissions. However, given routine daily operating activities and necessary reliance on external consultant support, the accelerated timeframes proposed may not be feasible in practice. (OP_ReGen-9)

Agency Response:

CARB made changes in response to this comment. Timelines in some of the referenced sections were changed in the 15-Day Changes. This comment is an opening paragraph below which the commenter provided specific detailed comments. Responses to those comments are provided elsewhere in this FSOR.

C.3-6 Provide flexibility on date of one-month re-monitoring

Comment:

{CARB staff note: Commenter quoted 45-Day Changes text of section 95469(a)(1) (instantaneous SEM).}

For the requirement in (B)2. 'shall be re-monitored one month from the initial exceedance' is a bit confusing for application. If the 30 days falls on a weekend or weather conditions for wind and rain preclude surface emission monitoring, then meeting this requirement might be impossible. We recommend changing this 'between 30 days but no longer than 45 days from the initial exceedance. (OP_YoloCo-12)

Comment:

{CARB staff note: Commenter quoted 45-Day Changes text of section 95469(a)(2) (integrated SEM).}

For the requirement in (B)2. 'shall be re-monitored one month from the initial exceedance' is a bit confusing for application. If the 30 days falls on a weekend or weather conditions for wind and rain preclude surface emission monitoring, then meeting this requirement might be impossible. We recommend changing this 'between 30 days but no longer than 45 days from the initial exceedance. (OP_YoloCo-16)

Agency Response to Combined Comments:

No changes were made in response to these comments. "One-month" re-monitoring aligns with existing federal requirements,[10] simplifying compliance and reporting for landfills subject to those rules and aligning the LMR with federal *Emission Guidelines and Compliance Times for Municipal Solid Waste Landfills* (Emission Guidelines or EG).[11] In practice, CARB recognizes that "one month" does not have a precise meaning as a unit of time passage but can be the same numbered day in the following month, thirty days, or another reasonable interpretation.

C.3-7 Revert start of 120-day period for new/replacement well to date of third exceedance

Comment: Timing for performing corrective action that involve substantial work/contractors. The general 120-day requirement is difficult for publicly owned landfills, as public works contracting requirements are difficult to meet with sufficient time to then do the work prior to the 120-day completion requirement. The County supports a 120-day requirement that starts from the date of the triggering exceedance. (OP_YoloCo-4)

Comment:

{CARB staff note: Commenter quoted 45-Day Changes text of section 95469(a)(1) (instantaneous SEM).}

The change in (B)3. of the 120-day new well requirement to "from initial exceedance", not "after 2nd failed re-monitoring" puts a substantial burden on publicly owned landfills. Conducting a public works solicitation for this sort of work takes most of the 120-day requirement, with required notices, contractor reviews, board approvals, and scope of work development. The County supports a 120-day requirement that starts from the date of the triggering exceedance. (OP_YoloCo-13)

Comment:

{CARB staff note: Commenter quoted 45-Day Changes text of section 95469(a)(2) (integrated SEM).}

The change in (B)3. of the 120-day new well requirement to "from initial exceedance", not "after 2nd failed re-monitoring" puts a substantial burden on publicly owned landfills. Conducting a public works solicitation for this sort of work takes most of the 120-day requirement, with required notices, contractor reviews, board approvals, and scope of work

[10] 40 C.F.R. § 63.1960(c)(4)(iv); 40 C.F.R. § 60.765(c)(4)(iv); and 40 C.F.R. § 60.36f(c)(4)(iv).
[11] 40 C.F.R. Part 60, Subpart Cf.

development. The County supports a 120-day requirement that starts from the date of the triggering exceedance. (OP_YoloCo-17)

Agency Response to Combined Comments:

No changes were made in response to these comments. Moving the start of the 120-day timeline to the date of initial detection aligns with requirements in existing federal rules[12] and ensures that the exceedance is corrected more quickly to minimize methane emissions. This also helps to ensure that operators plan and act promptly during the 10-day repair periods to leave sufficient time for well installation, if needed. The owner or operator can also request additional time allowances for repairs pursuant to section 95468(a)(1).

C.3-8 Do not require re-monitoring after installing new/replacement well following third exceedance

Comment:

Section 95469 (a)(1)(B)3. and (a)(2)(B)3.

The current LMR and the applicable Federal regulations define surface emission remediation as being achieved when new or replacement wells are installed within the timeframe established by the regulations. Immediate remediation of surface emissions is not always possible, as it takes time to equilibrate and optimize the gas collection system. RCDWR recommends the proposed section be modified to match the applicable Federal regulations. (OP_RIVCO-6)

Agency Response:

No changes were made in response to this comment. Confirmation that the area has returned to compliance within the 120-day timeline through re-monitoring clarifies an implied existing requirement because re-monitoring is the only means by which to establish that the remedy has corrected the exceedance.

C.3-9 Concerns about timeline for alternatives after third exceedance

Comment:

{CARB staff note: Commenter quoted 45-Day Changes text of section 95469(a)(3).}

In general, we like this flexibility for longer term corrective actions, rather than proscribing a 'new well' for all exceedance issues. We are concerned that the timelines for submission and approval of alternatives may not leave enough time within the 120-day requirement from initial exceedance to complete remediation of exceedances. (OP_YoloCo-19)

Comment:

Topic: SEM 95471(c)

[12] 40 C.F.R. § 63.1960(c)(4)(v); 40 C.F.R. § 60.765(c)(4)(v); and 40 C.F.R. § 60.36f(c)(4)(v).

Potential Issues:

2. Alternative correction plan for requests not including well install – timeline is tight.

Concerns:

- Who is going to hold the Executive Officer (AQMD) to the deadline for the alternative timeline?
- If denied, the site would need more than 30 days to install a well especially in areas that are difficult to get to. (OP_SWMD-20)

Comment: Under Section 95469(a), CARB has made various components of the SEM requirements more stringent. This includes:

…

- Adding additional criteria and tight timeline for seeking alternative remedies for SEM exceedances beyond new or replacement gas wells. (OP_OPAL Fuels-16)

Agency Response to Combined Comments:

CARB made changes in response to these comments. In the 15-Day Changes, the 120-day limit for completing alternatives was removed. The Proposed Amendments will instead rely on the demonstration from the owner or operator that the time requested is needed to complete the alternative plan.

A new or replacement well installation timeline extension after a disapproved alternative was not provided because this could be used to simply delay installing a well. The operator can work in parallel to move forward on procurement and scheduling for the well installation if they are concerned that the alternative may not be approved.

The Proposed Amendments did not "add additional criteria and a tight timeline for seeking alternative remedies for SEM exceedances beyond new or replacement wells." Under the current Regulation, there is no dedicated process for requesting such an alternative. The process is entirely new, and the criteria and timelines are necessary to ensure only robust alternatives are approved and that they are acted on quickly to minimize emissions.

The intention is for CARB and implementing air districts to act within the timelines provided. Staff is committed to ongoing communication and compliance assistance to address specific situations as they arise to minimize methane emissions.

C.3-10 Provide guidance on acceptable alternatives after third exceedance

Comment:

- §95469(a)(2)(B)(3) Alternative Remedy: Clarify acceptable alternatives to installing a new or replacement well.
- §95469(a)(3) Alternative Corrective Plan: Provide guidance/examples of acceptable measures. (OP_SMAQMD-21)

Agency Response:

CARB made changes in response to this comment. In the 15-Day Changes, CARB clarified that these alternatives must be an action that the operator could not reasonably complete within the time allotted to repair the first and second exceedance. In the 15-Day Notice, CARB provided examples including upgrading the blower or header pipes, or installing more robust cover over a larger area. However, CARB did not enumerate a list of acceptable alternatives in the regulatory text because CARB staff are not necessarily aware of all the site-specific situations that might necessitate an alternative and wish to retain flexibility for the owner or operator to demonstrate the effectiveness of an alternative.

C.3-11 Clarify acceptable re-monitoring for a continuous monitoring system

Comment:

§95469(a) – Re-Monitoring
TrelliSense suggests clarification of what constitutes “re-monitoring”. We believe that a continuous monitoring system should qualify as a re-monitoring method. If CARB agrees, we recommend including this allowance in this section. Allowing landfill operators to focus resources on corrective actions rather than manual re-monitoring efforts will both help ease the burden of compliance with this rule and facilitate effective corrective action. (OP_TrelliSense-8)

Agency Response:

No changes were made in response to this comment. Continuous monitoring technologies could only be used for SEM if approved with an alternative monitoring procedure through section 95471(e) of the Proposed Amendments. That section requires all alternatives to be used as a screening method, where a surface emissions exceedance is only established through follow-up monitoring with a hydrocarbon detector, and where repairs and re-monitoring are performed according to the requirements in sections 95469(a)(1) and (2). Therefore, the meaning of “re-monitoring” is clear. Requiring re-monitoring with a hydrocarbon detector maintains a consistent standard for when the surface emissions exceedances have been corrected.

4. Recurring Surface Emissions Exceedances

C.4-1 Expand recurring exceedance framework to sitewide recurrence

Comment: Recurring Surface Exceedances Framework - § 95469(a)(4): We support CARB’s efforts to establish a “recurring surface exceedance" framework that triggers increased monitoring frequency and corrective actions when repeated high readings are detected within the same grid. Specifically, requiring monthly monitoring and collection system and cover integrity assessments in areas with recurring exceedances represents an important accountability mechanism. To improve efficacy, we encourage CARB to expand this framework to ensure it captures systemic issues rather than isolated grid anomalies. Specifically, we recommend extending the recurring exceedance analysis to identify landfill-wide patterns. If multiple grids across the landfill meet the recurrence threshold within a 12-

month period, CARB should require increased monitoring frequency across the entire landfill surface. (OP_CAW-30)

Comment: Expand the recurring exceedance framework to identify landfill-wide patterns when multiple grids meet recurrence thresholds. (OP_CAW-35)

Agency Response to Combined Comments:

No changes were made in response to these comments. CARB staff considered the suggested approach in consultation with regulatory partners but determined it would increase complexity and potentially not result in significant additional benefit. CARB chose to focus on addressing problematic areas of landfills and more stringent criteria to convert to, or remain on, reduced SEM frequency. CARB appreciates the commenter's idea.

C.4-2 Limit response to only triggering grid and reduce timeline to return to quarterly frequency

Comment:

- Section: 95469(a)(4) – Recurring Surface Exceedances
- Current: Perform cover integrity assessment, monthly monitoring for impacted grid and all adjacent grids.
- Proposed: Limit to only affected grid and return to normal monitoring cadence after 3 months.
- Rationale: Would require excessive monitoring of areas not known to have issues. Efficacy of corrective action should be known after three consecutive months of monitoring. (OP_WM-6)

Comment: Under Section 95469(a), CARB has made various components of the SEM requirements more stringent. This includes:

…

- Adding additional requirements for Recurring SEM exceedances areas as detailed below:

Recurring Surface Exceedances (95469(a)(4)): The owner or operator of a MSW landfill that experiences either five initial (i.e., not including re-monitoring) instantaneous exceedances or three initial integrated exceedances within a single grid over a rolling 12 month period, including exceedances detected during monitoring pursuant to section 95469(a)(1) and (2) and compliance inspections, shall do the following in the grid that exceeded the threshold and all adjacent grids (i.e., grids that share an edge or corner):

- Complete a collection system assessment as described in section 9547l(j) and a cover integrity assessment as described in Section 95471(k) within 30 calendar days after reaching the threshold in section 95469(a)(4) and correct any issues identified in the assessments that could be contributing factors to the surface exceedances within 60 calendar days after reaching the threshold.
- Increase the frequency of surface emissions monitoring performed pursuant to section 95469(a) to monthly. The first monthly monitoring shall occur within 30 calendar days of reaching the threshold in section 95469(a)(4). The frequency can be reverted to

quarterly after six consecutive monthly monitoring periods show no exceedances in the area in which the monitoring frequency was increased.

The requirement in Section 95469(a)(4) to assess the condition of the collection system and perform monthly surface emissions monitoring in the grids adjacent to a grid with recurring surface emissions exceedances is onerous and unreasonable, especially since by definition grids that are adjacent to the grid with recurring surface emissions exceedances would not themselves have had recurring surface emissions exceedances. Surface emissions are a local condition that are remediated by adjusting the wells closest to the exceedance and/or repairing the cover at the location of the exceedance. The requirement to include the adjacent grids simply takes the focus (and labor) away from the actual location of the exceedance. (OP_OPAL Fuels-17)

Comment:

Section 95469(a)(4) - Recurring SEM Exceedances:

The requirement in Section 95469(a)(4) to assess the condition of the collection system and perform monthly surface emissions monitoring in the grids adjacent to a grid with recurring surface emissions exceedances is not practical or beneficial. By definition, grids adjacent to the grid with recurring surface emissions exceedances would not have had recurring surface emissions exceedances. Surface emissions are a local condition that are remediated by adjusting the wells closest to the exceedance and/or repairing the cover at the location of the exceedance. The requirement to include the adjacent grids simply takes the focus (and labor) away from the actual location of the exceedance. (OP_Ind/Gov Coalition-13)

Comment:

{CARB staff note: Commenter quoted 45-Day Changes text of section 95469(a)(4).}

The requirement to include 'all adjacent grids' changes the area from 50,000 sf to review to 450,000 sf to review. We recommend changing this requirement to doing the assessments in (A) to the grid but not including the additional surface emissions monitoring in the adjacent grids. (OP_YoloCo-20)

Comment:

{CARB staff note: Commenter quoted 45-Day Changes text of section 95469(a)(4).}

In (B) decrease the monthly monitoring to 3 months with no exceedances. This seems like plenty of time to ensure that repairs/changes are holding, without creating excessive extra work. (OP_YoloCo-21)

Comment: The requirement in Section 95469(a)(4) to assess the condition of the collection system and perform monthly surface emissions monitoring in the grids adjacent to a grid with recurring surface emissions exceedances is onerous and unreasonable, especially since by definition grids that are adjacent to the grid with recurring surface emissions exceedances would not themselves have had recurring surface emissions exceedances. Surface emissions are a local condition that are remediated by adjusting the wells closest to the exceedance and/or repairing the cover at the location of the exceedance. The requirement to include the adjacent grids simply takes the focus (and labor) away from the actual location of the exceedance. (OP_L and D-44)

Comment:

Topic: SEM 95471(c)

Potential Issues:

3. Repeated exceedances (≥5 instantaneous or ≥3 integrated within 12 months) require system and cover assessments and monthly monitoring including adjacent grids until no exceedances for 6 consecutive months

> a) Complete a collection system assessment as described in section 95471(j) and a cover integrity assessment as described in section 95471(k) within 30 calendar days after reaching the threshold in section 95469(a)(4) and correct any issues identified in the assessments that could be contributing factors to the surface exceedances within 60 calendar days after reaching the threshold.

Concerns:

- Timelines make the assessment and correction unrealistic.
- Timelines could be issue. Area required could be problematic. (OP_SWMD-21)

Agency Response to Combined Comments:

CARB made changes in response to these comments. In the 15-Day Changes, the requirement to increase surface emissions monitoring frequency in adjacent grids was removed. Based on staff review of comments, further discussions, and reviewing reported data, removing the requirement for SEM in adjacent grids likely retains most of the benefit of increased monitoring frequency with less resources expended.

CARB retained the requirement to perform collection system and cover integrity assessments in all adjacent grids, which helps to ensure that any deficiencies are addressed comprehensively in the larger area. For example, issues with wells or header pipes in adjacent grids can impact surface emissions as the areas of influence of wells are not limited to just the grid in which they are located. Similarly, erosion or other cover deficiencies may affect an area that crosses the perimeter of an individual grid.

The Proposed Amendments also retain the requirement to demonstrate six months of no surface emission exceedances to return to quarterly monitoring, which is necessary to demonstrate that the actions taken to correct issues identified in the cover integrity and collection system assessments were durable repairs over multiple seasons. Limiting the spatial extent of monthly monitoring to a single grid makes it more reasonable to perform for this period.

The timelines and area for assessments and correction are appropriate and the commenter contending these are unreasonable did not provide any rationale or specificity for CARB to respond to.

C.4-3 Monthly SEM is too frequent

Comment:

§95469(a)(4)(B) – Monthly Monitoring Frequency

Increasing monitoring frequency to monthly intervals will further strain the already-limited availability of field crews in California. Landfills will likely need to hire and train their own staff to perform monitoring events rather than relying on specialized consultants who perform this work daily. This shift may reduce measurement quality, as landfill staff must integrate monitoring into their many other operational duties rather than focusing exclusively on this specialized task. (OP_ReGen-11)

Agency Response:

No changes were made in response to this comment. Monthly SEM is only required in the limited circumstance of recurring surface emission exceedances, and in the 15-Day Changes, the area with this higher frequency was adjusted to only apply to the grid exceeding the recurring threshold (rather than also including the adjacent grids). In the ISOR, staff analyzed the number of grids expected to exceed the threshold annually as 113. Given that this represents an estimated 0.6% of the total grids at controlled landfills,[13] this change is expected to result in a small increase in SEM being performed. Therefore, CARB does not expect it to materially affect availability of consultants or the need to hire additional staff.

C.4-4 Limit recurring exceedances to a more localized area

Comment:

Section 95469 (a)(4): Recurring Surface Exceedances – Assessment and Monitoring Requirements

The proposed amendments in this subsection require enhanced monitoring for recurring exceedances, specifically five exceedances for instantaneous and three exceedances for integrated monitoring. For a 50,000 square-foot monitoring grid of a landfill, subsequent instantaneous exceedances within a grid may not necessarily be related or relevant. The current wording of the proposed LMR amendments does not adequately address this possibility, which could create significant and unjustified burdens for landfill operators to comply with the amended requirement. The proposed amendments under this subsection consider recurring exceedances solely on the basis of exceedance counts, without distinguishing between persistent, localized events and transient or dispersed occurrences.

The Sanitation Districts acknowledge that the grid is defined in the regulation as the smallest monitoring unit. Therefore, introducing sub-grid spatial criteria could add unnecessary complexity. Nevertheless, the description of recurring exceedance in the proposed amendments risks conflating isolated instantaneous exceedances with true recurring patterns. To better align the rule with actual monitoring practices and emission behavior, the Sanitation Districts recommend that CARB consider the following refinements:

- Clarify that integrated exceedances caused primarily by a single elevated instantaneous reading should not, by themselves, count toward the recurring exceedance threshold.
- Recognize the functional difference between instantaneous and integrated

[13] Total estimated number of grids is derived by dividing the total surface area (acres) of controlled landfills listed in ISOR Appendix B Table B-5 by the area of a grid (in acres).

exceedances by applying separate, balanced thresholds that account for their differing purposes and data overlap (e.g., increasing the number of integrated exceedances required to trigger recurrence).

- Define recurring exceedances based on persistence over time rather than unrelated exceedances within a grid, acknowledging that instantaneous exceedances are inherently localized and may not indicate widespread system deficiencies.
- Maintain focus on identifying and correcting persistent, localized emission sources without imposing redundant monitoring or system-wide assessments triggered by unrelated or transient exceedances. (OP_LACSD-7)

Comment: The Sanitation Districts recommend CARB to refine this amendment and clearly define what constitutes a recurring instantaneous exceedance within a grid. One possible rewording for defining a recurring instantaneous exceedance in a grid, for CARB's consideration, could be *"… either five initial (i.e., not including re-monitoring) instantaneous exceedances ("five-initial-recurring-instantaneous-exceedance" event within a grid is defined as any or each instantaneous exceedance of these "five exceedances" must be in a close vicinity (say, within 20 feet radius) of at least any two of the other four instantaneous exceedance within a single grid over a rolling 12-month period)…."*.

This definition and approach would focus compliance resources on persistent, localized emission sources that represent actual control deficiencies, while avoiding unnecessary assessments triggered by isolated or unrelated exceedances dispersed across a large grid. (OP_LACSD-8)

Agency Response to Combined Comments:

No changes were made in response to these comments. Integrated exceedances are, by definition, a condition that occurs across an entire grid as it is defined by a grid average. For instantaneous exceedances, a grid is the smallest defined spatial unit already being used for surface emissions monitoring purposes. Creating smaller subdivisions would lead to complexities for operators to define those smaller areas and track exceedances within them that outweigh the utility of constraining recurring instantaneous exceedances to smaller areas. Exceedances on separate sides of a grid may or may not be related to one another, but the intention is to investigate an area where repeated exceedances are found as several factors that can affect repeated exceedances could be spatially distributed, like insufficient collection infrastructure or inadequate cover properties.

Staff did not propose an element of time persistence because staff's analysis found that the proposed thresholds are rarely met in a single quarter. Adding a time factor would add complexity without a significant practical effect.

C.4-5 Clarify if 12-month rolling period includes pre-effective date exceedances

Comment: §95469(a)(4) Recurring Exceedances: Clarify whether thresholds apply only after Rule effective date; guidance needed on counting compliance re-inspections as exceedances. (OP_SMAQMD-22).

Agency Response:

No changes were made in response to this comment. Because the provision does not go into effect until the effective date of the amendments, only exceedances found in monitoring that is conducted after the effective date would count toward the thresholds. The Proposed Amendments state "initial (i.e., not including re-monitoring) instantaneous exceedances or three initial integrated exceedances" and therefore is clear that only the first detection counts toward the recurring threshold.

5. Unsafe-to-Walk Areas

C.5-1 General support for removing broad exclusions for the working face and inaccessible areas or requiring advanced technology to screen unsafe-to-walk areas

Comment: Landfill operators should be required to utilize the best technology available including satellites and drones to detect methane leeks from surfaces that are inaccessible on foot. (OP_Bruce-2)

Comment: The development of productive and cost-effective solutions is needed. The use of non-personnel tools such as drones, walking robots, and sensors provides a resource that helps to protect staff from entering areas where incidents can occur and can be utilized 24/7.

State of California staff, City of Bakersfield staff and RMI employees met in early 2025 to evaluate and attempt to validate the effectiveness of addressing these areas needing attention. Initial feedback provided in a joint report highlighted the benefits of this approach to monitoring.

It is hoped that the State of California will share its experiences with other states to further promote addressing the methane challenge. (OP_Ronnau-2)

Comment: RMI and EDF applaud CARB's proposal to strengthen working face monitoring to close gaps in existing monitoring protocols.

Recent remote sensing surveys have identified significant emissions coming from the landfill's working face. Unmanned Aerial Systems (UAS)-based methods can safely monitor the working face, which studies have shown contribute significantly to total site emissions and are typically excluded from walking SEM.

We strongly support CARB's proposal to leverage readily available advanced technologies to monitor previously excluded areas, and we urge the Board to maintain this requirement and the proposed hotspot thresholds (200 ppmv or 50 ppm-m). (OP_RMI/EDF-14)

Comment: We commend CARB for several important updates that strengthen the SEM framework, including:

- Monitoring of unsafe-to-walk areas - § 95469(a): As mentioned above in Issue Area I, we strongly support the inclusion of previously excluded "unsafe-to-walk" areas like the steep slopes and active face of the landfill. (OP_CAW-21)

Comment:

- Removal of broad exemptions for construction activities - § 95464(e): We strongly support the removal of the previous exemption for construction activities from the 500

ppmv emissions standard. (OP_CAW-39)

Agency Response to Combined Comments:

No changes were made in response to these comments. CARB appreciates the supportive comments and thanks the commenters. CARB has long recognized the importance of supporting other states in implementing climate strategies and frequently coordinates with other state and national governments to share experience and knowledge.

C.5-2 Do not require monitoring in unsafe-to-walk areas until broad alternatives approved

Comment:

Operators should not be required to monitor unsafe areas until CARB has approved alternative SEM technologies.

The Draft Regulation provides that "unsafe-to-walk surface areas" that cannot be monitored using the methodology outlined in Section 95471(c) must be monitored using an alternative SEM procedure under Section 95471(d) within the same calendar quarter. See Section 95469(a). CARB proposes to prescribe several "instrument requirements" on the alternative monitoring technology that can be used for this purpose, including the requirement to record sampling data at "a frequency of at least one hertz." 95471(d)(2)(C). This requirement is inappropriate and technically infeasible because one second intervals would flood both operators and CARB with immense amounts of data with no additional benefit in terms of emissions reductions. Accordingly, WM requests that CARB revise the requirement to reduce the frequency to five seconds.

CARB lists three examples of alternative technologies that can be used for this purpose: (1) a handheld instrument that measures methane column concentration between the user and a point on the landfill surface where the instrument is aimed; (2) a drone-mounted instrument that measures methane column concentration in a downward-facing direction; or (3) a rover-mounted instrument that measures methane volumetric concentration near ground-level. As noted above, WM understands the value of utilizing alternative monitoring technologies to conduct SEM, subject to additional research and development, particularly in order to comply with the approval process under Section 95471(e). It is not clear if, and if so, why the requirements for alternative technologies to use for the purpose of evaluating unsafe-to-walk surface areas is distinct from that of alternative technologies to use for SEM.

Regardless, the technologies suggested by CARB require additional research and development to ensure that they can operate in a standardized, reliable manner. Operators likely will not be able to comply with the requirement to monitor unsafe-to-walk surface areas using these technologies by the effective date of the revisions contained in this Draft Regulation.

Accordingly, CARB should impose the same technology review and approval process for the purposes of monitoring unsafe-to-walk areas under Section 95471(d) that it does for alternative SEM technologies under Section 95471(e). CARB must also delay the requirement to utilize alternative technologies to monitor unsafe-to-walk surface areas until a point in the future, such as July 1, 2027, to ensure that both the technologies are ready for regulatory use, and that

CARB has had ample time to review them for their ability to comply with the requirements under both Sections 95471(d) and (e). Until then, CARB should exclude unsafe-to-walk surface areas from quarterly SEM, to preserve the safety and wellbeing of landfill technicians conducting SEM in accordance with Section 95471(c). (OP_WM-58)

Agency Response:

CARB made changes in response to these comments. In the 15-Day Changes, the timelines for operators to follow up on screening detections were extended. No other changes were made in response to this comment.

The requirements for alternative technologies to use in unsafe-to-walk areas (in section 95471(d)) are intentionally distinct from those for alternative technologies to use for screening in lieu of SEM (in section 95471(e)). As discussed in the ISOR, alternatives for unsafe-to-walk areas do not require CARB evaluation and pre-approval because, though staff recognizes the importance of ensuring alternative technologies are used with standard procedures that have been demonstrated to be reliable and effective, this is balanced by the value of monitoring in areas that would otherwise not be monitored at all under the current Regulation. As described in the ISOR (p. 41), both U.S. EPA's enforcement alert and CARB Enforcement Division's experience show that current practices can result in overly broad areas being excluded from surface emissions monitoring (SEM). Operators currently exclude areas that are unsafe to walk, and CARB maintains that screening-level monitoring in these locations is preferable to complete exclusion.

CARB has maintained the 1 hertz data collection frequency, as this resolution is necessary for regulators to clearly view the measurement path and evaluate compliance with measurement procedure requirements. Multiple commercially available instruments already exist that can meet the requirements for screening unsafe-to-walk areas, including drones capable of collecting near-ground concentration measurements and handheld tunable diode laser absorption spectroscopy (TDLAS) instruments. Because the Proposed Amendments provide the general methods to be used, additional method development is not necessary for operators to begin screening.

CARB acknowledges that a more rigorous equivalency demonstration will occur for any alternative methods submitted under section 95471(e). However, waiting for applications to be submitted and approved could significantly delay monitoring in unsafe-to-walk areas. Once approved, operators may elect to use any section 95471(e) alternative method in these areas instead of the requirements in section 95471(d).

Section 95471(d) was intentionally designed to protect worker safety while still enabling monitoring coverage in locations that would otherwise be excluded, and modifications were made in the 15-Day Changes to provide operators additional time to follow up on screening detections. The design of the screening approach and extended timelines provided in the 15-Day Changes allow adequate time to arrange safe access for follow-up monitoring and repairs, such as bringing in appropriate equipment or making operational adjustments.

C.5-3 Exclude working face from unsafe-to-walk area monitoring

Comment:

The Working Face should be excluded from SEM until it is safe to monitor.

The Draft Regulation would exclude the working face area from SEM obligations under Section 95471(c)(1)(A) for the first 180 calendar days after the initial waste placement at that location and so long as active filling and compacting operations are ongoing. However, this exclusion does not account for the fact that where filling and compaction operations continue past 180 days after initial waste placement, the area will not be safe to monitor immediately upon cessation of filling and compaction operations. CARB should instead provide operators until cessation of filling and compaction in an area has ceased to require SEM. (OP_WM-59)

Comment: Under Section 95469(a), CARB has made various components of the SEM requirements more stringent. This includes:

- Only allowing active areas to be exempt from monitoring for 180 days once first waste is accepted there. (OP_OPAL Fuels-14)

Comment: CARB's proposed changes to Surface Emission Monitoring (SEM) are incompatible with Kiefer's operations:

- Active areas are only exempt from monitoring for 180 days after accepting waste, which is insufficient for engineering and well installation. For multi-acre modules, entire horizontal lifts may not be complete within 6 months, and thicknesses may be so shallow as to result in system non-compliance due to oxygen intrusion. This would be even further exacerbated if the wellhead oxygen requirements are simultaneously adopted. Additionally, a 6-month timeline for a project to install wells will not be possible for a public agency that needs to follow public contracting code to go through all of the legally required steps of design, gain permission to bid, bid, award, bond, and contractually start up a project – let alone construct anything. (OP_SacCo-16)

Comment:

Improved Coverage of Surface Emission Monitoring

OCWR supports the concept of improved coverage for surface emissions monitoring. However, using alternative technologies to monitor the landfill working face/active areas for methane emissions may have limited value as newly disposed solid waste would typically take six to eighteen months, under anaerobic conditions, to generate methane. While drones could help safely survey steep or inaccessible areas, their effectiveness depends on sensor accuracy, flight protocols, and data interpretation.

OCWR recommends that CARB consider regulatory flexibility and allow site-specific implementation and enforcement. Additionally, any proposed alternative technologies will need to be thoroughly evaluated and approved by CARB, and a standardized operational protocol shall be developed for alternative monitoring technology applications. (OP_OCWR-4)

Agency Response to Combined Comments:

No changes were made in response to these comments. After the 180-day working face exclusion period has expired, operators have multiple options to comply with the SEM

requirements, including: the unsafe-to-walk surface emissions monitoring procedures can be used to safely screen the area from a distance and avoid disrupting operations; operations can be temporarily paused in a partial area of the working face to make the area accessible for ground-based monitoring; or the working face can be shifted to a new location.

As discussed in the ISOR, CARB's rationale for setting a limited time period for exclusion of the working face is based on the emerging consensus from a growing body of research showing that the working face is a major source of emissions.[14,15,16] Until recently, this was not widely recognized because working faces were excluded from monitoring and technologies were not widely available to safely observe these areas. Research has also shown that waste begins to break down and produce significant quantities of methane before gas collection systems are typically expanded.[17,18] Allowing the working face to be perpetually excluded from monitoring would undermine addressing this important source of methane emissions.

If hotspots are found in screening, and exceedances confirmed in follow up SEM, then the Proposed Amendments provide the same timelines for repairs as exceedances that are detected during routine quarterly SEM (i.e., if a new well is needed, the operator is granted 120 days after the initial exceedance is measured to install and operate it).

C.5-4 Only require monitoring after unsafe conditions have resolved

Comment: Under the current rule, unsafe to walk areas are exempt from monitoring for the period of time that they remain "dangerous." Under the proposed rule (Sections 95469(a), 95471(d), and 95475(a)(40)), these areas are only exempt from standard SEM if they are unsafe to walk during the entire quarterly period of monitoring. And even if this requirement is met, the area is still required to be monitored by alternative means as described in (Sections 95469(a)). Due to limitations related to safety, access, and availability of technology, which may prevent these screening technologies from being deployed in the same quarter when an area was unsafe. As such, we request that the rule provide an allowance that based on site conditions and/or availability, that a landfill be allowed to monitor an unsafe to walk area when it is not a safety risk, as long as all reasonable efforts were made to conduct screening safely in the same quarter. (OP_OPAL Fuels-10)

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[14] CARB. (2024, April). *Summary Report of the 2020, 2021, and 2023 Airborne Methane Plume Mapping Studies.* *https://ww2.arb.ca.gov/sites/default/files/2024-04/2020-2021-2023%20Airborne%20Summary%20Report_FINAL.pdf*.

[15] Hanson, J.L., Yesiller, N., & Manheim, D.C. (2020, March 25). *Estimation and Comparison of Methane, Nitrous Oxide, and Trace Volatile Organic Compound Emissions and Gas Collection System Efficiencies in California Landfills: Final Report*. California Polytechnic State University.

[16] Scarpelli, T. R., Cusworth, D. H., Duren, R. M., Kim, J., Heckler, J., Asner, G. P., ... & Thorneloe, S. (2024). Investigating Major Sources of Methane Emissions at US Landfills. *Environmental Science & Technology, 58*(49), 21545-21556. *https://doi.org/10.1021/acs.est.4c0757*.

[17] U.S. EPA. (2023, October). *Quantifying Methane Emissions from Landfilled Food Waste*. EPA-600-R-23-064.

[18] RMI. (2022, July). *Key Strategies for Mitigating Methane Emissions from Municipal Solid Waste*.

Comment:

Section 95469(a), 95471(d), and 95475(a)(40) – Surface Emissions Monitoring for Unsafe-to-Walk Areas

Under the current rule, “unsafe-to-walk" areas are exempt from monitoring for the period of time that they remain “dangerous.” Under the proposed rule, these areas are only exempt from standard SEM if they are unsafe to walk during the entire quarterly period of monitoring. And even if this requirement is met, the area is still required to be monitored by alternative means as described in (Sections 95469(a) - *Surface Emissions Monitoring*).

While we are generally supportive of the requirement to make sure all areas are monitored each quarter, there are limitations due to safety, access, and availability of technology, which may prevent these screening technologies from being deployed in the same quarter when an area was unsafe.

Recommendation: We request that the rule provide an allowance for monitoring to be conducted within a subsequent quarter if monitoring can’t be conducted for the current quarter based on safety concerns, site conditions and/or availability, as long as all reasonable efforts were made to conduct screening in the same quarter. (OP_Recology-10)

Comment: Under the current rule, unsafe to walk areas are exempt from monitoring for the period of time that they remain "dangerous." Under the proposed rule (Sections 95469(a), 95471(d), and 95475(a)(40)), these areas are only exempt from standard SEM if they are unsafe to walk during the entire quarterly period of monitoring. And even if this requirement is met, the area is still required to be monitored by alternative means as described in (Sections 95469(a)).

While we are generally supportive of the requirement to make sure all areas are monitored each quarter, there are limitations due to safety, access, and availability of technology, which may prevent these screening technologies from being deployed in the same quarter when an area was unsafe. As such, we request that the rule provide an allowance that based on site conditions and/or availability, that a landfill be allowed to monitor an unsafe to walk area within the same or subsequent quarter, as long as all reasonable efforts were made to conduct screening in the same quarter. (OP_L and D-36)

Agency Response to Combined Comments:

CARB made changes in response to these comments. In the 15-Day Changes, the timelines to access the location identified in the screening-level monitoring for follow up monitoring were extended to ensure that personnel can take all steps necessary to safely access the location.

Allowing monitoring to occur in the subsequent quarter would delay repairing leaks and would also be difficult to administer and track compliance.

In response to the comment suggesting “these areas are only exempt from standard SEM if they are unsafe to walk during the entire quarterly period of monitoring,” please note this is intended as an alternative option, not a constraint. In other words, if an area is safe to monitor at some point in the quarter, conventional SEM using the procedure in section 95471(c) can be used in lieu of screening with an alternative technology and procedures described in section 95471(d).

C.5-5 Allow greater flexibility in unsafe-to-walk area monitoring procedures

Comment: Subsection (d) could be read to infer that the tools used to monitor surface emissions in unsafe-to-walk areas are capable of measuring methane volumetric or column concentration (i.e., sniffer drones). Discussions to date on use of remote sensing tools have centered upon their application being directional and not necessarily as quantitative measurement devices. While some of these tools have a limited capability to measure the concentration of emissions, there are concerns over the accuracy of the equipment due to how it is deployed over a variable substrate.

Some remote sensing tools currently employed are highly efficient but may not possess the measurement capabilities noted within this section (i.e., flyover, satellite imagery or standard drone imagery without measurement capabilities). With the goal being identification of emissions from areas that are unsafe to walk, the primary objective of these tools should be directional.

The regulation should allow for multiple approaches to meet the stated criteria for Unsafe to Walk Surface Areas. This should include equipment or methods that don't necessarily include volumetric or concentration measurement capabilities as first level directional screening. While the rule proposes an and/or approach to monitoring emissions in these areas (i.e., SEM or use of remote devices), the remote device option appears to be limited solely to sniffer drone technology. (OP_Ind/Gov Coalition-28)

Comment:

Section 95471 – Test Methods and Procedures

Subsection (d) could be read to infer that the tools used to monitor surface emissions in unsafe-to-walk areas are capable of measuring methane volumetric or column concentration. Discussions to date on use of remote sensing tools have centered upon their application being directional and not as quantitative measurement devices. While some of these tools (e.g. satellite imagery, flyover drones, etc.) are highly efficient at detecting methane emissions, the accuracy of these technologies to measure concentrations of emissions has not been adequately proven.

Recommendation: We request that CARB clarify that the primary objective of these tools should be identification of emissions for unsafe-to-walk areas. The regulation should allow for multiple approaches to meet the stated criteria for these areas, including equipment or methods that don't necessarily include volumetric or concentration measurement capabilities. Instead, if emissions are detected, follow-on verification monitoring could be accomplished via standard handheld equipment or using sniffer drones that would assist in determining the specific location of where the emissions are originating from. (OP_Recology-33)

Comment:

More Flexibility Needed for Monitoring and Addressing Issues on the Working Face and Unsafe-to-Walk Areas

Section 95471(d) limits the procedures for Surface Emissions Screening Procedures for Unsafe-to-Walk Surface Areas. The Alternative Surface Emissions Monitoring Procedures in Section 95471(e) are limited to 95471 (c) for Surface Emissions Monitoring Procedures. More flexibility is needed for all monitoring requirements, especially in unsafe areas. Operators

should be provided the opportunity to propose alternative monitoring equipment and methods including, but not limited to, those proposed in Section 95471 (e), which may include other remote sensing tools that can identify emissions from areas that are unsafe to walk even if those tools do not possess the same measurement capabilities as other methods noted in this section. (OP_RCRC-16)

Comment: Section 95470, Subsection (a)(1)(H) could be read to infer that the tools used to monitor surface emissions in unsafe-to-walk areas are capable of measuring methane volumetric or column concentration. Discussions to date on this topic have centered upon use of these tools as directional and not necessarily as quantitative measurement devices. Our view is that these tools are not capable of accurately measuring methane volume or concentrations and as such we would request that this text be adjusted to reflect that. A more appropriate approach would be to simply require that follow-on-surface emissions monitoring using conventional handheld equipment be employed within a suitable timeframe of emission detection via drone or stationary laser equipment. (OP_L and D-45)

Comment:

- §95471(d)-(e) Unsafe-to-Walk & Alternative Monitoring Procedures:
    - Introduces handheld, drone, or rover-mounted sensors with specifications, calibration, and operational requirements. Sac Metro Air District has evaluated alternative monitoring equipment in response to methane plumes detected during satellite flyovers but has found no available technologies that meet the proposed regulatory performance standards. The District has consulted with CARB regarding potential solutions; although some are under development, none are currently viable for compliance, underscoring a significant gap between regulatory expectations and available technology.
    - Follow-up for exceedances ≥200 ppmv (volumetric) or ≥50 ppm-m (column) must occur within 5–10 days. (OP_SMAQMD-31)

Agency Response to Combined Comments:

No changes were made in response to these comments. The Proposed Amendments establish quantitative thresholds because that sets a clear, consistent, and technology-neutral standard. The Proposed Amendments include thresholds for both volumetric and column concentrations because these are the two quantitative measures that are commonly used in detection instruments and enable both ground-level sampling platforms and remote sensing platforms. The criteria do not limit options solely to a single technology provider or that no options are available as two of these comments suggest; the Proposed Amendments list several examples of platforms and sensor types, and staff spoke to multiple vendors who provide technologies that are expected to meet the criteria. Additionally, staff expects that the Proposed Amendments will help promote adoption and development of new and emerging monitoring technologies.

In addition, the Proposed Amendments provide a process through which any entity can apply for approval of a monitoring technology and procedure to use in place of quarterly walking SEM with a Method 21-compliant hydrocarbon detector, under section 95471(e); once such a procedure is approved, it can also be used in unsafe-to-walk areas instead of the procedures in section 95471(d).

C.5-6 Allow alternative monitoring plans unsafe-to-walk areas

Comment: Requiring remote sensing of unsafe areas is presented as the only approach to take the place of monitoring exclusions of these areas. The LTF recommends an alternative monitoring plan to allow operators to look for real issues with the landfill collections system in these areas by using conventional monitoring in accessible adjacent areas or allow proposals of alternative sensing methods subject to approval of the local air districts. All efforts must be made to keep workers safe by keeping them out of the unsafe areas. (OP_SWANA-8)

Comment: The LTF recommends that instead of requiring remote sensing of unsafe areas as the only approach, an alternative monitoring plan should be allowed to look for real issues with the landfill collections system in these areas by using conventional monitoring, or other approved sensing technologies in accessible adjacent areas. All efforts must be made to keep workers safe by keeping them out of the unsafe areas. (OP_SWANA-18)

Comment: We believe there needs to be more flexibility in the use of remote sensing equipment for unsafe to walk areas, and the extent of monitoring relative to frequency parameters need to be streamlined. (T_RS-5)

Agency Response to Combined Comments:

No changes were made in response to these comments. The unsafe-to-walk procedures in the Proposed Amendments are meant to be technology-neutral and relatively flexible within while still providing some procedural constraints to ensure thorough screening. Alternative monitoring methods approved through section 95471(e) will be available for use in unsafe-to-walk areas, and owners or operators can submit requests for alternative compliance options for site-specific conditions under section 95468 that achieve equivalent methane control and enforceability.

C.5-7 Concerns about the value of monitoring unsafe-to-walk areas

Comment:

Remote Monitoring of “Unsafe-to-Walk” Areas:

Local air districts, in implementing the LMR, have carefully excluded unsafe areas from monitoring efforts. Before CARB proceeds with modifying this practice, the number of areas excluded should be examined; are the number of excluded areas extensive enough to cause an overall methane emissions problem? If CARB proceeds with requiring remote monitoring of unsafe areas, landfills operators would have to invest in remote sensing technologies. Is it cost effective to only discover a minor crack in the cover with a single 500 ppm exceedance? Also, an area that is unsafe to walk in will also be unsafe for workers to remediate any problems discovered. Per the discussion above, CARB needs to identify whether the focus is simply mitigation of cracks in the cover or uncovering real gas system problems. It is unlikely a crack in the cover in an unsafe area is worth the danger to workers needed to attempt remediation. However, a gas system problem could be dealt with more effectively by looking for improvements to the gas system and not endangering workers. (OP_SWANA-17)

Comment:

§95471(d)(1) – Drone and Rover-Mounted Instrument Requirements

This section suggests that drone-mounted and rover-mounted instruments are sufficiently widespread to make previously unmonitorable unsafe areas monitorable. This represents a mischaracterization of available technologies, as implementing these technologies is cost-prohibitive for most operators.

Contracting a sniffer drone service costs $15,000 per quarter, while purchasing a laser drone device costs $50,000 and requires specialized licenses and training to operate. These are not readily accessible tools for routine monitoring. (OP_ReGen-18)

Comment: Currently, areas deemed unsafe to walk are exempt from monitoring while dangerous. The proposed rule limits this exemption to areas unsafe for the entire quarterly monitoring period and still requires alternative monitoring. Technologies tested for such alternative monitoring have proven inconsistent and unreliable. Routinely they have "detected" methane that has not been able to be replicated by any other technology or in areas shown to be in compliance.

Moreover, many of Kiefer's unsafe areas are the active fill area or active construction zones where methane collection infrastructure cannot be safely turned on until activities are complete. Furthermore, if an area is unsafe to walk, the area will also necessarily be unsafe to send personnel to perform any remediation. (OP_SacCo-12)

Agency Response to Combined Comments:

No changes were made in response to these comments. However, in the 15-Day Changes, staff extended the timelines to follow up on screening detections to allow time for personnel and any specialty equipment needed to ensure follow-up monitoring and repairs can be conducted safely.

As described in the ISOR Appendix B, staff examined a sample of landfill reports to estimate the percentage of the landfill surface excluded from SEM. This analysis found that among that sample, 5% of the total surface area of closed landfills was excluded and 25% of the total surface area of active landfills was excluded. This represents a significant amount of unmonitored area. Additionally, unsafe areas are often unsafe because of operational reasons or steep slopes; it reasons that these are areas may be at increased risk of emissions because of activities that can disrupt the cover or collection system, and risk of erosion on slopes.

Regarding costs, in the ISOR Appendix B, staff treated costs for using unsafe-to-walk areas screening methods as having equal cost to traditional walking SEM per area monitored. This is supported by a cost analysis undertaken by the Colorado Department of Public Health and Environment (CDPHE) for a recent landfill methane rule promulgation.[19] CDPHE contacted three companies that provide drone or remote

[19] Colorado Department of Public Health and Environment (CDPHE). (2025). *Economic Impact Analysis (Initial Analysis), Regulation Number 31: Control of Methane Emissions from Municipal Solid Waste Landfills*. Retrieved May 14, 2025, from *https://drive.google.com/drive/folders/1oUQ6xyMl5ejJTyIYvmaVF_ijWRqbvjIV*.

handheld technologies and received quotes that represented similar costs as the cost to perform walking SEM, including annualized costs of equipment purchases.

One commenter suggests that drones are the only option available and cites cost figures and constraints to using drone technology. However, the Proposed Amendments allow a wide range of technology and platform types. CARB staff is aware that handheld tunable diode laser absorption spectroscopy instruments that meet the regulatory requirements are also available, and operation of those instruments generally does not require specialized licenses or extensive training.

One commenter expresses concerns about potential locations identified in screening that are not able to be confirmed through follow-up monitoring. If the screening detects a location for follow-up monitoring and the hydrocarbon detector measurement does not find an exceedance, then no repair or re-monitoring is required.

Staff provided significant rationale in the ISOR demonstrating that extensive areas are currently excluded and the potential emissions reductions through expanding SEM coverage is significant (see also the agency response in section IV.C.5-3 of this FSOR).

C.5-8 Clarify owner/operator responsibilities for developing/adopting monitoring protocols

Comment: §95469(a)(1) Surface Emissions Monitoring: Clarify whether sources must develop or adopt alternative monitoring for unsafe-to-walk areas and confirm applicability of standard repair/re-monitoring timelines. (OP_SMAQMD-19)

Agency Response:

No changes were made in response to this comment. Under the Proposed Amendments, operators must follow the requirements in section 95471(d) for monitoring any unsafe-to-walk areas. Section 95471(d) includes minimum technology requirements and basic procedures that must be followed. Operators have flexibility to choose how to comply with those minimum requirements (e.g., what exact technology will be used or where the user will stand or walk). The Proposed Amendments do require the standard repair and re-monitoring of exceedances discovered in follow-up monitoring as is required for any surface methane emissions exceedances, as described in section 95471(d)(6).

C.5-9 Do not allow unsafe-to-walk procedures for landfill design choices

Comment:

§ 95469(a) – Definition and Use of “Areas Hazardous to Traverse”

Issue:

The regulation allows operators to exclude “areas that are hazardous to traverse” from standard SEM and instead use alternative monitoring pathways under § 95471(d). However, in practice, the most common basis for deeming an area hazardous is simply that it has been constructed with steep slopes. Slopes are a *design choice*, not an unavoidable condition.

This creates a perverse incentive: landfills can reduce monitoring obligations by designing or maintaining surfaces to be too steep to access.

Recommendation:

Clarify that slope geometry alone is not sufficient grounds for designating an area as hazardous to traverse. If an operator claims an area cannot be monitored by standard SEM, the operator should provide written geotechnical justification demonstrating that a safer, walkable slope is not feasible for reasons of stability—not convenience or airspace maximization. While this is may be best addressed in Title 27 CCR §21090 adjacent the geotechnical slope requirements, it can be addressed in the definition of hazardous slopes in § 95475(a)(40).

Suggested Regulatory Language:

§ 95475(a)(40) “Areas that are hazardous to traverse.” Means landfill surface areas that cannot be safely accessed on foot due to temporary unsafe conditions, including active H_2S venting, leachate seeps, erosion repair activity, the active landfilling areas or geotechnically documented slope instability that is under corrective management. Conditions that arise from landfill design or operational choices, including slope steepness, absence of benches or access routes, or routine working face configuration, shall not constitute grounds for designating an area as hazardous to traverse, unless the owner or operator provides engineering justification, satisfactory to the administrator, that no walkable configuration is feasible. (OP_Sniffer-5)

Agency Response:

No changes were made in response to this comment. Requiring screening of these areas with remote technologies is the most practical and effective approach to take within the Proposed Amendments and significantly minimizes the “perverse incentives” referenced by the commenter since monitoring and repairs will still be required in these areas.

C.5-10 Add technology examples

Comment:

§ 95471(d)(1) – Surface Emissions Screening Procedures for Unsafe-to-Walk Areas

Issue:

Section 95471(d)(1) provides examples of sensor and platform types for surface emissions screening in unsafe-to-walk areas; however, the current list begins with column-integrated and non-surface-equivalent sensing approaches, and does not include an option that preserves the same near-surface sampling geometry and path spacing of standard SEM conducted under § 95469. Because the 500 ppmv instantaneous standard applies equally in unsafe-to-walk areas, the regulation can teach towards methods that yield data directly comparable to SEM in walkable areas.

Recommendation:

Revise § 95471(d)(1) to add a near-surface air sampling platform (e.g., drone-assisted trailing inlet, rover-guided sample tube, or equivalent) that maintains approximately 0–3 inches

sampling height and ≤25-ft traverse spacing, and place this example as the first item in the list. This signals regulatory preference toward measurement equivalency, consistent with the compliance outcome required under § 95469. Drones that sample near to the ground should also be included in this first example.

Suggested Revision:

Insert as the first listed example under § 95471(d)(1):

(A) A drone, rover, robot or vehicle-assisted surface air sampling system that collects air near the landfill surface

Then re-letter the remaining examples:

(B) A handheld instrument that measures methane column concentration…

(C) A drone-mounted instrument that measures methane column concentration…
(OP_Sniffer-9)

Agency Response:

Changes were made in response to this comment. In the 15-Day changes, language similar to that suggested by the commenter was added, but the list was not reordered. CARB notes that the list provides examples of types of technologies and platforms that may be applicable, but the examples do not limit the combinations of platforms and sensor types that could potentially meet the requirements.

C.5-11 Oppose use of column-integrated measurements

Comment:

§ 95471(d) – Use of Column-Integrated Optical Sensors in Unsafe-to-Walk Areas

Issue:

Section 95471(d) provides default approval of column-integrated optical methane measurements (e.g., open-path TDLAS) in unsafe-to-walk areas. However, column-integrated ("ppm-m") readings are not solely a function of methane concentration. They depend heavily on surface reflectance, absorption characteristics, incident angle, and substrate scattering behavior (and standoff distance and ambient wind conditions). As a result, measurement accuracy is substrate-dependent, not concentration-dependent, and data quality is heterogenous across common landfill cover conditions.

Evidence already exists showing non-performance in realistic landfill conditions. For example, Firmatek, a leading provider of TDLAS drone methane detection services, presented to the U.S. EPA as recently as 2024 that over snow-covered landfill cover, it is *"reasonable to believe the laser would scatter,"* resulting in unreliable measurements (https://downloads.regulations.gov/EPA-HQ-OAR-2024-0453-0020/content.pdf slide 8, "Operational Limitations"). Snow is a common seasonal cover condition on many California landfills. Bridger Photonics actually studied the issue of surface reflectance and quantified snow cover reflectance at 1651nm in the range of 3% and 20%, dependent on grain size (https://www.epa.gov/system/files/documents/2025-01/bridger-photonics-aerial-survey-alternative-test-method-matm-002_1.pdf).

The problem is not limited to snow. Reasonable performance concerns extend to many typical landfill substrates, including:

- Black, white, or green geomembranes, which have material-specific and undocumented NIR reflectance values. There is no published performance validation demonstrating that commodity open-path TDLAS systems can reliably return column-integrated methane measurements over these materials. Specifically black is known to absorb open path TDLAS laser light.
- Leachate seeps, saturated clay, and wet cover soils, which create specular and diffuse scattering that induce signal dropout. Many vendors handle dropout using proprietary internal QA filters, which discard data silently. This results in operator- and vendor-specific data deletion rules that are not transparent or auditable.
- Steep slopes and vegetated surfaces, where the optical path intersects the top of the vegetation several feet above the actual surface, returning a diluted atmospheric column rather than a measurement of near-surface emissions. This breaks comparability to the 500 ppmv instantaneous standard, which is defined at the surface.
- The unmitigated approval for TDLAS is not even restricted by fog, smoke or dust that certainly prevents high quality data capture with an open path TDLAS.

These substrate and path dependent limitations mean that column-integrated optical sensing cannot be assumed to produce measurement results equivalent to standard SEM, as required under § 95469 and under U.S. EPA alternative method equivalency principles.

Allowing this method as a default in § 95471(d) is therefore not productive when multiple other technologies are capable of collecting ground level ppm readings via robotics (Drones via ATL-150, quadruped robots, rovers, etc.).

Recommendation:

Column-integrated optical sensing should not be pre-approved as a default screening method in unsafe-to-walk areas. Instead, CARB should evaluate and approve each vendor + sensor + data-QA configuration individually, under the existing process in § 95471(e), to ensure that any such system can:

- Demonstrate acceptable performance across all common landfill substrates, including but not limited snow, geomembrane (all colors), wet soil, and vegetated cover conditions,
- Provide transparent data rejection criteria, and
- Produce measurement outputs that are comparable to SEM under § 95469.

Suggested Revision:

- Strike: § 95471(d)(1)(A) and § 95471(d)(1)(B)
- Replace: § 95471(d)(2) with cross-reference to § 95471(a) (method performance requirements) and strike all subparagraphs of § 95471(d)(2)
- In § 95471(d)(4)(D), strike: “If measuring column concentration, the measurement width or pixel size shall be no larger than 3 meters…”
- In § 95471(d)(5), strike: “or a column concentration 50 ppm-m or greater” (OP_Sniffer-10)

Agency Response:

No changes were made in response to this comment. The handheld hydrocarbon detector is ultimately used for determining if there is a leak, not the screening method. Owners and operators need sufficient flexibility in the types of technologies that can be used so as not to constrain the market to an excessively small number of providers or technologies. Maintaining sufficient technology choices and not constraining these areas to the full application/approval process in section 95471(e) is needed to immediately attain the value of monitoring in areas that would otherwise not be monitored at all under the current Regulation (see the agency response in section IV.C.5-2 for more information).

C.5-12 Practicality of monitoring and remediation following a screening detection

Comment: Final Thought on "Unsafe to Walk Surface Areas" – if these areas are such a hazard and are truly unable to be monitored, how then does one actually go to that area for remediation? And how is compliance to a 500ppmv surface limit of 95465(a)(1) (which maps to the federal requirement) enforced by collecting path integrated measurements in ppm*m with no correlation or model (inclusive of hyperlocal ambient wind) back to ppm? (OP_Sniffer-11)

Comment:

Topic: SEM 95471(c)

Potential Issues:

1. No more exclusion areas, all areas to be monitored via alternative methods if walking is not feasible (95469(a)(1)(b) and (2)(b))

    a) Drones, laser, rover mounted device.

    b) Working face only exempted for 180 after initial placement

Concerns:

- How do you remediate areas that exceedances are detected if the slopes are too steep or active areas with heavy equipment are too dangerous for personnel to enter? (OP_SWMD-19)

Agency Response to Combined Comments:

Changes were made in response to these comments. In the 15-Day Changes, additional time was provided for owners or operators to perform monitoring with a hydrocarbon detector after a screening detection in unsafe-to-walk areas. Performing walking SEM in an area with steep slopes, ongoing construction, or other similar potential safety hazards requires accessing those entire locations on a quarterly basis (by default). The screening approach available in section 95471(d) ensures that only the locations where a screening detection occurs would need to be accessed for follow-up action. This is expected to significantly reduce where the owner or operator will need to access and provide additional time to arrange for safe access. For example, if specialized equipment is needed to safely access a location on a steep slope or if operational activities need to be paused temporarily in a targeted location for measurement and remediation, the additional time provided after a screening detection allows for those types of actions to ensure safe access.

During pre-rulemaking workshops and individual meetings, staff made numerous requests for examples of areas that truly cannot be accessed safely, and discussed preparations, accommodations, and steps needed to ensure safe access with several operators, consultants, and inspectors. The responsive feedback gave assurance that any area can be accessed given sufficient time to prepare. In the event that an area cannot be accessed safely within 30 days the owner or operator could request an alternative compliance option (ACO) for additional time allowance for repairs. Such request must include the reason for delay, demonstrate that efforts were promptly initiated, and include the expected timeline to complete the repair.

C.5-13 Reduce period of excluding working face from monitoring

Comment: Monitoring of the working face - § 95471(c)(1)(A): We support CARB's proposal to include the working face in quarterly SEM for the first time, recognizing this area as a major source of emissions. However, the proposed exclusion of the working face from monitoring for 180 days after waste placement is excessive considering methane generation can begin well before six months. We recommend reducing this exclusion period to 90 days after waste placement, which would limit the exclusion to a single quarterly SEM event while maintaining operational flexibility for active disposal areas. We also encourage CARB to evaluate additional strategies in future updates to further improve monitoring and emissions detection at the working face. (OP_CAW-30)

Comment: Limit the working face SEM exclusion to 90 days after waste placement. (OP_CAW-34)

Comment: Additionally, CARB should eliminate monitoring exclusions and extend this requirement to the entire landfill, including areas of high methane emissions such as the working face and construction areas. We strongly oppose the decision to retain an exclusion for monitoring requirements on the working face for the first 180 days after initial waste placement, though we appreciate and support the addition of remote sensing requirements in unsafe-to-walk surface areas. (OP_IHRC-3)

Comment: § 95471(c)(1)(A) exempts the working face from monitoring for half a year. These are the main emissions harming fenceline communities. An 11/5/2025 paper in Nature finds that, "[T]he small fraction of open active areas in managed landfill accounts for almost all of the emissions detected by GHGSat." The rule needs to require that areas being actively filled must be as small as are stable, and that each such area must be sealed and monitored as soon as the full depth is filled. In big landfills, this can be daily. (OP_Burke-2)

Agency Response to Combined Comments:

No changes were made in response to these comments. The Proposed Amendments set forth substantial new requirements intended to prevent emissions at the working face and construction areas (e.g., installation of early gas collection infrastructure, limits to well downtime duration and number of wells that can be offline). But in recognition of the operational complexity involved in controlling emissions from the working face and the necessity of conducting daily disposal operations, staff proposed a finite period to allow filling to occur before requiring monitoring and repair of any exceedances in this area. Staff selected 180 days because methane production begins after anaerobic (i.e.,

low oxygen) conditions have been established in the waste, typically approximately 3 to 6 months after waste placement.[20]

C.5-14 Language conflict regarding working face exemption

Comment:

{CARB staff note: Commenter quoted 45-Day Changes text of section 95471(c)(1).}

Section 95471(c)(1)(A) conflicts in part with Section 95469(a) on surface emissions monitoring. The allowance for 180 days prior to monitoring active fill areas, seems specifically not allowed in Section 95469(a). (OP_YoloCo-34)

Agency Response:

No changes were made in response to this comment. Section 95471(c)(1) defines the monitoring area for section 95469(a), and section 95471(c)(1)(A) provides a modification of the monitoring area for a limited period when active filling and compacting are ongoing. The allowance for alternative screening in unsafe-to-walk areas is a modification of the requirement to perform walking SEM in those areas, but does not expand the monitoring area beyond that described in section 95471(c)(1) (and subsections below it).

C.5-15 Procedures are overly prescriptive

Comment:

{CARB staff note: Commenter quoted 45-Day Changes text of section 95471(d).}

This entire section is very proscriptive and doesn't allow for minor modifications to the procedure to meet the goal of surface emissions monitoring of the 'unsafe' areas. (OP_YoloCo-37)

Agency Response:

No changes were made in response to this comment. CARB respectfully disagrees that the monitoring procedure in section 95471(d) is overly prescriptive. The procedure includes basic instrument requirements that allows many different types of instruments and deployment platforms to be used. Basic minimum criteria for instruments and procedures are necessary to ensure accurate and meaningful readings and adequate coverage.

6. Alternative Surface Emissions Monitoring Procedures

C.6-1 General support

Comment: The Regulation should provide a framework for operators to use emerging technologies for purposes of finding and fixing discrete emissions. (OP_WM-25)

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[20] EPA Ireland. (n.d.). *Management of Low Levels of Landfill Gas.* Prepared by Golder Associates Ireland Limited on behalf of the Environmental Protection Agency. ISBN: 978-1- 84095-394-7.

Comment: Managing landfills is not an easy business. On a daily basis, landfill managers have to balance operations, safety, permitting, environmental compliance and hazards, personnel management, variable weather, gas collection, vendor needs and challenges, public relations, odor management, and planning - not to mention economics. And, of course, no two landfills are the same. It is critical to recognize the complexities and competing demands placed on landfill owners/operators when designing new regulations, especially those with the potential to increase compliance costs.

For this reason, TrelliSense's primary comment as described further below is to better enable, through regulatory design and language, the practice of using fixed, continuous technologies to monitor methane emissions and optimize gas collection. Continuous methane measurement platforms like TrelliSense have the potential to reduce landfills' long-term monitoring costs, mitigate safety hazards by reducing manual surveys, minimize false positives, and maximize emissions abatement and odor control through proactive and prompt discovery and management of methane emissions events. (OP_TrelliSense-1)

Comment: TrelliSense believes that methane quantification technologies with both spatial (i.e. optical) and temporal (i.e. continuous) coverage are essential for improving methane reporting accuracy, and, more importantly, effective landfill emissions management. We hope that our response has helped the reviewing committee better design the proposed rule to anticipate further rapid improvements in accurate and low-cost quantification methods beyond what is available today, to make compliance easier on landfill operators while effectively and efficiently abating methane across California's subject landfills. We hope that CARB's LMR updates are designed to be nimble and accommodating in anticipation of rapid emissions measurement technology improvements in the coming years, and we look forward to continued collaboration with CARB to refine standards and protocols that enhance methane emission accountability and contribute to state climate mitigation efforts. (OP_TrelliSense-12)

Comment: Environment California supports the proposed amendments to strengthen methane monitoring, shorten repair timelines, and require the use of better leak detection tools, such as drones and laser scanners. These updates move California toward cleaner air, stronger enforcement, and more transparency. (B_Env CA-1)

Comment: We... look forward to working with [staff] on additional 15-day changes in the following... consistent with the proposed Board Resolution, providing a framework for certification of emerging alternative monitoring technologies. (T_WM-4)

Agency Response to Combined Comments:

No changes were made in response to these comments. CARB agrees that alternative monitoring tools have potential for improving efficacy, efficiency, and consistency of monitoring. This is why the Proposed Amendments include a process in section 95471(e) to approve alternative monitoring procedures. CARB thanks the commenters for their support.

C.6-2 Do not limit to screening; application process too burdensome

Comment: As technology for monitoring landfill methane emissions advances, so too do the use cases for other types of new technologies. The rule should not limit its use to only screening for surface emissions. Such technology could further supplement and/or replace the

current SEM methods and procedures as well as component leak monitoring and cover integrity assessments.

The proposed application process is also burdensome and potentially not technically achievable which significantly limits potential use of any alternative technology or procedure. Most troubling is the criterion to demonstrate methane emission reduction equivalency. Such equivalency demonstration is not technically feasible nor appropriate. Standard Method 21 does not measure, quantify or reduce emissions; it monitors methane concentration. The standard SEM procedure does not measure emissions; it measures concentration. Further methods and procedures in 95471(c) do not quantify emissions or emission reductions so there is no mechanism to compare emission reduction equivalency.

Broadening the potential use cases and working with stakeholders to establish workable and reasonable criteria to streamline the application approval process will accelerate opportunities for landfill owners/operators to use advanced technologies and monitoring procedures. This could also potentially reduce compliance costs and labor hours. (OP_Ind/Gov Coalition-29)

Comment:

CARB must allow for technology innovation by employing a streamlined process to review and approve use of alternative technologies in a timely manner.

It is imperative that CARB, the solid waste industry, and other stakeholders understand the appropriate uses and limitations of emerging measurement technologies. Such technologies should be as accurate and reliable as possible before implementation into the LMR updates. However, CARB should not restrict advanced measurement procedures but rather promote a pathway for alternatives that incentivizes innovation and encourages research and development that would lead to more use application and increased reliability of alternative technologies.

WM supports the use of advanced technologies as alternative SEM procedures in Section 95471(e), but requests that CARB create a wider pathway to facilitate greater use of emerging technologies and not limit use as just a screening tool.

Drone technologies have made significant improvements in accuracy and reliability of leak detection through participation in the controlled release studies at SIMFLEX. During the first controlled release study in 2023, UAV Column Sensor Emission Assessment (UCSEA) vendors had a combined 90% probability of detection (POD) (the smallest emission that can be detected > 90% of the time) rate of 60-80 kg/hr. In 2024, UCSEA vendors had a 90% POD of 5.7 kg/hr, much improved from 2023.

These vendors continue to work with industry, academics, and regulators to develop an open-source, standardized methodology for regulatory SEM application in Canada. Additional controlled release initiatives were performed at SIMFLEX in 2025 including SEM walking path comparison to drone technologies, though results are not yet publicly available. We anticipate a proposed alternative SEM approach in Spring 2026.

CARB should work with stakeholders to create a more streamlined review and approval process of advanced technologies for alternative monitoring methods and procedures. The proposed rule limits alternative to just a screening approach. This is short sided of the agency, especially given the rapid development of drone application. Section 95471(e) should be allow for other innovative alternatives to surface emissions monitoring requirements such as

replacement option to Method 21 – potentially eliminating the requirement for ground validation of instantaneous and penetration readings. Leak component inspections and repairs could possibly benefit from use of advanced technologies. (OP_WM-55)

Comment: CARB must also remove the criterion to demonstrate methane emission reduction equivalency. Such equivalency demonstration is neither technically feasible nor appropriate. Standard Method 21 does not measure, quantify or reduce emissions; it monitors methane concentration. Alternative methods also will not serve to quantify emissions reductions, and so there is no mechanism to compare emission reduction equivalency.

Broadening the applicability and streamlining the review and approval process for both SEM and other compliance alternatives would practically and feasibly facilitate a more rapid incorporation of emerging technologies into the compliance obligations in reliable manner and reduce compliance costs and labor hours. (OP_WM-57)

Agency Response to Combined Comments:

No changes were made in response to these comments. The LMR provides for the approval of alternative compliance options and alternative test methods. The proposal establishes a new process specifically for statewide approval of alternative SEM procedures because that is the most salient use case that stakeholders have expressed interest in, and research has been conducted on.

CARB chose to restrict this process to screening approaches to ensure that there is a consistent standard for when an exceedance is detected and how to re-monitor to ensure it has been repaired. Implementation experience with approved screening procedures under the Proposed Amendments will inform future decisions on how alternative technologies could be used for regulatory purposes.

The application criteria are similar to those for alternative monitoring technologies in the oil and gas sector in federal regulations and for oil and gas and landfill applications in Colorado. The application requirements are designed to ensure only robust technologies and procedures are approved. The need for each requirement is explained in the ISOR.

The requirement for alternative technology procedures to demonstrate equivalent emission reductions is not unreasonable, nor technically infeasible. It is true that methane concentration measurements, alone, do not quantify emissions. Finding and repairing emission sources (whether through repairing cover, re-tuning a well, or other actions) reduces emissions. Demonstrating equivalent reductions does not necessitate quantifying each leak that is repaired; rather, an equivalent emission reduction standard means that the alternative method is at least as effective as the default SEM approach at finding emissions sources to enable repair (i.e., the total emissions resulting from surface sources is the same or less when using the alternative).

C.6-3 Automatically allow procedures approved by other regulators

Comment: While the Coalition letter contains several technical and implementation questions that deserve to be heard and further refined, and WCN is a signatory of this letter, this letter's comments are focused on Section 95471(e) – Test Methods and Procedures.

WCN has participated in research for methane detection and quantification, both at its sites as well as through research initiatives. While a certified, consistent methodology for methane quantification remains elusive, several technologies do perform well in detecting methane. Specifically, WCN has used OTM-51 for compliance in several US States; more importantly, WCN uses a modified OTM-51 for compliance in a State with both instantaneous and integrated surface emissions monitoring requirements. Given this experience in other locales, WCN believes CARB should approve for compliance those technologies which are already approved by other regulatory agencies for SEM compliance before any possible furtherance by CARB staff. (OP_WCN-1)

Comment: Specifically, we recommend that CARB:

- Continue improving to SEM requirements, including:

…

  - More clearly incorporating the UAS OTM-51 Method; (OP_EIP-2)

Comment:

CARB should more expressly allow the UAS OTM-51 method.

EIP appreciates CARB's consideration of our recommendations on establishing a process for approval of alternative test methods by including the proposed amendments in Proposed Section 95471(e) that create this process. The ISOR includes a rationale for this section that references EPA's mechanism to approve SEM instruments or procedures, citing specifically to OTM-51. However, OTM-51 is not expressly referenced in the proposed rule itself. Thus, it appears that, in order for a landfill operator to utilize this method, that operator would still have to seek individual approval of OTM-51, which seems unnecessary as this methodology was already vetted by the EPA.

In our January 2025 Letter, EIP urged CARB to incorporate UAS OTM-51 method, subject to all appropriate limitations and provisions explained in EPA's ALT-150 Letter, into the LMR revisions. By expressly including this method in the regulatory text, CARB would make clear that UAS-based monitoring is allowed as an alternative for performing SEM without the need for separate approval {Footnote: Operators in California would benefit from this clarity. In its ALT-150 Approval Letter, EPA states that "[f]or subpart Cf of 40 CFR 60, which is an Emission Guideline to be used by delegated state and local authorities to develop an individual State Plan, the availability or applicability of this alternative method must be determined on a case-by-case basis." ALT-150 Approval Letter at 8. By specifically including this method in the LMR revisions, CARB eliminates the confusion of "case-by-case basis" in seeking approval from EPA to use the alternative method.}. In its recently updated landfill methane regulations, the State of Washington was the first state to explicitly allow the option of using ALT-150 for SEM, and ECCC is also proposing that ALT-150 be allowed in its SEM requirements. CARB should follow Washington and Canada's examples and more explicitly allow for operators to use this specific, already approved method. (OP_EIP-10)

Agency Response to Combined Comments:

No changes were made in response to these comments. Federal regulations have less stringent SEM requirements than the LMR, notably using a wider spacing interval and omitting integrated monitoring. CARB does not believe it is appropriate to solely rely on other states' approvals without having the opportunity to evaluate the technology and

procedure. The Proposed Amendments include a process to apply for alternative surface emissions monitoring procedures.

C.6-4 Set 120-day Executive Officer review period

Comment: As part of the streamlined review and approval process, WM requests that CARB impose a deadline of 120 days to review and approve operators' use of technologies to comply with the SEM provisions of the Rule. If, after 120 days, CARB does not approve, disapprove, or request additional information, the request should be deemed approved. Moreover, if operators do not receive a response within 120 days and proceed to implement an alternative compliance option that is subsequently approved, operators should not be considered in violation of the Rule prior to receiving approval. This is particularly relevant for the purposes of monitoring unsafe-to-walk surface areas using alternative technologies; as recommended by WM below, technologies utilized for that purpose should also be subject to a request, review, and approval process to ensure that the technology being used is accurate and standardized. (OP_WM-56)

Agency Response:

No changes were made in response to this comment. The Proposed Amendments (and current Regulation) impose a 120-day timeline on Executive Officer review of ACOs. This is prudent because in many cases the ACOs are being requested because the owner or operator is unable to comply with a regulatory requirement and expedited decision is necessary to determine compliance status. Alternative surface emissions monitoring procedures are different. These are intended to take advantage of innovative new technologies to improve the efficiency, effectiveness, or consistency of monitoring, and CARB shares the goal of increasing the use of such technologies. However, approving an alternative procedure for a core method in the Regulation that can be used at all landfills may require more time for review and, in some cases, may involve significant back-and-forth with the applicant to arrive at a final, approvable application. By not setting a time limit on review, CARB aims to reduce the need to deny and receive resubmitted applications, and ensure there is sufficient time for evaluating applications.

Although the commenter is correct that approved alternatives under section 95471(e) can be used in unsafe-to-walk areas, the Proposed Amendments already include procedures that can be used in those areas as soon as the Proposed Amendments are effective. There is no basis in needing fast approvals of alternatives under section 95471(e) to enable monitoring of unsafe-to-walk areas.

C.6-5 Clarifications and implementation guidance

Comment:

§95471(d)-(e) Unsafe-to-Walk & Alternative Monitoring Procedures:

…

- Alternative procedures must demonstrate equivalent methane reductions to quarterly monitoring; guidance needed on review, enforcement, and recordkeeping.

- Clarification needed on crack-specific limits and follow-up for multiple exceedances. (OP_SMAQMD-32)

Agency Response:

Changes were made in response to this comment. In the 15-Day Changes, specification was added for how to determine whether multiple locations above the instantaneous surface methane emission limit count as a single or multiple exceedances in section 95471(c)(2)(B) to provide the clarification recommended by the commenter. No other changes were made in response to this comment.

The Proposed Amendments require the applicant to demonstrate that the proposed procedure achieves equivalent emission reductions. Additionally, the recordkeeping and reporting requirements relevant for that procedure will be proposed by the applicant and approved by CARB as part of the alternative procedure. Thus, evaluation of each of these items will depend on whether the owner or operator followed all the approved requirements for the alternative procedure.

In the 15-Day Changes, specification was added for how to determine whether multiple locations above the instantaneous surface methane emission limit count as only a single exceedance in section 95471(c)(2)(B).

C.6-6 Ensure continuous monitoring does not impose additional compliance burdens

Comment: TrelliSense is particularly supportive of CARB's inclusion of flexible remote sensing allowances including continuous monitoring technologies. Continuous monitoring has the potential to transform the accuracy and timeliness of methane management, offering a clear pathway toward measurable and verifiable emissions reductions. TrelliSense believes that continuous monitoring should become a desirable and common practice across landfill operations. Therefore, it is our primary recommendation that CARB ensure the rule avoids any unintended disincentives for this practice. Specifically, operators who deploy continuous measurement systems should not face disproportionate compliance burdens for follow-up actions based on temporary exceedances that might otherwise go undetected with a quarterly survey practice. TrelliSense encourages CARB to consider defining exceedances in a way that emphasizes temporal persistence (e.g., emissions that last beyond a defined period) rather than instantaneous readings. This approach would help promote the adoption of continuous monitoring while maintaining regulatory integrity, and focusing site operator efforts on managing the leaks that truly matter - those that are not just large, but sustained. (OP_TrelliSense-3)

Agency Response:

No changes were made in response to this comment. Surface methane exceedances are established based on the concentration measured using a hydrocarbon detector meeting the requirements of section 95471(a), whether during routine SEM required by section 95469(a), or during follow-up monitoring triggered by an alternative screening approach as specified in sections 95471(d) and (e). To the extent that the commenter is referring to approval of alternative surface emissions monitoring procedures under section 95471(e), the conditions that trigger follow-up walking SEM to establish where this a surface methane exceedance are proposed by the applicant pursuant to section

95471(e)(3)(A). Thus, they could include a different threshold, time limitations, or other conditions to ensure appropriate use of continuous monitoring data.

C.6-7 CARB will not have the capacity to adequately evaluate requests

Comment:

§ 95471(e) — CARB Does Not Have the Resources to Evaluate the Alternative Method Requests This Rule Will Generate

Issue:

The proposed LMR allows any vendor or operator to request approval of alternative surface emissions monitoring methods, with very little limitation. This is going to trigger a flood of vendor submissions, each with its own hardware, firmware, QA logic, signal processing, and interpretation model. CARB does not have the staff, technical bandwidth, or review capacity to meaningfully evaluate these submissions at the level required to protect the integrity of the regulation.

Worse, many of the alternative methods to be evaluated rely on indirect measurements, such as column-integrated methane concentration or concentration in the plume. These are not surface-level ppm measurements, and therefore do not directly identify leaks. To be equivalent—legally and scientifically—an indirect method must be converted back to surface-level ppm, because surface ppm is the enforcement trigger under both state and federal law. Even in the two step process of “increased meter reading” to “maximum meter reading” in Method 21 and OTM-51 both meter readings are surface level ppm values.

Once conversion is required, the measurement becomes a modeling exercise. And methane plume behavior depends on interacting environmental and surface conditions, including:

- Surface material (geomembrane color, daily cover, gravel, fines, clay, snow, grass)
- Vegetation structure (bare → sparse → dense → thatch → brush)
- Moisture state (dry → damp → saturated → ponded → frost → snow)
- Solar heating and diurnal thermal stability (morning inversion vs. midday mixing)
- Wind speed, wind direction, turbulence, slope-driven drainage flows
- Barometric pressure trend controlling gas flux
- Sensor viewing angle and slope geometry

These do not vary one at a time. They interact. Which means equivalency must be proven across the combinations.

Even a conservative combinatorial scenario set is thousands of unique scenarios:

6 surface materials

× 5 vegetation / trapping states

× 5 moisture states

× 4 thermal stability regimes

× 4 wind regimes

× 3 pressure states = 7,200 distinct conditions

And that does not include slope orientation, viewing angle, plume intermittency, or leak size variation.

The reality is:

- No vendor will collect validation data across 7,200+ real-world operating conditions.
- No model will generalize correctly without that data.
- And CARB does not have the ability to review the models even if the data existed.

If one weak indirect method is approved—one that appears to find leaks during carefully staged vendor demonstrations (or narrowly defined academic controlled release) but fails under everyday landfill conditions—operators will immediately migrate to that method because it will find fewer leaks, require fewer repairs, and cost less.

This is not hypothetical. This is exactly how method-shopping works in every sector where alternatives are loosely controlled. This is why the US EPA has a very high bar for approving alternatives.

Approving even one inadequate alternative method may take years to unwind and becomes a whack-a-mole problem for the next least effective approved alternative.

Recommendation:

CARB should adopt a strict restraint posture:

- Do not approve indirect, non-surface level ppm measurement methods unless they verbosely demonstrate and publicly document validated ground-level ppm equivalency across real-world combinations of confounding conditions.
- Require that localization uncertainty be quantified, validated and incorporated into required follow-up inspection.
- Recognize that the burden of proof is inherently large, and that CARB should not accept models in compliance data without considering the full number of confounding variables in combination.
- Pause approval of indirect alternatives until CARB establishes a formal third-party verification program capable of evaluating modeling assumptions, QA logic, and failure modes.

Alternative methods are only safe to approve if they find the same leaks. Indirect methods can only prove that through massive real-world validation datasets. Those datasets will not exist, and CARB cannot review them at scale. Without restraint here, method-shopping will undo the purpose of the regulation.

Suggested Language:

Revise § 95471(e)(3) to include two categories of alternatives – those that collect surface level concentration data and those that collect signal that is then used to infer surface level concentration data

(3) The applicant shall provide information that is sufficient for demonstrating that the proposed alternative surface emissions monitoring procedure achieves methane emission reductions that are at least equivalent to the methane emission reductions that would be achieved by quarterly monitoring complying with the procedures in section 95471(c). Equivalency shall be demonstrated by showing that the alternative procedure reliably identifies the same locations

requiring follow-up monitoring and the same surface methane exceedances that would be identified using surface-level methane measurements in accordance with section 95471(c). The following information shall be included in the application:

(A) The following information shall be included in the application for test methods collecting near to surface concentration measurements:

(1.) A description of the alternative work practice per EPA GD-045, including the monitoring technology or technologies, the monitoring procedures, any criteria and restrictions on using the technology or technologies (such as minimum sensor specifications or capabilities, resolution, precision, and any climate, environmental, or topographic limitations), data collection, logging, management, analysis, and data quality indicators and an increased reading definition for required follow-up monitoring per section 95471(e)(1).

Reference: U.S. EPA, Methods Format (EMMC-GD-045), Office of Air Quality Planning and Standards, Emission Measurement Center, August 2020. Available at: https://www.epa.gov/sites/default/files/2020-08/documents/gd-045.pdf

(2.) Substantive technical support information pursuant to EPA GD-022 *Reference: U.S. EPA, Alternative Test Methods for Source Measurement of Air Pollutants (GD-022), Office of Air Quality Planning and Standards, August 2020. Available at: https://www.epa.gov/sites/default/files/2020-08/documents/gd-022.pdf* (3.) Whether the proposed alternative monitoring procedure, or the technology or technologies used in the procedure, has been approved for regulatory use for other emissions monitoring requirements or by other regulatory authorities.

(3.) A discussion of any advantages and disadvantages of alternative technology and procedure (including factors such as ease of use, cost, coverage, objectivity, transparency) and letters of support from at least three representatives of facilities that have utilized or observed the proposed procedure.

(B) The following information shall be included in the application for test methods not collecting near to surface concentration measurements:

(1.) A description of the alternative work practice, including the monitoring technology or technologies, the monitoring procedures, any criteria and restrictions on using the technology or technologies (such as minimum sensor specifications or capabilities, resolution, precision, and any climate, environmental, or

topographic limitations), and the scientific basis and mathematical formulation for converting the measured signal to an equivalent surface-level methane concentration field, and the conditions under which that conversion is valid (all instrument, ambient and surface conditions) for follow-up monitoring as described in section 95471(e)(1).

(2.) The method detection limit and probability of detection of the technology or technologies, and a description of the procedures used to determine the method detection limit and probability of detection with respect to a surface level increased meter reading of 200ppm within definitive region of the landfill with spatial uncertainty (e.g. coordinate with 2 sigma radius confidence interval). The applicant shall collect, verify, and submit field data encompassing all relevant combinations of: (i) surface cover material, (ii) vegetation density, (iii) moisture state, (iv) wind speed and direction, (v) temperature/season, and (vi) barometric pressure trend to support these determinations. The field data shall include direct comparisons

to surface-level methane concentration measurements collected at the landfill surface in accordance with section 95471(c),

(3.) Quality assurance and quality control procedures necessary to ensure proper application of the alternative monitoring procedure, including but not limited to any technology calibration or maintenance requirements and any technology or method training requirements. Quality assurance documentation shall include disclosure of all data filtering, culling, signal rejection, and interpolation logic used to generate reported measurements. Removal of any raw data will generally not be allowed, e.g. instrumentation errors and out of specification reflectance/absorption shall either be remeasured or treated as exceedances.

(4.) The frequency of emissions monitoring that will be performed. For continuous monitoring techniques, the frequency of measurements and modeling justification, inclusive of all temporally variable environmental parameters to prove equivalence.

(5.) Data collection, logging, management, analysis, and data quality indicators for the alternative monitoring procedure. Raw measurement data, calibration parameters, uncertainty estimates, and all intermediate outputs used in surface-level concentration conversion shall be retained and made available to the Executive Officer upon request.

(6.) Compliance procedures, including recordkeeping and reporting.

(7.) Whether the proposed alternative monitoring procedure, or the technology or technologies used in the procedure, has been approved for regulatory use for other emissions monitoring requirements or by other regulatory authorities.

(8.) A demonstration (e.g., through field testing or modeling) that the methane emission reductions achieved by the alternative surface emissions monitoring procedure is at least equivalent to the emission reductions that would be achieved by quarterly monitoring complying with the procedures in section 95471(c). This demonstration shall include quantified localization uncertainty, which must be incorporated into the required follow-up monitoring area.

(9.) A discussion of any advantages and disadvantages of the alternative technology and procedure (including factors such as ease of use, cost, coverage, objectivity, transparency) and letters of support from at least three representatives of facilities that have utilized or observed the proposed procedure. The discussion shall include known limitations tied to environmental or surface conditions where performance may differ from surface-level measurements. (OP_Sniffer-13)

Agency Response:

No changes were made in response to this comment. Section 95471(e) only allows approval of alternatives as a screening approach, where the locations meeting the screening threshold are then monitored with a hydrocarbon detection to establish whether an exceedance has occurred. Because of this, column concentrations measured in parts-per-million-meter (ppm-m) would not need to be converted to a ground-level concentrations as the commenter contends – the threshold for screening could simply be a column concentration value that is sufficiently conservative to provide assurance that the screening approach would identify any leaks that may exceed the concentration limits in section 95465.

Achieving equivalent emission reductions does not necessarily mean the technology must detect all the same leaks at the same time under the same conditions. It means finding and mitigating at least the same amount of emissions as would be found and mitigated through the default SEM procedure. For example, this might involve monitoring more frequently or with tighter spacing with an instrument that has a higher detection limit; or using a tiered approach with multiple technologies to guide where more sensitive or intensive monitoring must occur.

CARB has set a high bar for approval of alternatives with very detailed criteria. Other commenters have expressed that they believe the criteria are too restrictive. What the commenter has proposed would be an unnecessarily narrow and constrained set of criteria that would significantly limit the types of technologies that could be used.

Environmental organizations and community members are supportive of operators using alternative technologies and largely support the proposed provision – and some have even requested that alternatives become mandatory. This provision is not intended to allow industry to use inferior methods, and CARB's evaluation process will ensure any proposed alternatives meet or exceed the emission reductions achieved through current SEM requirements.

CARB has well over a decade of research experience evaluating, using, developing, and deploying alternative technologies for methane emissions monitoring. Additionally, CARB has long-standing and extensive relationships with experts in academia and other jurisdictions that can be leveraged to better contextualize and interpret information provided in an application, where needed.

C.6-8 Require mandatory use of alternative technologies across entire landfill

Comment: We strongly support CARB's proposal to require the use of alternative surface emissions monitoring technologies for areas of the landfill surface deemed unsafe to walk as proposed in § 95469(a). This amendment is an important shift away from the broad exemptions that have historically limited the scope and effectiveness of methane detection and oversight. Additionally, we are supportive of CARB's framework for approving alternative emission monitoring procedures (§ 95471(e)) that establishes clear requirements and performance standards.

However, we urge CARB to extend this requirement beyond "unsafe-to-walk" areas and apply it across the entire landfill surface. As research from FluxLab and others has shown, the current manual walking SEM method is outdated, labor-intensive, prone to human error, and less efficient compared to modern technologies that can provide more frequent and comprehensive emissions monitoring and more reliable data.

While we understand the importance of having robust data from these technologies prior to requiring them for full-surface SEM, we recommend a clear transition pathway toward mandated utilization. Specifically, we recommend requiring the use of approved alternative SEM procedures once three or more technologies have been approved by the Executive Officer. This would ensure a smooth and clear transition from labor intensive, less efficient manual walking surveys. It would also incentivize continued innovation, provide regulatory certainty for operators, and accelerate the adoption of more accurate, data-rich monitoring methods. (OP_CAW-8)

Comment: To address these issues, we recommend that CARB:

- Establish a phased transition plan to full-coverage monitoring with alternative technologies as the Executive Officer approves alternative SEM procedures. (OP_CAW-10)

Comment: Establish a phased transition plan to mandatory full-coverage SEM using alternative technologies once three or more have been approved by the Executive Officer. (OP_CAW-16)

Comment: The surface emissions monitoring procedure, which is the primary source of surface leak detection, remains largely unchanged. Despite major advancements in monitoring technology and a deeper understanding of landfill emissions dynamics over the past fifteen years, these lessons are not sufficiently reflected in the Proposed Amendments. A pathway toward mandatory adoption of remote sensing technology for SEM, combined with more frequent (monthly) monitoring and tighter SEM spacing (less than 25 feet), is essential. (OP_CAW-3)

Comment: Create a pathway to require the use of advanced monitoring technologies for surface emissions and component leak monitoring across landfills, given their superior performance, reliability, and cost-effectiveness. Specifically, CARB could require their usage once three or more methodologies have been approved by the Executive Officer. (OP_RMI/EDF-6)

Comment: Further, we strongly support the use of advanced monitoring technologies for SEM and component leak monitoring. We commend CARB's proposed process to evaluate advanced technologies and approve them for use statewide once their efficacy is demonstrated.

However, given the superior performance, reliability, and cost-effectiveness of these technologies relative to walking SEM – as noted in presentations by FluxLab and others – we urge CARB to develop a phased process to require advanced methods once approved.

Specifically, we recommend requiring the use of approved alternative SEM procedures once three or more technologies have been approved by the Executive Officer. This would ensure a smooth and clear transition from labor intensive, less efficient manual walking surveys. EPA found that many MSW landfill operators and their contractors are failing to properly follow Method 21 walking SEM requirements. (OP_RMI/EDF-16)

Comment:

To Protect Public Health, CARB Should Require More Effective Monitoring Technology, More Frequent Monitoring, and Eliminate Monitoring Exemptions

While the proposed LMR amendments recognize the inadequacy of traditional monitoring methods and begin to close some of the resulting public health and environmental protection gaps, they should go farther. Traditional methods for monitoring methane emissions from landfills are inadequate and leave the health of landfill-adjacent communities unprotected. Available data demonstrates that the current requirement for annual walking surface emissions monitoring (SEM) does not lead to sufficient identification of methane leaks and exceedance events, demonstrating a need for more comprehensive monitoring requirements. These gaps are even more pronounced in areas that are currently excluded from monitoring requirements, such as the working face and areas of construction, where methane emissions are likely to be

the highest. The new regulation must close these gaps and require landfill operators - particularly those in proximity to vulnerable communities - to monitor more frequently without exemptions or exclusions, using layered approaches to measure emissions and enable prompt, transparent corrective measures. Given the direct health impacts of methane, as well as its role as a carrier gas for other air toxics, stricter monitoring and correction requirements are necessary to adequately protect public health.

Readily available, affordable, effective technologies exist to supplement traditional SEM. CARB should modify the proposed LMR amendments to require the use of such new technologies layered together with traditional SEM and newer aerial monitoring techniques. CARB should retain authority to determine the effectiveness of any new technology proposed in fulfillment of this requirement. (OP_IHRC-3)

Comment: § 95471(d) on p. 57 allows dangerous areas to use remote sensing, which must be required to cover all areas in every inspection, at least monthly. The 11/5/2025 paper in Nature finds that remote monitoring detects twice as much methane as ground methods. (OP_Burke-5)

Comment: …[W]e encourage CARB to consider strengthening its draft rule by:

- Requiring the use of advanced technologies for efficient monitoring and emissions reduction; (B_US Reps-3)

Comment: Además, el método de caminar sobre la superficie con un detector manual deja grandes áreas del vertedero sin revisar debido al terreno inclinado y condiciones peligrosas; y si el detector se mantiene un poco demasiado lejos de la superficie, puede no detectar fugas. En su lugar, se debe exigir a los operadores de vertederos y a los reguladores que utilicen las tecnologías más avanzadas para detectar fugas de metano, incluyendo drones y satélites.

English translation:

In addition, the method of walking on the surface with a handheld detector leaves large areas of the landfill uninspected due to sloped terrain and dangerous conditions; and if the detector is kept a little too far from the surface, it may fail to detect leaks. Instead, landfill operators and regulators should be required to use the most advanced technologies available to detect methane leaks, including drones and satellites.

(B_Gutierrez-2) (B_Calderon-2) (B_Mascoso-2) (B_Rios-2)

Comment:

We urge the Board to also adopt several enhancements. This includes: To require cost effective advanced monitoring technologies such as drones, once multiple systems are approved; (T_RMI-7)

Comment: I recently learned about the threats that methane poses to our environment and our health. And I'm here to urge CARB to make some much needed changes to the Landfill Methane Regulation.

The method of walking the surface with a hand-held dictator -- detector, excuse me, leaves huge areas of the landfill unchecked due to steep terrain and dangerous conditions. And if the detector is held just a little too far from the surface, it can miss leaks. Instead, landfill operators and regulators should be required to use the latest technologies to detect methane leaks, including drones and satellites. (T_GNC-1)

Comment: I want to mention that when I first started hearing about how landfills are currently regulated in California, I was incredibly surprised the fact that in the 21st century we're still walking the face of a landfill and using a detector to try to find plumes, when we have now satellites and drone technology that can -- that can monitor those things. (T_VIP2-1)

Agency Response to Combined Comments:

No changes were made in response to these comments. CARB agrees that alternative SEM technologies have potential for improving the efficiency, effectiveness, and consistency of SEM. However, specific procedures still need to be demonstrated to provide at least equivalent effectiveness as the SEM procedures in the LMR across a wide range of topographical and climatic conditions. The process within the Proposed Amendments allows for that demonstration.

Requiring the use of an alternative once three alternatives have been approved would not provide stakeholders adequate ability to comment on procedures that would become mandatory. Instead, in Resolution 25-14 adopting the Proposed Amendments, the Board directed the Executive Officer to report on implementation by mid-2028 including "evaluation of monitoring technologies" and to propose additional amendments within 24 months of determining that alternative technologies can be "scaled and cost-effectively integrated into monitoring of the entire landfill surface." This approach better allows for updated requirements to be considered through the formal rulemaking process.

See the agency response in section IV.C.2-1 for more information on frequency and spacing interval.

C.6-9 Increase monitoring frequency using alternative technologies

Comment: Increase surface emissions monitoring frequency from quarterly to biweekly with advanced technologies (i.e., twice per month) at all landfills. (OP_RMI/EDF-7)

Comment: We also encourage CARB to require bi-weekly surface emissions monitoring using approved advanced monitoring technologies to enhance methane detection and repair.

Advanced monitoring technologies are generally more affordable than walking surveys.

Therefore, operators can cost-effectively and safely monitor multiple times per month, as EPA noted in its Aerial Monitoring White Paper: "[i]f aerial technologies could be used as a replacement for, or as a tool to reduce the frequency of manual (ground-level) surface monitoring events, they could result in lower labor costs and increased efficiencies." Several public and private landfill operators in California are already leveraging drones and other available advanced technologies to more frequently and comprehensively monitor fugitive emissions. For example, San Bernardino County and Orange County conduct leak surveys with methane-detecting drones at their landfills. The Proposed Amendments' monitoring frequency is increased for facilities with violations, but not all landfills. CARB should consider requiring monitoring biweekly using advanced technologies instead of quarterly to cover the entire landfill surface area. (OP_RMI/EDF-17)

Agency Response to Combined Comments:

No changes were made in response to these comments. The Proposed Amendments do not require the use of alternative monitoring procedures and no specific monitoring frequency is prescribed in section 95471(e). Instead, the Proposed Amendments are designed to allow different monitoring frequencies for each technology to achieve at least equivalent emission reductions as the default SEM procedures. This might include using screening technologies at a higher frequency, including continuous monitoring.

C.6-10 Perform a review of alternative procedures after implementation

Comment: EnviroVoters is strongly supportive of the path for required use of alternative surface emissions monitoring tech, which would improve upon the current limited scope of how landfill areas are monitored. To harness the full potential of these advanced technologies, we ask that staff consider a midterm review so this is pursued within a reasonable timeline. (T_CEV-3)

Comment: We do recommend a couple minor changes that we think will make this more effective. One is to put a timeline on the technology assessment by the Executive Officer. We suggest 18 months. (T_CCA-2)

Comment: First is that we're grateful to see advanced monitoring technologies like drones and other remote sensing tools prioritized in the Board resolution. These tools are essential for improving surface emissions monitoring, efficiency, and coverage. To support accountability and timeline progress, we ask the Board to include a commitment to assess these available technologies within 18 months of adoption of these amendments. A clear timeline would help ensure that monitoring improves as quickly as the technology does, strengthening emissions protections and preventing dangerous leaks. (T_CAW-1)

Agency Response to Combined Comments:

No changes were made in response to this comment. CARB appreciates the commenters' support for Resolution 25-14 adopting the Proposed Amendments. While the Proposed Amendments do not include a requirement for the Executive Officer to assess the available technologies, the Resolution included Board direction for the Executive Officer to report on LMR implementation by mid-2028, including an "evaluation of monitoring technologies as well as the feasibility of other alternative technologies for methane detection."

C.6-11 Clarify that operators can switch between SEM methods without approval

Comment:

§ 95468 — Alternative Compliance Requests

Issue:

The proposed § 95468 allows owners/operators to request alternative monitoring, test methods, and compliance measures. However, federal law at 40 CFR §63.7(f)(5) prohibits switching back and forth between an approved alternative test method and the originally specified test method without "administrator" approval. As drafted, the LMR is silent on how a facility that has been approved to use an alternative method may later revert to the standard

method. Without clarity, this creates regulatory risk for operators and Air Districts and may create conditions where an approved alternative unintentionally prevents an operator from returning to the baseline requirements in §§ 95464, 95469, and 95471.

Recommendation:

Explicitly state that reversion to the standard test method is nominally pre-approved with notification, without additional Executive Officer action, provided the operator meets all underlying monitoring frequency, recordkeeping, meteorology, and performance requirements in the LMR. This aligns California implementation with 40 CFR §63.7(f)(5) and preserves operators' ability to always comply using the default regulatory pathway.

Suggested Regulatory Language:

"§ 95468(f) Approval of an alternative test method, monitoring procedure, or compliance measure under this section shall not preclude the owner or operator from returning to the applicable standard test method or monitoring procedure specified in this subarticle.

Reversion to the standard method is considered pre-approved upon notification to the Executive, provided that the owner or operator conducts the standard method in full accordance with the monitoring frequency, recordkeeping, and performance requirements specified in § 95464, 95469, and 95471."

Question for CARB: In other Cf states, when regulations do not align with the federal plan, customers have monitored per both the state and federal regulation (e.g. customers in WA state continue to do 1 month inspections of exceedance locations per the federal requirements despite not being required in the WA state regulation). For alternative compliance measures, how do sites ensure no federal liability for alternative test methods that are not federally approved but approved in CA (OP_Sniffer-3)

Agency Response:

No changes were made in response to this comment. The Proposed Amendments do not require any approval or notification to switch between the default SEM methods and any approved alternatives under section 95471(e). How owners or operators maintain compliance with federal requirements is beyond the scope of this rulemaking, but note that no owner or operator is required to use approved alternatives in the Proposed Amendments.

C.6-12 U.S. EPA-approved alternative monitoring methods

Comment:

§ 95471(e) — Default Acceptance of U.S. EPA-Approved Alternatives (With Preservation of California's More Stringent Requirements)

Issue:

When the U.S. EPA has already reviewed and approved an alternative monitoring procedure, California gains a high-confidence determination that the detection technology meets the federal equivalency requirement and collects high quality data.

Despite this, the draft regulation does not currently state that U.S. EPA-approved alternatives are default accepted in California. This creates three avoidable risks:

- Redundant state evaluation burden — CARB will needlessly re-review methods that EPA has already vetted.
- Inconsistent federal/state determinations — CARB could approve or deny methods differently than EPA, creating regulatory conflict and SIP compliance risk.
- Delayed adoption of high-performance methods — Operators will face uncertainty when seeking to adopt emerging technologies (e.g., ALT-150).

At the same time, California's monitoring intensity (e.g., 25-foot spacing) is more stringent than the federal standard (30-meter spacing). Therefore, default federal approval must be paired with a provision that the state's operating requirements still apply. For example, OTM-51 includes a provision for site specific spacing; that spacing is tuned to 25 feet per the LMR.

Recommendation:

To ensure consistency with federal determinations while preserving California's stronger monitoring performance requirements:

- Any method already approved by U.S. EPA as an alternative to Method 21 should be default accepted in California.
- BUT the method must be deployed at California's required monitoring spacing, grid coverage, and follow-up requirements.

Proposed Regulatory Language:

(Add as § 95471(e)(6))

"(6) Any surface emissions monitoring procedure that has been formally approved by the U.S. Environmental Protection Agency as an alternative monitoring procedure to Method 21 for landfill surface emissions monitoring shall be deemed approved under this section, provided the owner or operator implements the procedure in accordance with the operational requirements of § 95471(c), including but not limited to traverse spacing, probe or sensor height, follow-up inspection, repair requirements, documentation standards, etc.

(A) Upon recognition of such a U.S. EPA-approved procedure, the Executive Officer shall publish the approval and the applicable California-specific implementation conditions on the Landfill Methane Regulation program webpage.

(B) Publication may include clarifying deployment parameters necessary to ensure consistency with the monitoring intensity, follow-up thresholds, and corrective action provisions of this subarticle.

(C) Owners or operators shall apply any published California-specific implementation parameters as enforceable conditions of use." (OP_Sniffer-4)

Comment:

§ 95471(e) - SIP Alternative Approval Conflicts

Issue:

California's landfill methane program operates under §111(d) as a Cf State, meaning the state's implementation must remain at least as effective as the SIP-approved federal baseline. If CARB approves an alternative monitoring procedure that the U.S. EPA has denied or has not approved after submission, the state risks:

- Breaking SIP equivalency,
- Creating regulatory inconsistency,
- Enabling weaker leak detection performance, and
- Incentivizing method-shopping toward the least stringent option.

Recommendation:

CARB should not approve any alternative surface emissions monitoring procedure that has been denied by U.S. EPA, or submitted to U.S. EPA but not yet approved. Conversely, if a CARB approved alternative test method is denied by the US EPA the US EPA decision should take precedence to reduce SIP inconsistencies.

Proposed Regulatory Language:

(Add as new § 95471(e)(4) and (5); renumber remainder)

"(4) CARB shall not approve any alternative surface emissions monitoring procedure, or any procedure that is substantially similar in detection principle, signal interpretation, or data-processing logic, if U.S. EPA has denied approval of the same or similar procedure, or if U.S. EPA has not granted approval after submittal.

(5) If U.S. EPA denies approval of a substantially similar monitoring procedure that CARB has previously approved under this section, the CARB approval shall be automatically suspended upon EPA's denial. The owner or operator shall revert to the monitoring procedures in § 95471(c) or a different approved alternative per § 95471(e)." (OP_Sniffer-14)

Agency Response to Combined Comments:

No changes were made in response to these comments. The Proposed Amendments include detailed criteria for requesting and approving alternative monitoring procedures to demonstrate that the alternatives result in at least equivalent methane emissions reductions as the quarterly SEM procedures in section 95471(c). The Proposed Amendments contain more stringent surface emissions monitoring requirements than federal rules, and therefore do not disrupt equivalency for the purpose of the Emission Guidelines. The full application package required in section 95471(e) is needed to fully assess the alternative for compliance with the requirements in the Proposed Amendments. Part of that application package is identifying whether the alternative procedure or technologies used in the procedure have been approved by other regulatory authorities so the Executive Officer will be aware of any such approvals when evaluating the application.

7. Component Leak Monitoring

C.7-1 Allow electronic records in lieu of physical tags

Comment:

- Section: 95469(c)(1)- Tagging
- Current: Affix weatherproof tag with ID
- Proposed: Allow photographs or other similar electronic recordkeeping
- Rationale: Monitoring equipment already tracks date/time and concentration. (OP_WM-10)

Agency Response:

No changes were made in response to this comment. A physical tag provides the most direct method for anyone who may be inspecting or repairing equipment to know which components have an identified and unrepaired leak without the need to request records and interpret electronic files. This requirement is needed for enforceability of the Proposed Amendments.

C.7-2 Add exception process for component leak repairs

Comment:

- Section: 95469(c)(2)-Component leak repair
- Current: Must be repaired and remonitored within 10 days
- Proposed: Add exception process
- Rationale: Need exceptions for when special orders or parts/service are needed (OP_WM-11)

Agency Response:

No changes were made in response to this comment. The current Regulation already requires the component to be repaired within 10 days, consistent with current regulatory implementation. This was added explicitly in the 45-Day Changes for improved clarity. The alternative compliance option process in section 95468 allows for owners and operators to request additional time allowance for repairs.

C.7-3 Remove component leak monitoring plan

Comment:

Section 95464(b)(5) and (6) – Component Leak and Cover Monitoring Plans

CARB should delete the requirement for development of a component leak monitoring plan as it is redundant. The rule language itself (95469(c) and 95471(f)) is sufficiently prescriptive for what components are subject to monitoring and how the monitoring must be conducted. The plan would simply reiterate what is already prescribed by the rule – tracking of components is done through as-built and other records and reports. (OP_Ind/Gov Coalition-11)

Agency Response:

No changes were made in response to this comment. Planning documents are useful for personnel performing component leak monitoring (CLM) to guide the monitoring by improving consistency in methods and adherence to regulatory requirements. These plans will help ensure that personnel are aware of the methods that must be used, the identity of all components that need to be monitored, how to locate each component for monitoring, the frequency of monitoring, and the timelines for responding to component leaks. For example, section 95469(c) requires monitoring all "components containing landfill gas under positive pressure," but without advance planning, monitoring personnel may not be aware of the location of all components that contain landfill gas at positive pressure.

C.7-4 Increase CLM frequency to monthly

Comment: Component Leak Monitoring - § 95469(c): We appreciate CARB's inclusion of quarterly component leak monitoring requirements for all components containing landfill gas under positive pressure. Component leaks are a meaningful and under-recognized source of emissions, and requiring operators to identify, tag, repair, and re-monitor leaks within 10 calendar days represents a critical improvement to emissions reductions under the LMR. We recommend increasing the monitoring frequency to monthly to ensure more timely detection and mitigation of component leaks, which will further reduce emissions and enhance overall system performance. (OP_CAW-44)

Comment: Increase component leak monitoring frequency from quarterly to monthly to ensure timely detection, repair, and mitigation of emissions. (OP_CAW-46)

Agency Response to Combined Comments:

No changes were made in response to these comments. This comment is out of the scope of the rulemaking because no changes were proposed to the frequency of component leak monitoring (note that the requirement to perform component leak monitoring quarterly was previously in section 95469(b)(3) of the current Regulation).

C.7-5 Clarify whether component leak monitoring plans require regulator approval

Comment:

§ 95464 Gas Collection and Control System Requirements

…

(b)(5)…New Plan requirements for Component Leak Monitoring…– Clarify whether there is a requirement to submit to the local Air District for review and approval. The review process should be clearly outlined with additional timelines in place to prevent landfills from being subject to any penalties as a result in delay of review and approval once submitted to the regulating authority. (OP_WPWMA-4)

Comment:

Topic: New Plans – 95464(b)(5)

Potential Issues: Component Leak Monitoring Plans… due within 90 days of the rule promulgation

Concerns:

- Will the AQMD need to approve the plan? Would the landfill be subject to any penalties as a result of delays from the AQMD in approving the plan?

Potential Alternative: N/A (OP_SWMD-6)

Agency Response to Combined Comments:

No changes were made in response to these comments. The Proposed Amendments do not require component leak monitoring plans to be proactively submitted for review and approval. However, CARB or an implementing air district can request a component leak monitoring plan which then must be provided by the owner or operator.

C.7-6 CLM plan reviews will add to air district workload

Comment: §95464(b)(5)(C): Landfills may need to submit complete lists of monitored components, significantly increasing reporting and review workload. (OP_SMAQMD-14)

Agency Response:

No changes were made in response to this comment. Component leak monitoring plans do not need to be submitted to CARB or implementing air districts unless they are requested per section 95470(a)(3). In recognition that air districts may request and review these plans for conformance with the plan elements required, whether initially or on an as-needed basis, costs for air district review were added in the 15-Day Notice.

C.7-7 Require updates to CLM plans more frequently

Comment: § 95464(b)(5) on p.13 allows 90 days for updates when equipment changes. Updates also need to be done in 30 days. (OP_Burke-8)

Agency Response:

No changes were made in response to this comment. A 90-day update period ensures that no more than one CLM event passes before the plan is updated. This is an appropriate minimum update frequency to balance the need for accurate plans with avoiding excessive updates that could be an administrative burden for owners or operators.

C.7-8 Allow less frequent CLM at landfill gas-to-energy facilities

Comment:

Section 95469(c): Component Leak Monitoring – Positive Pressure Components

The proposed amendment in this subsection requires leak checking of components under positive pressure at flare stations and energy recovery facilities. Flare station leaks can be checked and repaired quarterly without shutdowns. However, repairs at energy facilities typically require the entire plant to be shut down, which would reduce the beneficial use of

landfill gas. SCAQMD Rule 1150.1 allows leak checks during planned outages for energy recovery facilities, reflecting operational realities. Aligning CARB's rule with this approach ensures regulatory consistency, operational safety, and effective leak control while maintaining consistent beneficial use of LFG. (OP_LACSD-9)

Agency Response:

No changes were made in response to this comment. A key objective of the Proposed Amendments is to remove broad exemptions from monitoring that contribute to the potential for emissions to go undetected and which lack mechanisms to ensure equivalent levels of enforceability or methane emission control. Many component leaks can be repaired or minimized without shutting down facilities, or quickly repaired to minimize downtime. The ACO process in section 95468 allows for owners and operators to request additional time allowance for repairs.

8. Other SEM and CLM changes

C.8-1 Support SEM and CLM changes

Comment:

CARB has taken steps forward to strengthen SEM and component leak requirements.

In addition to expanding coverage to previously excluded areas, RMI and EDF support CARB's proposed requirements around barometric pressure, wind and survey speed, advanced notification of monitoring plans, and limited relaxation of spacing requirements. We also support the structured corrective action and re-monitoring framework, including escalating requirements for landfills with persistent issues. These changes will improve monitoring integrity and ensure prompt and effective corrective action. (OP_RMI/EDF-15)

Comment:

SEM Improvements

As identified in the 2024 EPA Enforcement Alert, operators and their contractors are failing to comply with the SEM requirements in the federal Clean Air Act ("CAA"). Specifically, EPA noted that "[r]ecent inspections also revealed widespread shortcomings in the SEM program at MSW landfills, including methane emissions at higher rates of exceedance, with many above 50,000 ppm, which is 100 times higher than the regulatory limit." Issues such as monitoring speed and time, departing from the established path, expired calibration gas, and improperly excluding areas from monitoring were also documented by EPA.

EIP appreciates the proposed amendments that address these deficiencies. We also appreciate the proposed amendments that reflect recommendations we made in our January 2025 Letter. However, we still encourage CARB to make further improvements to SEM, as described in more detail in sections below. (OP_EIP-8)

Agency Response to Combined Comments:

No changes were made in response to these comments. CARB appreciates the comments and thanks the commenters. Responses to the request for further improvements in OP_EIP-8 are addressed elsewhere in this FSOR based on the remaining content of that comment letter.

C.8-2 Clarify that SEM exceedances are not violations

Comment:

- Section: 95469(a)(1)(B)(2-3) & (a)(2)(B)(2-3) – Re-monitoring and replacement well reporting
- Current: Re-monitor grid one month after exceedance, report replacement well to EO, replace within 120 days
- Proposed: Clarify that exceedances are not violations so long as specified actions are taken.
- Rationale: Federal rules specify that, so long as specified actions are taken, exceedances are not violations. (OP_WM-5)

Agency Response:

CARB made changes in response to this comment. In the 15-Day Changes, CARB clarified that exceedances detected during compliance inspections are violations, consistent with current regulatory implementation (see sections 95469(a)(1)(D) and (a)(2)(D) and items 67 and 72 in the 15-Day Notice "Summary of Proposed Modifications").

Exceedances discovered by an owner or operator are not violations, so long as the owner or operator follows the requirements to repair and re-monitor the exceedance as provided in sections 95469(a)(1) and (2). The Proposed Amendments specify at what point a violation has occurred following detection by an owner or operator (see sections 95469(a)(1)(B)3. and (a)(2)(B)3.).

C.8-3 Make new SEM requirements less burdensome

Comment: CARB is proposing more stringent and, at times, arbitrary components within the SEM requirements.

Key changes include:

- Limiting the exemption period for active areas to 180 days after initial waste acceptance.
- Reducing the corrective action initiation period to three days.
- Introducing further criteria and compressed deadlines for requesting alternative remedies for SEM exceedances not resolvable through new or replacement gas wells.
- Imposing additional obligations for areas with *Recurring Surface Exceedances (95469(a)(4))*.

For instance, in *Section 95469(a)(4)- Recurring Surface Exceedances*, the provision requiring an assessment of the collection system's condition and the performance of monthly surface emissions monitoring in grids adjacent to those exhibiting recurring surface emissions exceedances may be considered burdensome and disproportionate. By definition; adjacent grids themselves have not demonstrated persistent exceedances. Surface emissions typically represent localized issues, best addressed by adjusting nearby wells or repairing covers at the specific point of exceedance.

Recommendation: We suggest that CARB meet and confer with landfill operators and technical experts to determine alternative solutions that are less stringent and burdensome. (OP_Recology-9)

Agency Response:

CARB made changes in response to this comment. In the 15-Day Changes, the corrective action initiation period was changed to five days and increased SEM frequency following recurring surface exceedances was limited to only the grid experiencing the recurring exceedances (not the adjacent grids). For more information, see the agency responses in sections IV.C.3-2 and IV.C.4-2.

No changes were made to the 180-day working face exclusion period in response to this comment. See the agency response in section IV.C.5-3 for more information about the working face SEM exclusion period.

The Proposed Amendments did not introduce "further criteria and compressed deadlines for requesting alternative remedies for SEM exceedances not resolvable through new or replacement gas wells." Under the current Regulation, there is no dedicated process for requesting such an alternative. The process is entirely new and the criteria and timelines are necessary to ensure that if alternative remedies are pursued they are implemented quickly to minimize emissions.

C.8-4 Only apply new SEM requirements to integrated SEM

Comment: Enhanced surface gas monitoring should only apply to the integrated monitoring program since it directly affects problems with the gas collection system. The original LMR language for the instantaneous monitoring program, as well as monitoring at closed landfill, should remain the same. There is no direct evidence that enhancing these programs will result in additional methane reduction. (OP_SWANA-7)

Comment: The updated LMR shortens timelines for remediation of surface monitoring exceedances, both instantaneous and integrated. The LTF has commented previously on the original intent of instantaneous versus integrated monitoring standards. The instantaneous monitoring standard of 500 ppm generally identifies leaks in the landfill cover. In most cases, these leaks are a result of cover cracks that can be quickly remediated, but they do not necessarily indicate problems with the gas collection system. The proposed regulatory enhancements are not needed here since minor leaks do not result in substantial methane emissions. Integrated monitoring measures leaks which are accumulated over a wide area. An exceedance of this standard could be more indicative of a problem with the gas collection system and more problematic methane emissions. This should be the focus of regulatory enhancements which can mitigate methane emissions.

The LTF has the following recommendations regarding the proposed amendments to the routine surface monitoring requirements:

- The instantaneous surface monitoring requirements of Section 95469 (a)(1) should not be modified, except that a landfill operator can, at their discretion, choose to instead of re-monitoring an area where an exceedance is measured, install a new landfill collection well within 120 days (also applies to Section 95469 (a)(2)).

- For Section 95469 (a)(2), Integrated Surface Monitoring, the requirement for corrective action within three days should be removed and allow the landfill operator to decide when in the 10-day re-monitoring time period, to begin corrective actions. Landfills operators can, based upon extensive experience and available resources, choose the time within the 10-days to more efficiently deploy repair crews to affected areas.
- There should be no changes to surface monitoring requirements for closed landfills because there is no evidence that a problem exists that would require enhanced monitoring. CARB admits this in the ISOR that, "…*there is limited data to estimate the effectiveness of any given measure or set of measures*." This is an ineffective use of resources. (OP_SWANA-16)

Agency Response to Combined Comments:

CARB made changes in response to these comments. In the 15-Day Changes, the corrective action initiation period was changed to five days. No other changes were made in response to these comments. Staff is not aware of any evidence to suggest that instantaneous emission sources are "minor leaks" and "do not result in substantial methane emissions" as the commenter suggests. Most exceedances in LMR reporting are instantaneous. Airborne and satellite remote sensing have detected large emission plumes that operators reported were found through instantaneous monitoring following notification.

C.8-5 Update Method 21 response time requirements

Comment:

§ 95471(a) – Update Antiquated Method 21 Response Time

Issue:

Surface emissions monitoring is performed while moving across the landfill surface, walking at about 1.8mph. Instruments with slow response times (T90 > 10 seconds) either smear and dilute the methane signal or respond to signal that is now dozens of meters in the past and therefore not reproducible.

Multiple methane detectors and almost all currently deployed in operation are capable of 10 second response times.

Recommendation:

CARB should require all instruments used to determine methane concentrations under § 95471 to have a T90 response time of ≤ 10 seconds.

Engraving this into the regulation closes the loophole of a bad actor procuring a slow response methane detector for the purpose of spatially averaging the methane data to never find an increased meter reading or exceedance. Changing the response rate to 10 seconds compliments the already implemented 1Hz sampling rate data recording.

Proposed Regulatory Language:

Add to § 95471(a)(3):

"(3) "10s" replaces "30s" in EPA Reference Method 21 8.1.3.2"

Replace § 95471(d)(2)(B) with:

"Response Time: The system response time, defined as the time interval from a step change in methane concentration at the input of the sampling system to the time at which 90 percent of the corresponding final value is reached as displayed on the instrument readout, shall be equal to or less than 10 seconds." (OP_Sniffer-7)

Agency Response:

No changes were made in response to this comment. The requirements in the Proposed Amendments remain aligned with federal rules, by maintaining the same response time as required by U.S. EPA Method 21. This alignment ensures that instruments able to be used for federal rules can also be used for the Proposed Amendments.

C.8-6 Automatically allow non-walking SEM methods

Comment:

§ 95471(c) – Defining the traversing pattern as a walking pattern for Surface Emission Monitoring

Issue:

Section 95471(c) is a prescriptive method for collecting SEM data per specific requirements that ensure consistency and data quality. The opening line defines the whole section's goal: "The owner or operator shall measure the landfill surface concentration of methane using a hydrocarbon detector meeting the requirements of section 95471(a). " Nowhere in this goal is the deployment modality of the hydrocarbon detector specified. 95471(c)(1) and 95471(c)(1)(B) continue to define a hydrocarbon deployment modality agnostic test method by defining what needs to be inspected "cover penetrations, distressed vegetation, cracks or seeps" and how - "Testing shall be performed by holding the hydrocarbon detector's probe within 3 inches of the landfill surface while traversing the grid" From this context the grid must be *traversed*. There is no clear requirement that the traversing must be via walking except for defining the pattern to be traversed as a "walking pattern" in several locations in § 95471(c); there is, however, no requirement that the walking pattern must be traversed by walking. There is just a causal definition of the path as a walking path. Multiple technologies (drones towing ground sampling probes, quadruped robots, rovers) are all capable of traversing a walking path while meeting all the strictly defined criteria in § 95471(c), leading to ambiguity in the regulation.

Requiring walking does not define the measurement; it defines only the human burden and safety risk.

Recommendation:

Remove the ambiguity in the regulation by either:

- Replace "walking pattern" with "traversing pattern" or,
- Clearly define the hydrocarbon detector must be deployed to the landfill surface via a walking human

Option 1 yields a lower SEM cost and reduced risk of landfill operator injury.

Suggested Regulatory Language:

If option 1: Replace “walking” with “traversing” in in § 95471(c)(1), in § 95471(c)(1)(C), § 95471(c)(1)(C)(1), § 95469(b)(2)(A)(2)

If option 2: Replace § 95471(c) with “Surface Emissions Monitoring Procedures: The owner or operator shall deploy human operators to walk the entire surface of the landfill to measure the landfill surface concentration of methane using a hydrocarbon detector meeting the requirements of section 95471(a). The landfill surface shall be inspected using the following procedures: (OP_Sniffer-12)

Agency Response:

No changes were made in response to this comment. The procedures require visual inspection as well as monitoring with a hydrocarbon detector and are designed to be used at walking pace with the capabilities of a human. Deploying sensors on alternative platforms may not precisely mimic a walking survey – such as enabling greater traversing speeds[21] – and raises questions about how certain requirements would be met (e.g., identifying and monitoring areas with cover cracks or distressed vegetation, searching for the entire extent of a leak, and encircling well bores and other cover penetrations). The alternative procedure approval process in section 95471(e) is better equipped to consider any differences and ensure that the method of deployment will result in at least equivalent emission reductions.

C.8-7 Support barometric pressure recordkeeping

Comment:

- Site conditions - § 95471(c)(2)(D) and ‘(3)(C): We support the new barometric pressure monitoring requirements. CARB’s explanation for this change in the ISOR appropriately explains the connection between barometric pressure variations to landfill gas dynamics and emissions, and the inclusion of this data will provide important context for interpreting SEM results, ensuring that SEM is conducted under appropriate site conditions. (OP_CAW-23)

Agency Response:

No changes were made in response to this comment. CARB appreciates the comment and thanks the commenter.

[21] A recent U.S. EPA Enforcement Alert highlighted the impact of monitoring speed and stated that deploying on motorized platforms cannot produce accurate readings unless following an approved test method. (U.S. EPA. (2024, September 25). Enforcement Alert: EPA Finds MSW Landfills are Violating Monitoring and Maintenance Requirements. Retrieved June 18, 2025, from *https://www.epa.gov/enforcement/enforcement-alert-epa-finds-msw-landfills-are-violating-monitoring-and-maintenance*.)

C.8-8 Use local weather stations for wind speed and barometric pressure

Comment:

Topic: SEM 95471(c)

Potential Issues: All wind speed and barometric pressure readings for the duration of all surface emissions monitoring

Potential Alternative:

- Allow use of local weather stations for wind speed and barometric pressure readings in lieu of requiring facilities to have equipment to measure wind speed and barometer pressure. (OP_SWMD-23)

Comment: It is unclear from the regulations whether facilities may rely on information from local weather stations for windspeed and barometric pressure for reporting purposes, rather than having to purchase and install special equipment for this purpose. The former would be more efficient with no loss of reliability. (OP_Recology-29)

Comment: We recommend language that would allow facilities to rely on local weather stations for purposes of reporting windspeed and barometric pressure. (OP_Recology-32)

Agency Response to Combined Comments:

No changes were made in response to these comments. The current LMR already requires wind speed to be measured using an on-site anemometer (section 95471(c)(1)(C)) and no changes were proposed to that requirement. For barometric pressure, readings from a local weather station are acceptable measurements.

C.8-9 Require SEM occur during normal atmospheric conditions

Comment: Specifically, we recommend that CARB:

- Continue improving to SEM requirements, including:
  - Requiring that SEM occur only during normal atmospheric conditions; (OP_EIP-1)

Comment:

CARB should require that SEM occur only during normal atmospheric conditions

In our January 2025 Letter, we recommended that CARB require that SEM occur only during normal atmospheric conditions. Several sections of the proposed amendments require keeping meteorological data, including barometric pressure. Although Proposed Section 9541(c)(3)(C) adjusts the section to require recording barometric pressure during the sampling period, it falls short of requiring that SEM occurs only during normal atmospheric conditions.

As previously described in our January 2025 Letter, it is well-documented that higher methane emissions are directly associated with atmospheric conditions, like lower barometric pressure. Studies conclude that “fluctuations in barometric pressure have a more pronounced correlation with landfill gas recovery than the absolute pressure values, highlighting the importance of changes in barometric pressure in determining LFG recovery efficiency.”

Accordingly, CARB should require in the final LMR that monitoring is conducted when atmospheric (also barometric) pressure is representative of normal site conditions. Wellheads are operated with respect to atmospheric pressure. Therefore, short-term variability in the local pressure can impact the effectiveness of the GCCS, where the vacuum pressure is set monthly, and thus impacts surface emissions. Emissions decrease when atmospheric pressure rises and increase when the pressure falls. Canada's ECCC cautions in technical guidance that SEM should not be conducted "[i]f atmospheric pressure is rising sharply or is considerably higher than the average for the area." Therefore, SEM conducted during periods of elevated atmospheric pressure would result in atypical measurements.

CARB should keep the recordkeeping requirements to show that SEM is conducted when barometric pressure is within the range of average daily variation at the site. However, data tracking alone is not enough. CARB must also ensure that SEM is not selectively conducted at times when methane concentrations are unusually low due to atmospheric conditions. Without a requirement that SEM must be conducted during normal atmospheric conditions, CARB cannot guard against such selective monitoring. We strongly urge CARB to include in its final rule a requirement ensuring that SEM is performed under normal atmospheric conditions. (OP_EIP-9)

Agency Response to Combined Comments:

No changes were made in response to these comments. CARB agrees with the commenter that SEM should not be selectively conducted at times when emissions are unusually low due to atmospheric conditions. By requiring recordkeeping of the barometric pressure, CARB will have access to that data to understand whether atmospheric conditions are contributing to differences in emissions readings from SEM.

C.8-10 Include walking speed in SEM procedure

Comment: Specifically, we recommend that CARB:

- Continue improving to SEM requirements, including:

…

  - Improving walking pattern monitoring requirements; (OP_EIP-3)

Comment: CARB should improve walking pattern monitoring requirements

EIP appreciates CARB's adoption of our recommendation to decrease the walking pattern to 25-foot spacing for the entire landfill in Proposed Section 95471(c)(1)(C)1. CARB includes some meaningful improvements in Proposed Section 95470(b)(3)(E), which adjusts the 100-foot spacing interval to 25 feet when an exceedance is found. Proposed Section 95471(c)(2)(B) is a proposed subsection that establishes that the entire contiguous area exceeding the concentration limit whenever an instantaneous exceedance is detected. However, EIP still recommends that CARB further improve the walking pattern requirements.

CARB should include a walking speed (e.g. one meter per second (1 m/s)). By specifying a walking speed, CARB could address deficiencies noted by EPA in their recent enforcement alert (e.g. if the pace on the serpentine path is too fast, the equipment will not have adequate time to identify an elevated concentration). (OP_EIP-11)

Agency Response to Combined Comments:

No changes were made in response to these comments. CARB thanks the commenter for the comments. Regarding walking speed, CARB chose to set a minimum measurement frequency (1 measurement per second) to address adequate measurement density along the walking path. Improvements to reporting under the Proposed Amendments will enable CARB to better understand the impact walking speed has on SEM outcomes.

C.8-11 General comment on SEM procedures

Comment: §95471(c)(1) Surface Emissions Monitoring Procedures: Requires monitoring landfill surface methane using hydrocarbon detectors and inspecting grids including cover penetrations, distressed vegetation, cracks, or seeps. (OP_SMAQMD-30)

Agency Response:

No changes were made in response to this comment. In the 45-Day Changes, the requirements identified by the commenter were simply moved to this section from their previous location in section 95471(c)(2)(D) with a clarification added. These are not new requirements, and the comment does not identify any particular concern.

C.8-12 Further strengthen SEM requirements

Comment: We appreciate CARB's efforts to strengthen the SEM requirements and recognize the numerous improvements included in the Proposed Amendments. Many of these updates meaningfully improve monitoring accountability, consistency in data collection, and responsiveness to exceedances. However additional fixes are needed to ensure that the SEM framework adequately captures emissions across all landfill surfaces and prompts timely corrective actions that reflect the urgency of methane mitigation. The stakes could not be higher – every undetected emission represents both a lost opportunity for methane reduction and a continued environmental and public-health burden on surrounding communities. (OP_CAW-20)

Agency Response:

No changes were made in response to this comment. This comment is introductory language where specific recommendations were made in subsequent comments that are responded to individually in this FSOR.

D. Wellhead Standards and Monitoring

1. Pressure Action Level and Exceedance Requirements

D.1-1 Allow extension when more than 120 days is needed to return to negative pressure

Comment:

Wellhead Pressure Provisions

The Draft Regulation should include an alternative timeline provision for those instances in which corrective action will take longer than 120 days. This would align with AAAA which provides a process to submit a root cause analysis, corrective action analysis and implementation timeline to Administrator/EO. (OP_WM-39)

Comment:

- Section: 95469(e)(1) – Positive pressure
- Current: Must correct within 120 days
- Proposed: Include provision where corrective action will take longer than 120 days.
- Rationale: Align with AAAA which provides a process to submit a root cause analysis, corrective action analysis and implementation timeline to Administrator/EO. (OP_WM-13)

Agency Response to Combined Comments:

No changes were made in response to these comments. The 120-day timeline to correct positive pressure is unchanged from the current Regulation. A clear deadline is important to ensure corrective actions are completed quickly and wells are returned to negative pressure, which is essential for effective gas extraction. CARB notes that both the current Regulation and Proposed Amendments provide alternatives for certain circumstances, as described in section 95464(c)(1)–(3) and 95468.

D.1-2 Recurring positive pressure actions too stringent

Comment:

§95469(e)(2)(B) – Weekly Wellhead Monitoring Requirement

Requiring weekly wellhead monitoring for at least one year if three or more positive pressure readings are observed would be extremely costly, overly strict, and would paradoxically discourage facilities from performing routine monitoring at their own discretion.

When ReGen observes a well with positive pressure, we respond immediately and often increase monitoring frequency until the pressure issue is resolved. For example, we may record three positive readings in one week while actively diagnosing an underlying issue. If such proactive monitoring events trigger an annual requirement for weekly readings, it would discourage the very increased monitoring that benefits emission control. (OP_ReGen-17)

Comment: The Draft Regulation would subject landfills with three recurring positive pressure readings at a wellhead during a 12-month period to perform a collection system assessment "in a 200-foot radius around the well" and "correct any issues discovered[.]" Section 95469(e)(2)(A). Operators would also be required to monitor the wellhead pressure on a weekly basis for one year and may revert back to monthly monitoring where positive pressure is detected during no more than 15% of the weekly monitoring events.

CARB has not explained its rationale for requiring assessment within a 200-foot radius, especially where the wellhead pressure has already been corrected. Moreover, the requirement to "correct any issues discovered" is vague and subject to overbroad interpretation. CARB should revise this provision to require assessment of the area within a 5-foot radius of the well, consistent with provisions in other states' landfill methane rules. In addition, CARB should remove the language to "correct any issues discovered" and instead

require operators to conduct corrective action in accordance with the wellhead monitoring provisions in Section 95469(e)(1).

In addition, CARB should remove the requirement to conduct weekly monitoring for an entire year because it is overly stringent and not necessary to identify and implement the repairs necessary to prevent positive pressure readings. (OP_WM-40)

Comment: We would expect that both the…fifteen percent positive pressure requirement be removed and consistency with EPA Federal Rule Making be maintained. (OP_WPWMA-10)

Agency Response to Combined Comments:

CARB made changes in response to these comments. In the 15-Day Changes, the period for which weekly monitoring is required was changed to six months, and the requirement to perform a collection system assessment was limited to not be required more than once in a six-month period for the same area. No other changes were made in response to these comments.

The Proposed Amendments do not discourage proactive monitoring as described by the commenter, because the recurring pressure threshold excludes periods of re-monitoring and corrective action (section 95469(e)(2)).

Recurring positive pressure readings signal that the repair actions being taken are not durable and are only temporarily addressing the condition. The purpose of more frequent monitoring is to ensure the repair action was durable and more to promptly identify any exceedances that may continue to recur. The purpose of the assessments is for the owner or operator to identify and address the root cause of recurring positive pressure exceedances. The 200-foot radius is necessary to clearly specify and constrain the area needed to thoroughly investigate and remediate the underlying cause of the positive pressure, that may not be directly at the wellhead, as explained in the ISOR (p. 60). CARB is not aware of any other state regulations that contain a requirement to assess an area around a well with positive pressure, and believe the commenter may be referring to a requirement for surface emissions monitoring within a 5-foot radius in Colorado's Landfill Methane Rule. Surface emissions tend to be fairly localized while gas collection wells usually serve an area of approximately one acre, necessitating a larger assessment area to identify the underlying cause of repeated positive pressures such as damaged wells or piping.

The Proposed Amendments do not specify what repairs are needed because of the broad array of potential problems and solutions that could be encountered. The requirement to "fix any issues discovered" is based on the owner or operator's own assessment and clearly intended to mean issues that could be contributing to the recurring positive pressure. The Proposed Amendments are more specific for one type of issue that may be encountered in the description of the collection system assessment itself (section 95471(j)): "If a collection system component is determined to be pinched, broken, or otherwise compromised it shall be repaired or a replacement well shall be installed within 120 calendar days."[22]

[22] Note that "within 120 calendar days" was added in the 15-Day Changes.

This provision is intentionally designed to be more protective than federal rules to better ensure proper functioning of gas collection wells and thus was not removed.

D.1-3 Exclude transient positive pressures from recurring threshold and do not require continuous monitoring

Comment:

Section 95469(e)(2) – Recurring Pressure Exceedances

The draft rule adds new and stringent monitoring requirements for recurring pressure exceedances. The recurring pressure exceedance requirements are triggered if, within any 12-month period, there are three positive pressure readings in the monthly monitoring at a particular well, excluding months when corrective actions are underway. It is common for certain wells – particularly those adjusted to meet temperature or oxygen requirements or used for migration control – to operate at low vacuum settings. Consequently, transient positive pressure reading may occur, for instance, due to fluctuations in barometric pressure. These short-term exceedances, provided they can be resolved on the day of the occurrence with a simple valve adjustment, should not contribute toward the three-event threshold. Additionally, the mandate to install continuous pressure monitors in wells based on a 15% positive pressure is unnecessary. Continuously monitoring pressure will not resolve underlying reasons for wells exhibiting positive pressure, and landfill owners and operators already perform root cause analysis and corrective action analysis when other parameters are exceeded.

Recommendation: We request CARB include allowances for short-term exceedances that can be corrected on the same day. Additionally, we suggest CARB remove the requirement to continuously monitor pressure based on a 15% threshold. (OP_Recology-17)

Comment:

Section 95469(e)(2): Recurring Pressure Exceedances

The proposed amendments under this subsection require a collection system assessment within 30 days after the third positive pressure reading in a 12-month period, followed by weekly monitoring and, if necessary, continuous instrumentation. However, short-term positive pressures often occur due to normal operations—such as daily barometric changes, condensate buildup, or routine wellfield adjustments—and do not indicate system failure or increased surface emissions. Requiring one year of weekly monitoring or continuous pressure measurement based on these routine transient conditions would impose significant operational and financial burdens. Operators might respond by unnecessarily increasing collector vacuum to offset positive readings, potentially causing air intrusion, higher oxygen levels, increased wellhead temperatures, and reduced methane quality. The Sanitation Districts recommend that CARB provide regulatory flexibility in addressing issues associated with pressure:

- Acknowledge that short-term positive pressures due to diurnal or barometric fluctuations are expected and do not necessarily indicate a system deficiency.
- Allow operators to exclude isolated, short-duration pressure fluctuations from recurring exceedance determinations.
- Require weekly monitoring only where there is evidence of persistent, unresolved pressure issues, rather than applying it automatically after three positive readings

- Implement mandatory continuous pressure monitoring to wells with chronic pressure exceedances, not those with intermittent or weather-related fluctuations.
- Clarify that recurring positive pressure provisions should target actual operational deviations rather than short-term fluctuations caused by normal environmental or operational factors. (OP_LACSD-11)

Comment: The recurring pressure exceedance requirements are triggered if, within any 12-month period, there are three positive pressure readings in the monthly monitoring at a particular well, excluding any months during which corrective action was being taken. Many wells, especially those that have been tuned down to meet temperature or oxygen requirements, or are used for migration control or shallow collection, are required to be maintained at low vacuum settings. Thus, it is not common during, for example, barometric pressure changes that these wells will go positive. We do not think these short-term pressure exceedances should be counted toward the three-event threshold as long as they can be corrected on the same day of exceedance with a simple valve adjustment. (OP_L and D-39)

Comment: The requirement to install a continuous pressure monitor in the well based on 15% positive pressure readings should also exclude these same short-term exceedances that can be easily corrected on the same day. Finally, continuously monitoring pressure is not going to solve any of the underlying reasons why wells sometimes exhibit positive pressure. (OP_L and D-40)

Comment:

Topic: Enhanced Wellfield Monitoring (95469)

Potential Issues:

3. Positive Pressure - ≥0 in H_2O (3x in 12 months)

    a) Weekly pressure & temperature checks; expand GCCS or rebalance vacuum if persistent.

    b) Monitor the wellhead pressure on at least a weekly basis. Monthly monitoring can resume following one year with positive pressure in no more than 15 percent of the weekly measurements, provided that all instances of positive pressure are able to be corrected within the same week (prior to the next weekly monitoring). If positive pressure is detected in more than 15 percent of the weekly (or more frequent) measurements over one year, install a system to continuously monitor pressure in the well.

    c) Correct ≤60–120 days

Concerns:

- Positive Pressure: 15% of wellfield without pressure exceedances to return to monthly monitoring from weekly.

Potential Alternative:

- Remove 15% Positive Pressure Requirement. (OP_SWMD-13)

Agency Response to Combined Comments:

CARB made changes in response to these comments. In the 15-Day Changes, the period over which weekly measurements occur after recurring positive pressure was changed from one year to six months. No other changes were made in response to these comments.

The LMR has required wells to operate at negative pressure since going into effect in 2010, with certain enumerated exceptions (section 95464(c)). Federal rules also require the collection system to operate at negative pressure.[23] Operators can adhere to this long-standing standard without risking excessive air/oxygen intrusion or increased temperatures. For example, if vacuum cannot be achieved without excessive ambient air intrusion, improved cover integrity can achieve both objectives: according to the Landfill Methane Outreach Program (LMOP),[24] a "more impermeable seal on the surface of the landfill allows more vacuum to be applied to LFG collectors while minimizing the potential for atmospheric air and water to seep into the waste mass and ultimately into the LFG collectors."

CARB respectfully disagrees that short-term events should be excluded from the recurring threshold. The purpose of this recurring threshold is to more thoroughly investigate areas with repeated loss of vacuum. Fixing positive pressure quickly does not provide assurance that the well continues to operate at negative pressure between monitoring events. In these cases, further investigation is warranted to ensure continuous negative pressure operation.

CARB also respectfully disagrees that more frequent monitoring is not useful in correcting the cause of recurring positive pressure. Knowing how often and under what conditions positive pressure is occurring is valuable information for assessing why there is recurring positive pressure and what actions could be taken to better ensure negative pressure operation under a variety of conditions. Further, it enables operators to respond to such exceedances promptly.

The Proposed Amendments use three monthly positive pressure readings over the course of a 12-month period as the standard to define when there are persistent pressure issues. Additionally, mandatory continuous pressure monitoring does only apply to wells with chronic pressure exceedances by only requiring this where more than 15% of weekly measurements over the course of 6 months show positive pressure. Please note that the increased monitoring frequency applies only to the well with recurring positive pressure, and the 15% threshold refers to the number of readings at that well—not "15% of wellfield" as one commenter suggests.

D.1-4 Clarify which well types are subject to negative pressure requirement

Comment: §95464(c) Wellhead Gauge Pressure: Clearly establish which wells fall under the regulation. (OP_SMAQMD-15)

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[23] 40 C.F.R. § 60.763(b); 40 C.F.R. § 60.36f(a)(3); and 40 C.F.R. § 63.1958(b).

[24] Landfill Methane Outreach Program (LMOP). (2024, January). *LFG Energy Project Development Handbook*. *https://www.epa.gov/system/files/documents/2024-01/pdh_full.pdf*.

Agency Response:

No changes were made in response to this comment. All wells that are part of the gas collection and control system are subject to the negative gauge pressure requirement, except as provided in sections 95464(c)(1)-(3), or during repairs and temporary shutdowns pursuant to section 95464(e).

D.1-5 Timeline for system expansion is too short

Comment:

§95469(e)(1)(B) – Root Cause Analysis and System Expansion Timeline

This section requires root cause analysis for wells with positive pressure readings not corrected within 15 days, and suggests implementing system expansion within 60 days of the initial reading. This means operators would have only 45 days to drill new wells if a well cannot be fixed within the initial 15-day period.

This timeframe is too short to feasibly mobilize a drill rig to the landfill and begin well drilling. Landfill gas well drilling is a specialized activity, and drill rigs are not always available on short notice. Additionally, the public board approval process required for government agencies like ReGen makes accomplishing this work in less than 2 months extremely difficult. (OP_ReGen-13)

Agency Response:

CARB made changes in response to this comment. In the 15-Day Changes, the phrasing was adjusted in section 95469(e)(1)(B) to clarify that corrective actions do not need to be completed within 60 days. Rather, the root cause analysis must be conducted within that timeline. The total allowable time to complete corrective action remains at 120 calendar days – the same as in the current Regulation.

D.1-6 Reduce time for repairs and re-monitoring

Comment: Most repairs and retests are not urgent enough. Taking 3 or more days to start repairs and 10 or more days to retest and report, needs to change to 1 day to start repairs, 3 days to retest, and 1 more day to report. Particularly egregious are 60 and 120 days allowed in § 95469(e)(1)(C) on p. 33. (OP_Burke-6)

Agency Response:

No changes were made in response to this comment. Owners or operators need a reasonable period of time to evaluate, plan, and implement appropriate corrective action; schedule personnel for re-monitoring; and ensure complete and accurate reporting. CARB staff balanced those needs against the need for expeditious action to repair surface methane exceedances, positive wellhead pressure, and other issues when proposing these timelines.

D.1-7 Make zero pressure compliant

Comment:

Section 95469 (e)(1)

A zero-pressure reading is not equivalent to a positive pressure reading. While a zero reading indicates that the well is not under vacuum, it also means there is no landfill gas pressure. If the intent is for all wells to remain under vacuum, the section should be revised to state that explicitly. (OP_RIVCO-8)

Comment:

Section 95469(e)(1): Positive Pressure Corrective Action – Inclusion of Zero Pressure

The proposed amendments in this subsection added zero-pressure reading as one of the criteria for wellhead adjustments and enhanced monitoring. Zero-pressure reading is common and doesn't necessarily indicate a risk of gas emission or ineffectiveness of a relevant collector. The inclusion of a zero-pressure reading requirement would not provide a meaningful benefit for emission control but would impose an unnecessary burden on landfill operators. Furthermore, correcting a zero-pressure reading may cause overpulling of LFG, which can introduce air into the waste mass. Therefore, the Sanitation Districts recommend that CARB exclude zero-pressure readings from the positive pressure corrective action requirements. This ensures that corrective actions are directed toward actual positive pressure conditions, improving regulatory clarity and avoiding unnecessary procedural actions. Under USEPA NSPS Subpart XXX and SCAQMD Rule 1150.1, corrective actions apply only to actual positive-pressure conditions, not to zero-pressure readings. Aligning Section 95469(e) with these well-established regulations would provide consistency across regulatory agencies. (OP_LACSD-10)

Agency Response to Combined Comments:

No changes were made in response to these comments.

As discussed further in the agency response in section IV.D.1-3 of this FSOR, both the current LMR (section 95464(c)) and federal rules[25] require the collection system to operate under negative pressure, and require corrective actions when a well is measured at positive pressure. This is necessary to ensure that gas collection system is designed and operated to draw all landfill gas toward the gas control device(s), as is explicitly required in section 95464(b)(1)(C). Staff recognizes that mathematically, zero is neither a negative nor a positive number. However, in the context of gauge pressure, zero is atmospheric pressure, and vacuum pressures fall below zero on a gauge pressure scale. Therefore, values below zero are referred to as negative pressure. The clarification of zero being included as a positive pressure reading resolves any potential confusion.

[25] 40 C.F.R. § 60.763(b); 40 C.F.R. § 60.36f(a)(3); and 40 C.F.R. § 63.1958(b).

2. Temperature Action Levels

D.2-1 Lower temperature thresholds

Comment: The current temperature threshold is too high to prevent the melting of underground gas collection pipes and must be lowered to prevent gas leeks and subsurface fires like those experienced at Chiquita Canyon landfill. (OP_Bruce-4)

Comment: Methane concentration and landfills gas temperature thresholds must reflect the lessons learned and technological improvements since these standards were first established.

…

The wellhead operational temperature threshold of 145°F and temperature monitoring framework risks allowing high subsurface temperatures to persist for far too long, potentially triggering or worsening SET events or landfill fires.

Landfill fires and (SET) events present an especially urgent and preventable threat. Once ignited, these fires can burn for months or years, releasing toxic air pollutants and volatile organic compounds that endanger nearby residents. Several communities in California have endured or are enduring prolonged exposure to hazardous air pollutants, evacuation orders, and long-term health and property impacts from these events. Beyond public health consequences, landfill fires and SET events inflict significant financial costs, disrupt local waste systems, and damage the credibility of operators and regulatory agencies. Proactive monitoring and tighter operational thresholds are among the most effective tools to prevent these events before they escalate into large-scale disasters that are exponentially more costly to mitigate and control. Strengthening early detection and mitigation requirements will protect communities and preserve public confidence in both operators and CARB's oversight role. (OP_CAW-7)

Comment: Temperature Monitoring and Response - § 95464(d) and 95469(e)(3): We appreciate CARB's comprehensive approach to temperature monitoring and response. However, we are deeply concerned that the current 145°F threshold and the associated response timelines may not adequately prevent subsurface elevated temperature (SET) events. Wellhead readings can be misleading and temperatures above 131°F are indicative of active reactions and warrant immediate corrective action.

We commend CARB for linking exceedances of 131°F to collection system and cover integrity assessments, and for developing the wellhead trend analysis framework. However, the current 60-day delay before enhanced monitoring and downwell temperature monitoring are triggered is too long and does not account for potentially rapid head development below the surface. (OP_CAW-49)

Comment: Lower the temperature threshold for wellheads to 131°F or (1) Initiate downwell temperature monitoring within 30 days of a wellhead exceeding 131°F, rather than waiting 60 days and (2) conduct weekly monitoring of wellhead temperatures exceeding 131°F until readings return below the threshold. (OP_CAW-52)

Comment: Lower the wellhead temperature threshold to 131°F or initiate downwell monitoring within 30 days instead of 60 days and conduct weekly monitoring for wells exceeding 131°F (OP_CAW-59)

Comment:

The Federal New Source Performance Standards and Emission Guidelines retain the 131 degrees Fahrenheit standard.

Because CARB is considering alignment with the federal standards as it sets a temperature threshold, the history of these standards is important. CARB should not merely align with the higher National Emission Standards for Hazardous Air Pollutants ("NESHAP") threshold. As discussed in depth in these subsections, sufficient evidence shows that the New Source Performance Standards ("NSPS") and Emission Guidelines' ("EGs") threshold of 131 degrees Fahrenheit is more protective than that in the NESHAP. Given California's recent experience with landfill fires, CARB should adopt more protective requirements to prevent additional fires.

Over time, the EPA's air quality standards for landfills were revised to weaken requirements for addressing temperature as well as nitrogen and oxygen content at landfills. A temperature limit of 131 degrees Fahrenheit was set in the 1996 NSPS because this temperature was cited by industry as a temperature that indicates that there may be a subsurface problem. Nitrogen levels were limited to 20% with a corresponding oxygen level of 5% But operators were allowed to set higher parameters if "supporting data [showed] that the elevated parameter [did] not cause fires or significantly inhibit anaerobic decomposition by killing methanogens."

However, landfill operators argued to EPA during a subsequent revision that, due to variability among landfill sites, these thresholds were difficult to meet and that approval of alternative parameters was often delayed, preventing efficient operation of collection systems. Operators further claimed that these standards were unnecessary because landfill operators are already incentivized to reduce the risk of fire and explosions at their sites. Ultimately, the temperature standard was maintained in the 2016 NSPS and the nitrogen and oxygen standards were eliminated. Operators are required to monitor oxygen and nitrogen content but there are no associated reporting thresholds or corrective actions.

In the 2020 NESHAP revisions, EPA weakened the temperature standard by increasing it to 145 degrees Fahrenheit and the rule replicated the NSPS approach to nitrogen and oxygen content, requiring monitoring but no corrective action or reporting. In addition, in the 2020 NESHAP revisions, EPA finalized "minor edits" to the 2016 NSPS and EGs "allowing landfills to demonstrate compliance with the 'major compliance provisions' of the NESHAP in lieu of complying with the analogous provisions in the NSPS and EGs." Subparts XXX and Cf, the NSPS and EGs respectively, provide operators the option to comply instead with the NESHAP "major compliance provisions." However, the NESHAP provides no analogous "major compliance provisions" referring back to the EGs and NSPS. Thus, a source may choose to comply with the NESHAP rather than the corresponding provisions of the NSPS and EGs. Practically, this amounts to operators otherwise subject to the NSPS or EGs being allowed to instead comply with the operational standards for the GCCS and the compliance provisions of the NESHAP.

However, EPA's own analysis of the NESHAP rule indicates that temperatures below 145 degrees can indicate possible fire hazards. When EPA established the 145 degree standard, it cited a Solid Waste Association of North America ("SWANA") manual of practice for landfill GCCS, which states:

> *polyvinyl chloride piping begins to fail at 145 °F and fails at 165 °F, temperatures above 140 °F could indicate aerobic conditions [meaning the presence of oxygen, posing a fire*

risk], and landfill gas temperature over 135 °F indicates a possible subsurface oxidation event (SOE)[rapid and self-sustaining combustion of organic waste that is exposed to oxygen (aerobic conditions)].

Therefore, the use of 145°F as a temperature threshold in EPA's 2020 NESHAP revisions does not provide a sufficient rationale for CARB to use this threshold. EPA weakened its original temperature threshold of 131 degrees Fahrenheit in 2020, revising it to 145 degrees Fahrenheit while acknowledging significant increased risks at temperatures below 145 degrees Fahrenheit.

If CARB elects to use 145 degrees Fahrenheit as a threshold, it should have an independent basis for doing so.

<u>CARB Should strongly consider revising Section 95464(d) to establish a 131 degrees Fahrenheit standard.</u>

In Proposed Section 95464(d), CARB establishes a wellhead standard of 145 degrees Fahrenheit. In the ISOR, while rightly pointing to the disastrous outcomes from SET events and landfill fires, CARB reasons that aligning with the federal requirements is sufficient rationale for setting the maximum temperature standard at 145 degrees Fahrenheit. This is a mistake. CARB should instead establish a maximum temperature standard of 131 degrees Fahrenheit, aligning instead with the NSPS and EGs.

In fact, in the ISOR, CARB explains that elevated landfill gas temperatures can potentially damage wells and lead to degraded performance of the GCCS, resulting in excess emissions. However, CARB fails to account for the damage that begins and is possible at temperatures lower than 145 degrees Fahrenheit as described in Section VII.A above.

Moreover, while high oxygen concentrations greater than five percent may be acceptable for short periods if gas wellhead temperatures are below 131 degrees Fahrenheit, the risk of a SET Event increases as the temperature exceeds 131 degrees Fahrenheit with oxygen of five percent or greater. Also, as the gas wellhead temperature exceeds 170 degrees Fahrenheit, the potential for a SET Event becoming a smolder is higher if oxygen is at or above five percent. Additionally, as temperatures increase in a landfill, the concentration of some VOCs can increase by one to two orders of magnitude.

Accordingly, EIP urges CARB not to finalize its proposal to align with the 145 degrees Fahrenheit threshold in EPA's weakened 2020 NESHAP revisions. Because degradation of GCCS components can begin as low as 140 degrees Fahrenheit and the increase in VOC emissions associated with elevated temperatures, CARB should instead include the standard of 131 degrees Fahrenheit. (OP_EIP-18)

<u>Comment:</u> …[W]e encourage CARB to consider strengthening its draft rule by:

…

- Going beyond federal standards with proactive fire prevention measures, including lower temperature thresholds and faster regulatory responses. (B_US Reps-5)

<u>Comment:</u> Segundo, me preocupa enormemente el potencial de incendios subterráneos debido a temperaturas excesivas bajo la superficie, como se vio en el vertedero de Chiquita Canyon en el sur de California. El umbral de temperatura propuesto de 131 grados es

demasiado alto para evitar que esto suceda y debe reducirse, ya que las temperaturas más profundas podrían ser aún más altas.

English translation:

Second, I am extremely concerned about the potential for underground fires due to excessive temperatures below the surface, as seen at the Chiquita Canyon landfill in Southern California. The proposed temperature threshold of 131 degrees is too high to prevent this from happening and should be reduced, since the deepest temperatures could be even higher.

(B_Gutierrez-3) (B_Calderon-3) (B_Mascoso-3) (B_Rios-3)

Comment: I'm greatly concerned about the potential for underground fires due to excessive subsurface temperatures, as was seen by the Chiquita Canyon Landfill in Southern California. The proposed temperature threshold of 131 degrees is far too high to keep this from happening and must be lowered as the temperatures deeper underground could be even higher. (T_GNC-2)

Comment: I support the proposed regulation and would like to thank CARB LMR staff for adding surface and downwell temperature monitoring to this updated LMR. Ensuring operators are not melting and collapsing methane control equipment pipes is a great step forward in reaching methane emission reduction goals and protecting the nearby public.

Existing regulation allows temperature increases and temperature monitoring to occur in the dark. Thank you for hopefully bringing it into the light. I would add at 131 degrees Fahrenheit at the surface, you are still going to be identifying problem landfills, instead of preventing landfills from becoming a problem. (T_CCEJN2-1)

Comment: [We recommend] secondly, to change the wellhead temperature period to 30 days, so that again we're catching that problem sooner. (T_CCA-3)

Comment: We strongly support CARB's temperature monitoring framework. However, the amendments allow wells to exceed 131 degrees Fahrenheit for 60 days before downwell monitoring begins. And with only monthly readings, this could mean nearly three months of elevated temperatures before subsurface conditions are observed.

This is particularly concerning, since temperature differentials down the well can be extreme. To reduce the risk of runaway heating events, we urge CARB to shorten this timeline to 30 days and increase monitoring frequency to weekly, ensuring earlier detection and intervention. (T_CAW-2)

Comment: We are also glad to see the progress with the temperature monitoring framework. However, we ask that earlier downwell monitoring triggers be incorporated as the current timeline remains a little too long and raises flags about not properly preventing landfill fires. As both the Chair and staff shared earlier, addressing methane in California is one of the most critical pathways to addressing climate change in an immediate manner, especially when we're facing an unprecedentedly challenging federal environment. (T_CEV-4)

Comment: Fires have emerged as a priority concern for communities across California living near landfills. CARB’s LMR revisions include several provisions that will help prevent subsurface elevated temperature (“SET”) events and landfill fires, including expanded emissions and GCCS monitoring with corrective action, wellhead temperature monitoring, and cover integrity assessments. We encourage CARB to consider recommendations on mitigating

fire risk from Californians Against Waste and the Environmental Integrity Project. (OP_RMI/EDF-26)

Comment: We also need faster action on high-temperature wells. Delays increase the risk of underground fires and impact nearby communities. Stronger temperature thresholds and quicker checks protect people before things get worse. (T_Ruano-2)

Comment: I am asking CARB to…strengthen the temperature response timeline. (T_Ruano-4)

Comment: And while this regulation is not perfect in its current form, there are certain issues that I have with the temperature threshold that was set. I want to urge the Board to pass the regulation. (T_VIP2-2)

Comment: The temperature framework can be stronger. (T_VIP3/CEJC-2)

Agency Response to Combined Comments:

No changes were made in response to these comments. Landfill gas temperatures from 60 to 130 degrees Fahrenheit (°F) are widely considered to be the normal range that maintains normal biological activity under anaerobic conditions. As discussed in the ISOR, CARB staff agrees with the commenters that the risk of heat-generating chemical reactions increases as the temperature exceeds 131 °F, and therefore the Proposed Amendments require proactively limiting oxygen, assessing cover and collection components, and additional monitoring to inform appropriate preventative or corrective actions.

Staff also agrees with the commenters that wellhead temperature can significantly underestimate actual subsurface temperatures, and therefore the Proposed Amendments require downwell monitoring to determine the actual temperature the well is exposed to.

As described in the ISOR, the rationale for the 145 °F standard was not solely for the purpose of alignment with the *National Emission Standards for Hazardous Air Pollutants: Municipal Solid Waste Landfills* (NESHAP)[26] as one commenter suggests, but also because the biological activity of methanogenic bacteria slows above this temperature, and some materials used in well construction can withstand only short periods of higher temperatures without deforming or failing, impeding their ability to capture landfill gas. The selection of 145°F — rather than temperature standard of 131°F in the *Standards of Performance for Municipal Solid Waste Landfills That Commenced Construction, Reconstruction, or Modification After July 17, 2014* (New Source Performance Standards or NSPS)[27] and Emission Guidelines — eliminates the need for CARB to consider requests for higher operating values for individual wells, while the requirements for wells that exceed the 131°F threshold help to prevent temperatures exceeding the 145°F standard and ensure such exceedance is promptly detected.

[26] 40 C.F.R. Part 63, Subpart AAAA.
[27] 40 C.F.R. Part 60, Subpart XXX.

Staff did not reduce the 60-day timeline for downwell temperature measurement and enhanced monitoring because wellhead monitoring data and regulator experience has shown that temperatures between 131–145 °F can often be quickly managed and temperatures returned to normal levels. Allowing 60 days for correction of an elevated temperature over 131 °F before enhanced and downwell monitoring is required recognizes that simple corrective actions may be possible to reduce temperatures. The 60-day timeline is intended to allow sufficient time both to implement corrective actions (e.g., cover improvements, GCCS repairs) and to observe whether they have been effective. In response to concerns about potential rapid changes in temperature, staff proposed section 95469(e)(7)(A) separately to require monitoring frequency to be increased from monthly to weekly in response to such changes.

The Proposed Amendments are designed to ensure prompt detection and early intervention by operators, and require intensive monitoring and proactive responses to changing conditions to support safe and effective operation of landfill gas collection and control systems. As discussed in the ISOR, the proposal goes beyond existing federal rules with more stringent requirements, including:

- Progressively limit oxygen with increasing temperatures (NESHAP does not limit oxygen)
- Perform enhanced monitoring and downwell monitoring at both the affected well and surrounding wells (NESHAP requires this only at the well with elevated temperature)
- Perform downwell temperature monitoring monthly beginning at 131°F (NESHAP requires downwell temperature monitoring annually, beginning at 165°F)
- Conduct and submit the root cause analysis, corrective action analysis, and implementation schedule when a corrective action cannot be fully implemented within 60 days (NESHAP requires only when the corrective actions are expected to take longer than 120 days).

Together this represents the strongest set of assessment and monitoring requirements for elevated temperatures of any regulations at the federal or state level.

D.2-2 Raise temperature thresholds

Comment: {Footnote: WM does not agree that temperature changes resulting in wellhead temperatures below 131°F should be cause for alarm, nor that changes should be monitored weekly unless wellhead temperatures are 160°F+. We agree that directional changes are more important than absolute values.} (OP_WM-79)

Comment: Intermittent high temperature readings may occur sporadically at any facility and data suggests that it is a common occurrence. U.S. EPA studied the wellhead temperature issue during the rulemaking for the NESHAP rule and elected to establish a 145°F wellhead temperature limit. This limit is intended to replace the 131°F limits found in earlier New Source Performance Standard (NSPS) and Emission Guideline (EG) rules. As such, we request that CARB change the proposed rule such that wellhead temperatures of 131°F do not require any corrective action. Only at 145°F should corrective action be triggered. (OP_OPAL Fuels-5)

Comment: After extensive evaluation, the EPA concluded that LFG extraction system components, including high-operating-value (HOV) wells, are capable of safely operating at

temperatures up to 145°F without posing a combustion or subsurface fire risk. Methane production in landfills is governed by microbial decomposition processes, which are active across a wide range of temperatures. Scientific literature identifies three categories of methane producing bacteria:

- Psychrophiles: Optimal at 12–18°C (53.6–64.4°F)
- Mesophiles: Optimal at 25–40°C (77–104°F)
- Thermophiles: Optimal at 55–65°C (131–149°F), with some active up to 70°C (158°F)

While most landfills operate in the mesophilic range, research indicates that thermophilic conditions can yield more efficient gas production. Therefore, temperature increases alone should not be used as a proxy for landfill instability or fire without additional diagnostic data.

We believe the 145-degree F threshold is an appropriate starting point for gas collection control system and cover integrity assessments. Once these assessments have been completed and if the temperature cannot be reduced within the agreed period, enhanced monitoring could be initiated to further evaluate the occurrence. Additionally, we believe that any initiation of these assessments or enhanced monitoring should be the result of data gathered over a 60-day period encompassing multiple measurements (i.e., minimum 3 exceeding this limit within this period vs. a single data point). (OP_Ind/Gov Coalition-23)

Comment:

Temperature Triggers for Assessments Should Be Adjusted and Recalibrated

Exceedances of wellhead temperatures at 131 degrees Fahrenheit are not indicative of major gas collection system problems. As proposed in Section 95469 (e)(3), any well exceeding 131 degrees will require an extensive collection system assessment and cover integrity assessment and force a reductions in the oxygen content in the wellhead. These full assessments are not warranted based upon a single exceedance. Additional cover material can be used to fill in cracks and other surface openings, with remeasuring after a suitable period to determine whether the responses adequately resolved the issue. Continued exceedances may warrant additional measures such as a review of the area around the specific well.

While most landfills appear to operate with temperatures below 131 degrees, it appears that some operate normally at temperatures up to 145 degrees without causing any adverse internal or external consequences. It would be more appropriate for the full gas collection control system assessment and cover integrity assessment to be triggered by exceedances of the 145-degree Fahrenheit temperature threshold.

For these reasons, we recommend setting the threshold triggering assessments of the collection system and cover integrity, and oxygen content monitoring, at 145 degrees, rather than the 131 degrees currently proposed. (OP_RCRC-17)

Comment: We request that CARB change the proposed rule to align the temperature thresholds with federal rules. This would mean that the corrective actions outlined in this subsection are triggered at 145 F. Should CARB feel that corrective actions are warranted at 131 F, we suggest limiting any required actions to increased monitoring of the specific well and adjacent wells. (OP_Recology-20)

Comment:

Wellhead Temperature Requirements

The draft rule incorporates wellhead temperature limits and enhanced monitoring from the federal NESHAP, along with provisions from Assembly Bill 28 as outlined by CalRecycle's Todd Thalhamer. These changes would substantially increase the cost of tuning and monitoring the wellfield at Kiefer. The proposed threshold of 131°F for triggering enhanced monitoring is not uncommon for landfill wells to reach. Presently, industry has demonstrated that higher wellhead temperatures are both safe and appropriate. This could force the premature removal of safely operating wells to avoid regulatory violations, wasting public funds and disrupting efficient operations. Every removal of a landfill well is a costly burden when those wells are necessarily replaced. Additionally, shut down wells extract no methane – meaning regulations that take viable wells offline lead to greater harm to the environment without benefit. (OP_SacCo-2)

Comment: Our consultant has evaluated data for 118 California landfills and almost 14,000 active gas wells, and approximately 7% of the wells (over 900) and 35% of the landfills (over 40) have had wells with readings over 131° F. Some wells simply operate at higher temperatures, have for years, and this has not resulted in any adverse consequences at the landfill. U.S. EPA studied the wellhead temperature issue during the rulemaking for the NESHAP rule and elected to establish a 145° F wellhead temperature limit. This limit is intended to replace the 131 ° F limits found in earlier New Source Performance Standard (NSPS) and Emission Guideline (EG) rules. As such, we request that CARB change the proposed rule such that wellhead temperatures of 131 ° F do not require any corrective action, but instead can trigger an increase in the monitoring of the specific well and adjacent wells. Only at 145° F should corrective action be triggered. (OP_L and D-23)

Agency Response to Combined Comments:

CARB made changes in response to these comments. In the 15-Day Changes, the conditions that allow reducing frequency and ceasing enhanced monitoring and downwell temperature monitoring were changed. Specifically, that additional monitoring can cease if the downwell temperature does not exceed 145 °F. This aligns with the original intent of requirements for preventative action and additional monitoring in response to gas temperatures above 131 °F and helps alleviate the concern that wells above 131 but below 145 °F would require correction or be drawn into protracted frequent monitoring.

In response to the request from multiple commenters that CARB change the Proposed Amendments such that wellhead temperatures of 131 °F do not require any corrective action, but instead trigger an increase in the monitoring of the specific well and adjacent wells, staff notes that the proposed corrective action standard for temperature is 145 °F. Temperature below 145 °F is not required to be reduced to below 131 °F. Repairing deficiencies identified in assessments are necessary to achieve effective emissions control and limit air intrusion.

Staff agrees that temperature increases alone are not sufficient to understand subsurface conditions, and not all wellhead temperatures over 131°F are necessarily experiencing an event that risks causing adverse impacts to the gas collection system. This informed the basis of the proposed approach, which is designed to ensure data is

available to determine whether there are indicators of a subsurface reaction in the affected and surrounding wells, hotter temperatures downwell, air intrusion that could exacerbate heat and pressure generation, or deficiencies in the collection system and surface cover. This information is needed to inform the appropriate steps to manage changing conditions and ensure that temperatures are stabilized to avoid exceeding the 145 °F temperature corrective action standard.

In response to a commenter's concern that the requirements could encourage premature removal of safely operating wells to avoid regulatory violations, staff wishes to note that while the Proposed Amendments allow for a well to be temporarily disconnected in response to concerns for fire or elevated temperature, decommissioning wells (without repair or replacement) is not an acceptable corrective action under the Proposed Amendments. In addition to improving cover integrity and repairing damaged components, site-specific conditions may indicate the need for further corrective actions (e.g., installing more wells to remove heat and pressure, installing deeper wells, adding drainage or installing dual action wells equipped with pumps to remove liquids, and evaluating the need to upgrade well casing materials to withstand higher temperatures).

Staff respectfully disagrees that the higher temperature limit in NESHAP was intended to replace the 131°F limits in NSPS and EG. The rules involve different regimes where the NESHAP limit has a higher temperature allowance, but comes with additional enhanced monitoring actions not found in the NSPS and EG.

The prevalence of wells over 131 °F does not provide evidence that these conditions do not warrant further investigation.

For more information on the importance of wellhead parameter trend analysis, see the agency response in section IV.D.8-4 of this chapter.

D.2-3 Use multi-dimensional approach to temperature provisions

Comment:

Suggested Revisions to Wellhead Temperature Provisions

With respect to wellhead temperature, Section 95469(e)(3) of the Draft Regulation prescribes significant investigative and corrective requirements following a wellhead detection above 131° F. Setting the compliance threshold at 131F significantly deviates from existing practice, which requires progressive monitoring at wellhead temperatures of 145F and 160F, and could bring in many more wells (and landfills) than are currently subject to NESHAP's enhanced monitoring.

In promulgating the NESHAP regulations applicable to MSW landfills, US EPA stated that "[t]he purpose of wellhead temperature monitoring is to prevent fires and avoid conditions that inhibit anaerobic decomposition of the MSW" and therefore "chose 145 °F because it is high enough to provide flexibility to MSW landfill owners and . . . is low enough to promote efficient anaerobic decomposition and is protective enough to prevent fires and not damage GCCS equipment."

US EPA then revised subparts XXX (NSPS) and Cf (EG) to reflect the higher temperature standard, allowing "landfills affected by the NSPS and EG" to "demonstrate compliance with

the ‘major compliance provisions” of subpart AAAA “in lieu of complying with the analogous provisions in the NSPS and EG” to allow landfills to “follow one set of operational, compliance, monitoring, and reporting provisions for pressure and temperature.” US EPA expected, and it has been the case, that the revisions “reduce[d] the number of requests and burdens associated with submitting and reviewing the requests for higher operating values (HOVs) for temperature, as well as reduce[d] the frequency of corrective actions for exceeding the temperature limit.”

On this basis, wellhead temperatures of 131°F should not trigger the investigative and corrective actions that the Draft Regulation would require. A wellhead temperature threshold of 145°F threshold would be an appropriate trigger for GCCS and cover integrity assessments. Once these assessments have been completed, and if the temperature cannot be reduced within the agreed period, enhanced monitoring could be initiated to further evaluate the occurrence. However, initiation of these assessments or enhanced monitoring should be the result of data gathered over a 90-day period encompassing multiple measurements.

To better evaluate whether a SET event is occurring, CARB should impose more stringent monitoring requirements when the following conditions are present within a discrete area, based on data collected over two consecutive quarters {Footnote: Two quarters worth of data is necessary to assess the underlying factors driving the conditions at elevated temperature wells and, thus, how to properly manage the wells (i.e., whether to shut the wells off or increase draw on the wells).}:

- Two or more immediately adjacent wells demonstrate:
    - average wellhead temperatures of 145° F or greater and
    - average CH4/CO2 ratio less than or equal to 0.9
- Differential settlement
- Presence of cracks and fissures

Only when wellhead temperatures are equal to or greater than 145°F and a methane to carbon dioxide (CH4/CO2) ratio less than or equal to 0.9, should the facility begin enhanced monitoring, including weekly well readings of O2, CO2, CH4, and CO, and evaluating whether physical observations (smoke, etc.) are occurring, consistent with the NESHAP.

If a wellhead temperature exceeds 160°F and has a CH4 to CO2 ratio of less than 0.9, the facility should be required to monitor and determine if the elevated temperatures are expanding to include physical observations. Two quarters of well-field data should be trended to determine optimum landfill gas collection. Since the balance gas concentration typically includes some percentage of hydrogen, speciation will be necessary. Once the hydrogen concentration is determined, the elevated temperature well should be tuned to a maximum of 10-15% balance gas (typically assumed to be Nitrogen). If the wellhead temperature increases to equal or greater than 170°F the facility should be required to perform a 24-hour notification in accordance with NESHAP.

Lastly, wellhead temperatures should be used for compliance purposes, rather than any temperature within a well. WM would rather discuss a more robust framework based on wellhead temperatures than rely on extensive downwell temperature monitoring for the reasons described below. (OP_WM-36)

Agency Response:

CARB made changes in response to these comments. In the 15-Day Changes, the conditions to allow reducing frequency and ceasing enhanced and downwell temperature monitoring were changed as discussed in the agency response in section IV.D.2-2. No other changes were made in response to this comment.

As discussed in the ISOR, extensive discussions with academics, consultants, and regulators revealed agreement that wellhead temperatures between 131–145 °F can indicate that heat-generating chemical reactions may be occurring, and wellhead temperatures can significantly underestimate the actual temperature the well is exposed to. Staff chose to require collection system and cover integrity assessments and progressively limit oxygen beginning at 131 °F to stabilize temperatures and avoid reaching the maximum limit of 145 °F. Similarly, enhanced and downwell monitoring must begin sooner to inform appropriate preventative or corrective actions. For example, downwell monitoring provides critical information for the operator to properly manage the wells, such as by revealing whether a reaction is occurring at a deep or shallow depth which can more quickly indicate whether to increase or reduce vacuum.

Staff appreciates the commenter's detailed suggestions but believes more protective requirements are necessary for effective emissions control. By the time conditions such as differential settlement, fissures, and temperatures above 160 °F occur, the collection system may have already sustained damage, impeding its ability to capture landfill gas, and compromising the safety of workers and nearby residents.

D.2-4 Require action only for multiple high temperature measurements

Comment: We suggest that all corrective actions be triggered if, and only if, an elevated temperature reading occurs consistently over a 60-day period, as demonstrated by multiple measurements, as opposed to a single data point. (OP_Recology-21)

Comment: The follow-on actions proposed in the revised rule are comprehensive and should not be required to be implemented in the event of the occurrence of a single high temperature reading. Intermittent high temperature readings may occur sporadically at any facility. (OP_L and D-22)

Comment: The current draft of the revised LMR would appear to require an operator to initiate corrective actions, cover integrity assessments and collection system assessments immediately following the occurrence of single elevated temperature reading (i.e., greater than 131° F and 145° F as noted in Section 95464(e)(3) and (4)). We would suggest that all follow-on actions be required only if an elevated temperature reading occurs consistently over 60 days for any temperature threshold versus detection with a single reading. This would essentially encompass three (3) monthly readings and initiation of follow-up actions would be based on gathering of some statistically significant data. (OP_L and D-24) (OP_OPAL Fuels-6)

Agency Response to Combined Comments:

No changes were made in response to these comments. Limiting oxygen content and preforming collection system and cover integrity assessments are relatively simple actions to quickly respond and potentially rectify conditions that impede effective

emissions control and could contribute to further elevating temperatures that risk damage to gas collection infrastructure. While a 60-day period is provided before triggering more intensive enhanced monitoring and downwell monitoring for temperatures over 131 °F, such a period is not appropriate when the maximum temperature standard of 145 °F is exceeded.

D.2-5 Resolve ambiguity about interior vs. exterior wells and conflict with federal limits

Comment: §95464(d) Wellhead Temperature: Ambiguity regarding interior vs. exterior wells; temperature standard may conflict with existing federal or NESHAP limits. (OP_SMAQMD-17)

Agency Response:

CARB made changes in response to these comments. In the 15-Day Changes, response actions for elevated or quickly changing well temperatures were limited to interior wells (sections 95469(e)(3), (4), and (7)(A)). In section 95464(d) as referenced in the comment, the 45-Day Changes already reflected that the standard applies only to interior wells, however, in the 15-Day Changes minor wording adjustments were made to clarify this point.

There is no conflict with existing federal limits. As discussed in the ISOR, since the requirements of the Proposed Amendments are more stringent, they do not conflict with or impede compliance with existing federal requirements.

D.2-6 General comments on future work

Comment: We'd like to thank staff for the work on the draft LMR and look forward to working with them on additional 15-day changes in the following:

First, ensuring that LMR plays a productive role in managing site-specific conditions associated with elevated temperature landfills. (T_WM-1)

Comment: We're also committed to working with CARB, its sister agencies, the Legislature, and other stakeholders to ensure that elevated temperature events are diagnosed and properly managed. (T_WM-6)

Agency Response to Combined Comments:

No changes were made in response to these comments. CARB values feedback from operators and thanks the commenters for their continued engagement.

3. Higher Operating Values

D.3-1 Agency responsiveness to HOV requests is important

Comment: A key element of US EPA's program is the recognition that there may be specific conditions at individual wells that may require more time to resolve than is allowed by the rule. The concept of a higher operating value (HOV) has allowed operators to come into compliance and is an important element of the federal program. Agency responsiveness to requests from operators for HOVs is an important element of ensuring that there are feasible pathways to compliance while ensuring appropriate regulatory oversight. (OP_WM-27)

Agency Response:

No changes were made in response to this comment. As discussed in the ISOR, the Proposed Amendments are designed to avoid the need for issuing higher operating values (HOV) for temperature by setting the corrective standard to 145 °F, while the requirements for wells that exceed the 131°F threshold help to prevent temperatures exceeding the standard and ensure such exceedance is promptly detected. Under both federal rules and the Proposed Amendments, the operator must submit a root cause analysis, corrective action analysis, and corresponding implementation schedule when temperatures exceed the standard for a specified period. Staff notes that under federal rules, an HOV for an individual well to operate at higher temperature must include supporting data demonstrating that the elevated temperature neither causes fires nor significantly inhibits anaerobic decomposition by killing methanogens.

D.3-2 Prohibit HOVs

Comment: Higher Operating Value Waivers: A critical gap in oversight stems from the widespread and often opaque use of Higher Operating Value (HOV) waiver approvals, which allow landfill gas wells to operate above the 131°F and 145°F thresholds intended to prevent SET events. Depending on the timing of the request and Clean Air Act authorities, it is our understanding that these waivers may be reviewed by either the US EPA or the local Air District, creating a fragmented process with inconsistent oversight. In many cases, HOV waivers appear to be approved with minimal scrutiny, limited documentation, and no public transparency. These very conditions undermine regulatory safeguards and may delay corrective action.

At Chiquita Canyon Landfill, the continued operation of high-temperature wells under such waivers with minimal oversight contributed to the escalation of the crisis, allowing conditions to worsen unchecked. As a coalition, we strongly oppose the issuance of these waivers in California. At a minimum, when such waivers are granted, denied, or approved with conditions, operators must be required to promptly notify both local and state regulators and post all related documentation on the landfill's website for public access. Additionally, any waivers granted in California should have documented justification, robust monitoring and response protocols, and mandatory follow-up by both the operator and regulators. This transparency and response framework is essential to ensure timely regulatory intervention and to keep surrounding communities informed of risks that may impact their health and safety. (OP_CAW-68)

Comment: Prohibit operators from operating under HOV waivers for wells at elevated temperatures or high oxygen. At minimum, require operators to notify local and state agencies when such waivers are granted, denied, or approved with conditions, and post all related documentation on the landfill's public website to ensure transparency and timely regulatory oversight. (OP_CAW-72)

Comment: We've now also learned that the federal EPA has given waivers to 11 other landfills or 10 other landfills, so 11 total, including Chiquita, to operate at these higher temperatures. So it's clear that Chiquita Canyon is really a canary in the coal mine. And it should be a clear signal that we do not have the regulatory structure in place to effectively prevent disasters like this in the future. And we have to do more and the Methane Regulation is really a critical piece of protecting our community health and our environment. (T_Schiavo-2)

Agency Response to Combined Comments:

CARB made changes in response to these comments. In the 15-Day Changes, a requirement was added to promptly notify the Executive Officer when an owner or operator requests an HOV from another regulatory agency, and upon receiving a decision. This will ensure regulators are informed of operational conditions at a landfill and any criteria or monitoring provisions imposed under other regulatory structures, which is critical when evaluating compliance data or planning inspections, and will enable CARB to share this information with the public. CARB does not prohibit landfills from operating under HOVs for purposes of compliance with federal rules — and often, approved HOVs impose additional requirements that can help to manage impacts or improve oversight. However, HOVs issued for federal rules do not modify the temperature standards and response actions required under the Proposed Amendments.

As a correction, only U.S. EPA can issue HOVs to allow individual wells to operate at a higher temperature in California – this authority has not been delegated to local air districts.

4. Temperature Action Requirements

D.4-1 Allow flexibility to manage site-specific conditions for SET events

Comment: The Regulation must not constrain CARB, sister agencies, and operators to address and manage site-specific conditions associated with SET events. (OP_WM-21)

Comment: We also need to make sure that CARB can allow air districts to go above and beyond regulatory requirements and make tailor-made plans for their districts. We know that not every landfill is the same and there's unique situations and unique solutions for each one. And so, you know, different areas may need different rules. (T_Schiavo-7)

Agency Response to Combined Comments:

No changes were made in response to these comments. The Proposed Amendments set minimum standards that owners or operators must comply with. These standards do not prescribe the methods or specific actions that must be taken to reduce elevated temperatures. Flexibility to address elevated temperature events based on site-specific conditions will not be compromised. Furthermore, nothing in the LMR limits existing health and safety regulations or prevents local, state, or federal agencies from acting under their authorities.

D.4-2 Differentiate long-term management regime depending on type of high temperature event

Comment: The ISOR refers to a subsurface elevated temperature (SET) event as “a general term used to describe when temperatures of gas withdrawn from the waste mass are found to be above regulatory thresholds.” WM’s many years of experience in monitoring and correcting conditions at our more than 300 landfills and 30,000 gas wells across the country indicate that it is important to differentiate between two circumstances leading to elevated subsurface temperatures within a landfill: 1) near-surface subsurface oxidation (SSO) events that, if unmitigated, can lead to subsurface fires, and 2) what the ISOR describes as “a heat-releasing

chemical reaction deep within [a] landfill," which industry has traditionally referred to as "elevated temperature landfills," or ETLFs. The characteristics of these events are different and need to be managed as such.

The design of federal, state, and local regulations related to temperature thresholds has stemmed from control of SSOs, because these events have occurred for a longer period of time within the industry and are a predictable occurrence of normal landfill operations. ETLFs are rare but can result in serious consequences, as described in the ISOR, if not managed properly.

WM experienced a large ETLF at one of our landfills on the East Coast in 2015, around the same time our competitors were first seeing these events occur. As ETLFs hadn't been experienced up to that time, WM partnered with academic experts to study ETLFs to determine appropriate monitoring, management, and prevention strategies. As a result of external and internal research, WM routinely monitors parameters that have been observed in association with ETLFs, takes proactive measures at facilities exhibiting characteristics that could result in an ETLF, and deploys management activities at confirmed ETLFs.

Two of our most important findings bear on the design of the Draft Regulation:

- We have been actively managing the first ETLF WM experienced back East for the last decade. Parameters defining the event have stabilized over time; however, temperatures are still elevated 10 years later.
- Preventing the spread of the reaction area relies upon aggressive removal of gas and liquids from the area. Regulatory approaches that incentivize or require wells to be turned off run directly counter to preventing spread of a reaction through a landfill.

ETLFs are a relatively new phenomenon within the industry, and because they are quite rare and occur deep within the waste mass, they are more difficult to study relative to other landfill conditions. As far as WM is aware, we are the only landfill operator with an active research program dedicated to ETLFs; likewise, there are only a handful of academics who have worked on ETLFs. The limited published research on ELTFs should demonstrate that we do not definitively understand everything about these events. {Footnote: As further evidenced by the limited citations presented in the ISOR's justification for the wellhead monitoring parameters.} Regulatory design should reflect this uncertainty by not presuming cause and effect.

WM is aware that the SET expert cited in the ISOR believes that preventing SSOs can prevent ETLFs. WM notes that we dispute the premise that SSOs cause ETLFs, given that these events occur at depths where oxygen would not reach, as oxygen would have been expended nearer the surface. Regardless, WM believes that both SSOs and ETLFs need to be prevented. We believe we share consensus with regulators on the following:

- Landfill operators should prevent and fix oxygen intrusion.
- Landfill operators should maintain sufficient gas collection and control capacity.
- SSOs can and should be corrected within several months—although allowances need to be made for unique circumstances, as contemplated in the federal regulations.
- Trends consistently showing large temperature jumps indicate conditions that need further investigation. Regulators need to be aware that these trends are being observed.

- Wellhead temperature readings between 131-145F do not necessarily indicate abnormal conditions. Trends are more important, as are other parameters like gas quality. As stated in the ISOR:

  > "Thalhamer et al. (2025) suggests that an elevated landfill gas temperature (between 131 and 145°F) that is sustained but stable (not increasing) and exhibits no other indicators of a reaction (e.g., low carbon monoxide, and stable gas composition) may be lower risk of further increasing temperature than a well that increases in a matter of weeks but has not surpassed 131°F."

- If there are consistent readings showing wellhead temperatures 160-170F with inhibited methane production (methane/carbon dioxide ratio of less than 1) and physical indicators like settlement, a more comprehensive, multiagency approach is warranted to ensure that the appropriate actions are being taken to prevent the conditions that the ISOR describes on page 126. This includes drilling gas wells deep enough to reach a potential subsurface reaction area, which requires specialized training, equipment, and safety protocols.

It is with the spirit of ensuring the proper management tools are available for both SSOs and ETLFs that WM provides its comments on the wellhead monitoring requirements that have been added to the Draft Regulation.

Regulatory Amendments

The Regulation must allow for a pathway for deep subsurface chemical reactions to be managed.

The Draft Regulation is focused on the prevention of situations that could adversely affect the GCCS. As noted in the ISOR, "the LMR is not designed to, nor could it, eliminate SET events, the measures staff proposes in the LMR require intensive monitoring and proactive responses to changing conditions to ensure proper maintenance of the GCCS." While we believe significant amendments are needed to those sections of the Draft Regulation to meet this stated objective, we agree that the LMR should be focused on *prevention*, rather than remedy. But it does not appear that there is any mechanism to transition from the LMR prevention regime to a management regime, should a deep subsurface chemical event occur despite regulator and operator efforts at prevention.

It is critical that landfill operators have the ability to manage the site-specific conditions that would occur with a deep subsurface chemical reaction, focused on management approaches that have been demonstrated to succeed, which, in many cases, would be hindered by the actions required by the LMR. For example, one of the management strategies WM has relied on is to drill many more wells—in some cases, four times as is typical – to form a barrier around the reaction and aggressively remove liquids and gas. These wells are all intentionally in the "hotter zone" of the waste, so they would likely exceed the temperature thresholds in the Draft Regulation. The wellhead monitoring requirements that are contemplated at those temperatures would interfere with, or prevent, these activities when they are most needed.

We do not think the LMR is designed to dictate management of these events, as no framework is provided that recognizes the extent of management needed or timelines known to be required for these types of events (years, not months). As such, the Draft Regulations should allow the Executive Officer to authorize a corrective action pathway for confirmed deep subsurface chemical reactions that would be overseen by CalEPA and its relevant boards and

departments, including CARB. The Regulation could require regular reporting of progress to the EO as part of this corrective action pathway so there is maximum transparency into how the event is progressing.

The proposed wellhead monitoring requirements need to be revised to ensure appropriate oversight without punishing good actors and unnecessarily increasing costs to solid waste ratepayers.

The 45-Day package is the first time that stakeholders are seeing the proposed language on wellhead monitoring. WM understands that CARB is intending to impose more stringent monitoring requirements for the purposes of detecting, preventing, tracking, and correcting conditions characterized by higher temperatures. However, the Draft Regulation's wellhead monitoring requirements would create sisyphean tasks unnecessary to accomplish CARB's objectives. These would stack on top of what is already a(n overly) complicated web of federal, state, and local regulations – which, unless aligned, would all have different timelines for completion and standards of success. The ISOR has not provided sufficient justification for why these misalignments are necessary.

Having designed programs to monitor the tens of thousands of wells across our national landfill network, WM knows from experience that the frequency and type of wellhead data sought is not necessary to achieve the objectives of tracking potential SSO or SET events. The structure of monitoring program seems to suggest that – by providing a more rigorous regime for wells with repeat temperature or oxygen exceedances or positive pressure detections – operators failing to correct repeat issues will be subject to more oversight. WM does not disagree with this in concept; however, wellhead conditions that are not actually indicative of a more serious temperature issue should not be subject to the same punitive monitoring requirements, and CARB must recognize the conditions that do reflect a persistent issue. (OP_WM-29)

Agency Response:

CARB made changes in response to these comments. In 15-Day Changes, several modifications were made to better target wellhead monitoring and response actions, such as reducing the situations that trigger downwell temperature measurements, adjusting conditions for decreasing frequency and ceasing enhanced monitoring and downwell monitoring, and clarifying that these conditions are specific to each individual well.

Staff agrees with the commenter that the regulation is not designed to dictate management of these events. The Proposed Amendments do not prescribe the methods or specific actions that must be taken to reduce elevated temperatures. The Proposed Amendments allow – but do not require or incentivize – wells to be disconnected in the case of elevated temperature. (For more information, see the agency response in section IV.D.2-2 addressing concerns that the requirements could encourage well decommissioning to avoid regulatory violations.) Similarly, the Proposed Amendments do not prohibit or discourage actions such as installing additional wells.

In such cases as described by the commenter (i.e., a deep subsurface reaction is occurring and corrective actions taken have not been effective within the specified timeline), the operator may request alternatives to the monitoring requirements if those in the Proposed Amendments are not sufficient for informing ongoing, longer-term management once the conditions have stabilized.

Proper operation and maintenance of the GCCS, comprehensive monitoring, and early intervention in response to changing subsurface conditions are necessary for methane control and limit the consequences for public health and safety that can result from severe and prolonged surface elevated temperature (SET) events. Setting explicit temperature limits and correction time periods appropriately incentivizes such actions.

The Proposed Amendments require an operator to submit a root cause analysis, corrective action analysis, and implementation schedule when a corrective action cannot be fully implemented within 60 days; and establish that a violation has occurred when temperatures above the standard are not corrected within 120 days. Setting up an interagency process for the long-term management of elevated temperature conditions is beyond the scope of this regulation. However, CARB will coordinate with other local, State, and federal regulatory bodies as needed to evaluate the operator's corrective action plan, ensuring it comprehensively addresses all relevant health and safety impacts and provides for appropriate site-specific monitoring parameters for longer-term management.

D.4-3 Further restrict oxygen content when temperature exceeds 131 °F

Comment: Oxygen Monitoring and Recurring High Oxygen Events - § 95469(e)(5)-(6): We support the tiered oxygen content thresholds tied to wellhead temperature and the framework CARB established for addressing recurring high-oxygen events. This approach provides clear operational guidance and aligns well with the overall goal of maintaining safe landfill conditions. However, we are concerned that the current oxygen content restriction of 5 percent for wells exceeding 131°F may not be protective enough. As noted by CalRecycle staff:

> CalRecycle staff recommends that temperatures above 131°F (55°C) be considered the threshold at which a SET Event is considered to have started. We recognize that USEPA revised its regulation under the National Emissions Standards for Hazardous Air Pollutants (NESHAP) 40 CFR 63.1958(c), effective September 27, 2021, which increased the operational standard temperature from 131°F (55°C) to 145°F (62.8°C). CalRecycle still recommends the more conservative temperature threshold of 131°F (55°C) to initiate a root cause analysis, restrict oxygen to less than two percent, and repair the cover to prevent a SET Event. (pg. 5)

Based on this guidance, we recommend that CARB revise the framework to limit oxygen content to less than 2 percent for wells exceeding 131°F to better prevent SET events and maintain safe landfill conditions. (OP_CAW-57)

Comment: Limit oxygen to 2% for wells exceeding 131°F. (OP_CAW-64)

Agency Response to Combined Comments:

No changes were made in response to these comments. The 5% oxygen threshold is a long-standing regulatory threshold in federal rules (previously a corrective standard, and currently a recordkeeping requirement) and this is appropriate as a regulatory oxygen limitation in the lower elevated temperature range to limit oxygen intrusion in the waste mass while providing operational flexibility that may be needed to maintain effective gas collection.

Please note that the Proposed Amendments require progressively reducing oxygen below 2.5% when gas temperature is measured between 145 and 160°F, and reducing oxygen below 1% when above 160°F in recognition of the increased risk posed by oxygen intrusion at higher temperature.

D.4-4 Add more elements to root cause analyses

Comment: We also have significant concerns regarding the current definition and implementation of "root cause analysis" throughout the temperature monitoring and trend analysis frameworks in the Proposed Amendment. The provided definition in § 95475(a)(35) is overly vague and does not prescribe the investigative actions necessary to fully understand SET events and landfill fires. Without specific guidance, root cause analyses may fail to capture critical information about waste composition, subsurface reactions, or GCCS issues, leaving operators and regulators without actionable insights into the underlying causes of elevated temperatures. Operators should conduct targeted investigations, including borings in safe areas near suspected or confirmed SET events to assess reactive waste presence, and inspect cores for evidence of charring, discoloration, odors, or other indicators of thermal activity. Boring logs and all associated observations and reports should be shared with CARB, Air Districts, and the public. Documenting these observations is essential to fully understand subsurface conditions, identify the causes of elevated temperatures, and develop effective, appropriate mitigation strategies to prevent, slow, or stop heat migration. (OP_CAW-51)

Comment: Include targeted investigations for SET events, such as borings in safe areas near the event, inspection of cores for charring, discoloration, odors, or other thermal indicators, and documentation of findings to guide mitigation strategies. (OP_CAW-55)

Comment: Conduct targeted investigations for SET events, including borings in safe areas, inspection of cores for charring, discoloration, odors, or other thermal indicators, and document findings to guide mitigation strategies. (OP_CAW-62)

Agency Response to Combined Comments:

No changes were made in response to this comment. The proposed definition of "root cause analysis" mirrors federal rules, but certain provisions require a collection system and/or cover integrity assessment, which provides further specificity on requirements for investigating any deficiencies that may be contributing to the problem.

Borings and inspections of cores provide useful additional pieces of information for the owner or operator to analyze the root cause and design effective mitigation strategies. Such inspection opportunities are often provided when operators install new wells or temperature probes. However, staff does not anticipate that indicators such as charring are likely to occur when downwell temperatures are below the standard, and as such, this investigation is likely to be most informative in cases of severely elevated temperatures, e.g., above 170 °F, which requires expedited corrective actions and prompt notification under the Proposed Amendments.

D.4-5 Align temperature requirements with federal NESHAP

Comment:

Wellhead Monitoring-Temperature

Since wellhead temperature monitoring is already required and enforced by the EPA's National Emission Standards for Hazardous Air Pollutants (NESHAP) regulations, OCWR recommends that CARB consider aligning the LMR with the NESHAP to avoid complexity and redundancy in regulatory compliance. (OP_OCWR-6)

Comment:

Wellhead Monitoring – Temperature

Since wellhead temperature monitoring is already required and enforced by the EPA's National Emission Standards for Hazardous Air Pollutants (NESHAP) regulations, to avoid complexity and redundancy in regulatory compliance, the Sanitation Districts recommend that CARB consider aligning the LMR with the NESHAP. (OP_LACSD-13)

Agency Response to Combined Comments:

No changes were made in response to these comments. However, note that in the 15-Day Changes two methods for carbon monoxide (CO) measurement that are currently approved alternatives under NESHAP were added to the Proposed Amendments.

In many ways, the Proposed Amendments are closely aligned with the well temperature monitoring requirements in NESHAP, most notably having the same corrective limit of 145 °F, requiring mostly the same parameters for enhanced and downwell monitoring, having the same carbon monoxide thresholds to determine monitoring frequency, and requiring a root cause analysis, corrective action analysis, and implementation schedule after a persistent exceedance of the limit. However, CARB's intent was for the Proposed Amendments to be more protective than NESHAP by requiring prompt assessments to identify deficiencies and limit air intrusion, and by making more data available sooner (e.g., requiring enhanced monitoring and downwell temperature monitoring when temperatures exceed 131 °F for 60 days; requiring additional monitoring at surrounding wells). Further, note that these changes address gaps between the Emission Guidelines[28] and the LMR that resulted in the need for a federal plan. Therefore, the Proposed Amendments will better harmonize the LMR with the minimum requirements of the EG. Since the requirements of the Proposed Amendments are more stringent, they do not conflict with or impede compliance with existing federal requirements.

D.4-6 Reduce timeframes for assessments and associated corrections after exceeding 131 °F

Comment: Reduce the initial response timeframe to 14 days for assessments (instead of 30 days) and 30 days for correction (instead of 60 days) following any temperature exceedance above 131°F. (OP_CAW-61)

Agency Response:

No changes were made in response to this comment. The assessments require physical investigations of the collection system and surface cover, including performing measurements. Owners or operators also need to analyze data and interpret the results of measurements to determine appropriate repairs or maintenance to address any

[28] 40 C.F.R. Part 60, Subpart Cf.

issues found. Many repairs or maintenance actions may be able to be completed quickly, but the 60-day period recognizes the wide range of potential actions that could be indicated by the assessments. Requiring faster completion could incentivize less comprehensive actions that are less effective.

5. Wellhead Enhanced Monitoring

D.5-1 Allow alternative methods for carbon monoxide monitoring

Comment: Finally, the carbon monoxide ("CO") monitoring requirement to use Method 10 is not technically feasible. The EPA approved two alternative methods (ALT153 and ALT 154), which are based on laboratory sample analysis, impose a tremendous administrative burden and lag time with no corresponding benefit when compared to the much more practical field-based stain tube methodology. First, there are few labs that perform ALT 153 or ALT54; we are only aware of one in Southern California. Second, landfill gas collected in tedlar bags is classified as hazardous material and cannot be shipped per Department of Transportation regulations; essentially preventing access to the laboratory for most sites. Third, the lag time for laboratory analysis of CO samples is often greater than two weeks. Fourth, the labor and lab costs for extracting weekly samples at well greater than 131F will be excessive; WM already has one dedicated technician for a single site just to manage the NESHAP enhanced monitoring for CO at 145F. If all wells across WM's California sites with readings at or above 131F require CO readings, it will quadruple WM's labor needs and costs where finding technicians is already strained market. Also given the DOT shipping restrictions and limited lab services available, meeting the CO sampling and analysis requirements will not be technically or economically feasible.

A more effective alternative would be to retain the federal threshold of 145F and to allow the use of stain tubes to avoid reliance on the lab for analysis and reduce costs. Stain tubes provide instant feedback to GCCS operators in order to make immediate adjustments to the system to address high CO readings. (OP_WM-38)

Comment:

{CARB staff note: Commenter quoted 45-Day Changes text of section 95471(o).}

The use of EPA Method 10 for carbon monoxide (CO) for well head monitoring is more detailed than needed and will not provide results in a timely manner compared to the direct reading methods used for the other parameters. A direct reading method for CO such as the alternative developed to comply with EPA Part 63, Subpart AAAA would provide faster results, with the same quality as the other wellhead readings required in this section. We recommend directly referencing the alternative method in the regulation, not requiring operators to apply for an alternative. (OP_YoloCo-40)

Agency Response to Combined Comments:

CARB made changes in response to these comments. In the 15-Day Changes, two additional methods for measuring carbon monoxide in wellhead gas were added: U.S EPA ALT-144 and ALT-145.

Additionally, in the 15-Day Changes, the conditions that allow ceasing enhanced monitoring after 131 °F persists for 60 days were changed. In the 45-Day Changes the

temperature would have had to be brought down below 131 °F to cease enhanced monitoring, but in the 15-Day Changes that was changed to below 145 °F downwell. This means that wells operating in the 131-145 °F range (downwell) will not be subject to weekly enhanced monitoring if the downwell temperature does not exceed 145 °F.

However, direct field methods such as stain tubes or a portable gas analyzer (e.g., U.S. EPA ALT-143) were not added. Staff's understanding is that these methods for measurements of carbon monoxide are prone to error through either moisture effects (landfill gas is typically very humid) or interference from other species that may be present in landfill gas. Staff was unable to obtain comparative data demonstrating their accuracy, reliability under a range of conditions and gas compositions, and equivalence to the proposed methods.

The Proposed Amendments do not prohibit operators from using other methods for their own purposes, however, one of the test methods in 95471(o) must be used for compliance purposes.

D.5-2 Require daily or continuous enhanced monitoring (not weekly)

Comment: Require daily or continuous monitoring of all parameters (temperature, gas composition, pressure, flow rate) for wells exceeding 145°F until readings stabilize below 131°F. (OP_CAW-53)

Comment: Require daily or continuous monitoring of all parameters (temperature, gas composition, pressure, flow rate) for wells exceeding 145°F until stabilized below 131°F. (OP_CAW-84)

Agency Response to Combined Comments:

No changes were made in response to these comments. Weekly enhanced monitoring frequency was selected for alignment with federal requirements for enhanced monitoring.[29]

D.5-3 Add liquid level checks to enhanced monitoring

Comment: Include liquid-level checks in the enhanced monitoring framework for wells exhibiting concerning trends in temperature, oxygen, or other parameters. (OP_CAW-65)

Agency Response:

No changes were made in response to this comment. The commenter's recommendation is already provided for in the Proposed Amendments. The proposal requires a collection system assessment to be performed within 30 days of measuring a wellhead temperature that exceeds 131 °F, and at wells with oxygen at or above 5%. As set forth in section 95471(j), this assessment "shall include checking for […] pinched, plugged, watered-in, or otherwise impaired collection system components...." Enhanced monitoring is subsequently required if the elevated temperature persists for more than 60 days, and at wells with recurring high oxygen. In both cases, performing a

[29] 40 C.F.R. § 63.1961(a)(5)(viii).

liquid level check is therefore required prior to enhanced monitoring, rather than as part of this framework as the commenter suggests.

D.5-4 Require stronger response actions to SET events

Comment: Specifically, we recommend that CARB:

…

- Prevent subsurface elevated temperature events and landfill fires through:
  - Setting the maximum temperature threshold at 131 degrees Fahrenheit;
  - Improve the enhanced wellhead monitoring requirements to better prevent subsurface elevated temperature events. (OP_EIP-7)

Comment:

Preventing SET events and landfill fires through enhanced wellhead monitoring

As evidenced by the fire at Chiquita Canyon Landfill, SET events are extremely difficult to contain once they begin. CARB should consider stronger requirements to prevent SET events.

First, the most common type of landfill fire occurs between the surface and two feet below the landfill soil cover, i.e., surface fires, where fuel and oxygen are abundant. The other type of landfill fire is a subsurface fire or smolder that varies with depth depending on landfill operations, heat sources, available oxygen, and other factors. Subsurface smolder events can last multiple years to decades as the smolder thermally keeps breaking down surrounding combustible MSW. If not properly addressed, a SET Event that is limited to one area will become a smolder and may spread to the entire landfill facility if it is not isolated and contained. SET Events present a significant environmental threat by emitting pungent odors (reduced sulfur compounds and organic acids), VOCs, such as benzene, and particulate matter. In general, gas concentrations of NMOCs from MSW landfills double with every 18°F (7.7°C) increase in waste temperature.

Next, SET events are mainly caused by oxygen intrusion, waste temperature increases and leachate recirculation. Oxygen intrusion can occur from overdrawing the GCCS. The typical vacuum applied to a gas extraction well is approximately 125–250 mm (5–10 inches) of water column. When landfill operators use a higher vacuum to enhance methane recovery for energy production or to control odors and emissions, i.e., overdraw the gas collection system, oxygen can enter the landfill through damaged gas wellhead seals and cracks, cracks in the soil cover, ADC, poorly compacted cover soils especially on side slopes, and unsaturated subsurface materials. The use of insufficient daily cover—like ADC and fine grained covers—can contribute to oxygen intrusion and thus SET event risk. The introduction of oxygen in the waste mass and accumulation of heat via aerobic biodegradation or another exothermic process can provide the necessary conditions to initiate and sustain the subsurface thermal breakdown or spontaneous combustion of MSW. (OP_EIP-17)

Comment:

CARB should improve the enhanced wellhead monitoring requirements to better prevent SET events.

Proposed Section 95469(e) includes CARB's proposed revised wellhead monitoring requirements. CARB explains in the ISOR that:

> [r]outine monitoring of gas collection system data and prompt corrective action can prevent GCCS failures that result in excess emissions. Data from wellhead monitoring can signal the need to adjust the level of vacuum (well “tuning” or adjusting blowers), repair or improve the landfill surface cover, investigate potential damage or obstructions in the well or other components, and prevent potential conditions that may risk landfill subsurface fires or reactions. Requirements to take action only in response to measured values above a given limit (i.e., an exceedance) miss opportunities for early intervention in response to changing trends. Similarly, when repeated exceedances suggest initial corrective actions did not address the root of the problem, the Regulation lacks provisions for more significant corrective actions and more frequent monitoring.

EIP appreciates CARB’s intention to include proposed amendments aimed at preventing SET events and fires. We offer additional recommendations to those we raised in August of 2025 (in Attachment B) below to further strengthen these proposed amendments.

First, because we urge CARB to set the maximum threshold at 131 degrees Fahrenheit, CARB should also adjust the enhanced monitoring requirements accordingly. Therefore, the requirements currently associated with 145 degrees Fahrenheit threshold (Proposed Section 95469(e)(4)) should instead correspond to a 131 degrees Fahrenheit threshold.

Next, for exceedances of the 145 F threshold, CARB should finalize the same requirements it currently proposes for that temperature threshold but with more expedited timelines for enhanced monitoring and root cause analysis and corrective actions (currently Proposed Section 95469(e)(3), which should instead apply to 145 degrees Fahrenheit).

Proposed Section 95469(e)(4) should also be revised to require that once a temperature is measured to exceed 145 degrees Fahrenheit, the operator shall also conduct measurements to ascertain CO is not greater than 500 ppm and measure oxygen levels to ascertain that they are not greater than five percent oxygen. Corrective action should be required within five calendar days for either of these exceedances. For the entirety of Proposed Section 95469(e), CARB should consider expediting the timelines for corrective action.

Additionally, CARB should include requirements with the 131 degrees Fahrenheit maximum threshold that correspond to the GCCS material used, as indicated in [the table] below:

Table…: Temperature, Oxygen, LFG Well Material Requirements to Reduce SET Events.

Temperature Limit	Oxygen Limit	LFG Well Material
> 131°F (55°C)	<5.0%	PVC/HDPE
> 145°F (63°C)	<3.0%	CPVC/Steel
> 170°F (77°C)	<2.0%	CPVC/Steel
> 200°F (93°C)	<1.0%	Steel

Finally, CARB could allow wells with higher operating values to be excluded from this standard only if they measure oxygen levels below two percent and CO concentrations below 250 ppm. (OP_EIP-19)

Agency Response to Combined Comments:

No changes were made in response to these comments. The Proposed Amendments are designed to enable earlier detection of SET events and ensure data is available to inform prompt corrective action that can prevent GCCS failures. These provisions will be the most comprehensive set of wellhead and downwell temperature monitoring and response requirements in the nation.

Regarding timelines for reducing temperatures, owners or operators need sufficient time to plan and execute effective, site-specific corrective actions. The specified timelines are appropriate to reflect this. Regarding the suggestion to expedite timelines for enhanced monitoring, root cause, and correction action in response to an exceedance of the 145 °F standard, these activities are already required to begin promptly (corrective action must begin within five days; enhanced monitoring must begin within seven days; root cause must be conducted when temperature is not corrected within 15 days), and the commenter did not provide specific alternative timelines for consideration.

The commenter requests that the owner or operator should be required to measure carbon monoxide and oxygen when temperatures above 145 °F are detected and require corrective action if they are above thresholds. The 45-Day Changes already include requirements to measure these parameters and to limit oxygen content to 2.5% (more stringent than the commenter suggests). There is no specified limit to carbon monoxide content because it is used as an indicator of a potential subsurface reaction that corrective actions for temperature would address.

Collection system and cover integrity assessments are required in response to temperatures above 131 °F. The collection system assessment requires physical investigation, including checking for cracked, damaged, broken, pinched, plugged, watered-in, or otherwise impaired collection system components. These requirements are designed to identify where inadequate well materials may be failing and require that those conditions be repaired or the well be replaced.

The commenter proposes to allow wells with HOVs to be excluded from the requirements in section 95469(e)(3), provided that oxygen is below 2% and carbon monoxide (CO) concentration is below 250 ppm. Staff did not propose to exempt wells with HOVs (approved by other agencies) from the temperature standards and response actions set forth in the Proposed Amendments, because these measures are necessary to guide appropriate corrective actions, enable oversight, and achieve effective emissions control. For more information regarding HOVs, see the agency response in section IV.D.3-2.

See the agency response in section IV.D.2-1 regarding requests to lower the temperature corrective standard.

6. Downwell Temperature Monitoring

D.6-1 General support

Comment: Subsurface temperature monitoring requirements need to account for hotter temperatures present deeper underground. (OP_Bruce-3)

Agency Response:

No changes were made in response to this comment. Downwell temperature monitoring is required to detect whether there are hotter temperatures present deeper underground, as the commenter requests.

D.6-2 Reduce amount of downwell monitoring required

Comment: To arrive on a cost-effective regime, WM encourages CARB to revise the wellhead monitoring provisions to:

…

- Significantly reduce the amount of downwell gas monitoring prescribed (OP_WM-34)

Comment:

Concerns with downwell temperature monitoring

WM believes CARB should reduce the instances in which downwell temperature monitoring is required, given operational concerns and the availability of alternative approaches. Firstly, downwell temperature monitoring disrupts operation and poses safety concerns. Most downwell temperature monitoring would be conducted by technicians in the field (installing temperature probes in the number of wells the Draft Regulation contemplates for evaluation would be prohibitively expensive, as they are tens of thousands of dollars each, depending on the depth). These activities vent landfill gas (including methane) to the atmosphere and disrupt the operation of the well. This runs counter to the stated purpose of the LMR.

Secondly, gas flow within the wells makes it impossible to determine the “origin” of heat, taking downwell temperature measurements every 10 feet will not allow CARB or an operator to find the “hot zone” that may be of concern. Waste temperatures, as measured from boring logs obtained during new well drilling, would be more diagnostically appropriate.

NESHAP requires annual downwell temperature monitoring for wells with wellhead temperatures at 165F or above. The Draft Regulation could require downwell temperature monitoring every two years for wells with wellhead temperatures 145-165F and/or the installation of temperature probes within select areas of concern, in coordination with the operator. Monthly downwell temperature readings are not warranted under any condition. (OP_WM-37)

Agency Response to Combined Comments:

CARB made changes in response to these comments. In the 15-Day Changes, several modifications were made to better target wellhead monitoring and response actions, such as reducing the situations that trigger downwell temperature measurements,

adjusting conditions for decreasing frequency and ceasing enhanced monitoring and downwell monitoring, and clarifying these conditions are specific to each individual well.

Monthly downwell measurements provide actionable data to observe and respond to changes in subsurface temperatures that may not be apparent in gas temperature measured at the wellhead. The commenter's suggestion to require downwell monitoring every two years would not provide timely information about changes in the temperature within the landfill waste mass.

Staff has reviewed downwell temperature monitoring data and received strong recommendations from experts and other regulators about the importance of earlier and more frequent downwell monitoring and believe it provides significant utility. Downwell temperature measurements show what temperatures the well is exposed to and reveal the location (depth) of the reaction. Nothing in the LMR prohibits operators from using other measurement approaches that are additional to the proposed requirements, such as temperatures measured while drilling new wells, and such data can inform the root cause and corrective action analyses.

Downwell monitoring can be ceased when downwell temperatures do not exceed 145 °F. If downwell temperatures do exceed 145 °F, the elevated temperature must be corrected within 120 days. Thus, any long-term use of downwell temperature monitoring would be during a period of non-compliance with the temperature standard. See the agency response in section IV.D.4-2 for more information regarding requests for alternative monitoring requirements.

D.6-3 Require documenting and repairing issues found via downwell monitoring

Comment: Operators conducting downwell temperature monitoring should document not only temperature readings, but also observable well conditions, such as pinched, buckled, or flooded wells, regardless of whether a full collection system assessment is triggered. Documented well obstructions should be followed up with documentation demonstrating that repairs and corrective actions have been taken to address the obstruction and return the well to safe, effective working conditions. (OP_CAW-50)

Comment: Require operators conducting downwell monitoring to document well conditions (pinched, buckled, flooded), note the type and root cause of any obstructions, and take corrective actions. (OP_CAW-54)

Comment: Require operators conducting downwell monitoring to document well conditions (pinched, buckled, flooded), note the type and root cause of obstructions, and take corrective actions. (OP_CAW-60)

Agency Response to Combined Comments:

No changes were made in response to this comment. The commenter's suggestion is adequately accounted for under the proposal. Section 95464(a)(6) in the current Regulation and section 95464(a)(8) the Proposed Amendments specify that the gas collection system must be operated and maintained in accordance with the Design Plan. This means that when a component is broken or compromised (i.e., not performing as designed), it must be repaired. Provisions were added in the proposal (sections 95469(f) and 95471(j)) to clarify and underscore that the existing requirement applies

when such issues are identified through new requirements for liquid level monitoring and collection system assessment—though not exclusively when identified through required activities. A pinched or flooded well could also be discovered through downwell monitoring, which can be performed in a manner similar to liquid level monitoring. While staff did not propose to require documentation for any or all types of repairs, existing requirements ensure that records are kept for construction activities (as defined, and including well replacement), and records of any corrective action taken in response to wellhead or downwell temperature exceedances are required to be reported under proposed section 95470(a)(1)(K). Other new provisions will also support regulator awareness of issues discovered, such as reporting records of monthly wellhead parameter trend analysis.

D.6-4 Address downwell temperature monitoring requirements for horizontal wells

Comment:

Section 95469 (e)

The section includes multiple references to downwell temperature monitoring. Because not all wells are vertical, RCDWR recommends revising the section to address temperature monitoring requirements for horizontal wells. (OP_RIVCO-7)

Agency Response:

No changes were made in response to this comment. The procedure for downwell temperature monitoring directs the measurements to occur every 10 vertical feet. Thus, these measurements are only required in vertical wells and the text proposed in the 45-Day Changes is clear.

7. Oxygen Content Action Requirements

D.7-1 Remove actions for oxygen content at or above 5%

Comment: It is very common for landfills to have wells with oxygen over 5%. For example, it is very common for perimeter wells used for gas migration control; surface collectors, such as horizontal wells; and wells installed in low gas production areas (e.g., newer waste areas, older waste areas with declining gas production, areas with large quantities of nondegradable waste, very dry climate landfills, etc.) to have elevated oxygen. This is a normal occurrence and does not represent an operational or design issue.

Oxygen limits were removed from the original NSPS in subsequent rule revisions by U.S. EPA because it was demonstrated that adjusting wells to artificially meet an arbitrary 5% oxygen standard did not reduce the number or frequency of subsurface landfill fires but did result in a reduction in LFG recovery and an increase in surface emissions and subsurface gas migration. This is because wells are arbitrarily tuned down to reduce oxygen levels, which reduces their ability to extract gas. As such, we request that the specific oxygen limits be removed from the rule; instead, like the federal NSPS and NESHAPs rules, oxygen would be monitored monthly and used as a parameter in well adjustments, but without the arbitrary limit. (OP_OPAL Fuels-7)

Comment: Worth noting on oxygen content is information from a large database of landfills would indicate that 96% of landfills have wells that contain over 5% oxygen and as many as half of the wells on these sites have oxygen content levels above 5%. This can be due to perimeter wells that are in shallow waste but have been installed for the purpose of controlling gas migration from fill areas. Even with this data, there is not a widespread set of subsurface oxidation events occurring throughout California and requiring its reduction to levels that may not be practical will have negative collateral effects (ie. reducing vacuum on the well field to pull in less oxygen but resulting in decreased methane capture). (OP_Ind/Gov Coalition-25)

Comment: The draft rule reintroduces a 5% oxygen limit at the wellhead, previously removed from federal regulations and never part of the LMR. This limit has historically caused operational challenges, particularly in dry climates and in new waste areas. (OP_SacCo-10)

Comment:

Wellhead Monitoring - Oxygen

OCWR strongly urges CARB to reconsider imposing oxygen concentration limits on wellheads. Oxygen concentration above 5% alone is not indicative of a possible landfill fire. LFG collectors placed near boundaries to control lateral and subsurface gas migration typically operate with higher oxygen concentrations due to the use of higher vacuum levels. If a strict 5% oxygen limit is imposed, reducing the vacuum level at these gas migration control collectors would decrease the collector's radius of influence, compromising gas migration control and potentially allowing methane and other landfill gases to migrate offsite, creating hazards to human health. Furthermore, the EPA removed the operating standard for oxygen and nitrogen at gas collectors from the New Source Performance Standards (NSPS) for Landfills and Emission Guidelines (EG) to allow operators to employ site-specific LFG control measures. (OP_OCWR-5)

Comment:

§ 95469 Monitoring Requirements

Enhanced Wellfield Monitoring

The proposed enhanced well-field monitoring requirements include adding prescriptive oxygen concentration limits that have been removed by the Federal Environmental Protection Agency (EPA) based on flexibility and effectiveness. These additions should be removed from this proposal based on the following primary arguments made by the EPA during the removal of these limits in the Federal Rule:

- Arbitrary Limits: The EPA determined that the previous limits (e.g., 5% oxygen or 20% nitrogen as an exceedance trigger) were not always appropriate for all landfill conditions. High oxygen levels can be a natural result of gas production declining in older waste sections, and not necessarily indicative of a fire risk or poor performance in those specific areas.
- Operational Flexibility: The previous, strict limits could hinder the most efficient operation of the Gas Collection and Control System (GCCS). Landfill operators were sometimes forced to take actions that focused on meeting the specific wellhead criteria rather than focusing on optimizing the overall system for maximum gas capture and emission reduction. Removing the rigid limits provides operators with more flexibility to adjust the system to site-specific conditions.

- Focus on Relevant Indicators: The EPA shifted the focus to other operational parameters considered more direct indicators of system performance. The current rules emphasize maintaining negative pressure at the wellhead (to ensure gas is being drawn into the system) and a temperature below 131°Fahrenheit (55°Celcius) (to indicate a potential subsurface oxidation event or fire risk) as key operational standards for triggering corrective action.
- Burdensome Compliance: Industry comments, which the EPA considered, noted that the previous requirements could result in an "overly burdensome compliance exercise" that didn't always translate into actual emission reductions. (OP_WPWMA-8)

Comment:

Wellhead Monitoring – Oxygen

Oxygen concentration above 5% alone is not indicative of a possible landfill fire. Some LFG collectors are installed for the protection of groundwater quality, as well as to control lateral and subsurface gas migration. Some collectors will typically have higher oxygen concentrations due to the use of higher vacuum levels to mitigate gas migration. If a strict 5% oxygen limit is imposed, the vacuum level at these gas migration control collectors would need to be tuned down. The vacuum reduction would decrease the collector's radius of influence, compromising gas migration control and potentially allowing methane and other landfill gases to migrate offsite, creating hazards to human health. Furthermore, to maximize energy recovery benefits with improved gas quality while maintaining compliance, landfill operators are motivated to maintain cover integrity and fine-tune the collection system to minimize air intrusion and gas emissions.

In addition, the U.S. Environmental Protection Agency (EPA) removed the operating standard for oxygen and nitrogen at gas collectors from the Municipal Solid Waste Landfills: New Source Performance Standards (NSPS), Emission Guidelines (EG) to allow operators to employ site-specific landfill gas control measures for limiting surface gas emissions and controlling subsurface migration by installing shallow gas collectors that often operate above the 5% oxygen threshold.

For the reasons discussed above, the Sanitation Districts strongly urge CARB to impose oxygen concentration limits on wellheads with temperature readings above 145°F only instead of imposing oxygen concentration limits on all wellheads. This approach will provide more emphasis on resolving wellheads with actual issues, rather than risking unintended consequences such as subsurface migration and groundwater contamination. (OP_LACSD-12)

Comment: It is very common for landfills to have wells with oxygen over 5% oxygen. Data suggest that almost 52% of the wells (over 7,000) and almost 96% of the landfills (over 110) have had oxygen readings over 5%. For example, it is very common for perimeter wells used for gas migration control; surface collectors, such as horizontal wells; and wells installed in low gas production areas (e.g., newer waste areas, older waste areas with declining gas production, areas with large quantities of non-degradable waste, very dry climate landfills, etc.) to have elevated oxygen. This is a normal occurrence and does not represent an operational or design issue. This is particularly relevant to L and D, which is a Construction and Demolition site, with no putrescible fraction in the waste stream.

Oxygen limits were removed from the original NSPS in subsequent rule revisions by U.S. EPA because it was demonstrated that adjusting wells to artificially meet an arbitrary 5% oxygen standard did not reduce the number or frequency of subsurface landfill fires but did result in a reduction in LFG recovery and an increase in surface emissions and subsurface gas migration. This is because wells are arbitrarily tuned down to reduce oxygen levels, which reduces their ability to extract gas. As such, we request that the specific oxygen limits be removed from the rule; instead, like the federal NSPS and NESHAPs rules, oxygen would be monitored monthly and used as a parameter in well adjustments, but without the arbitrary limit. (OP_L and D-25)

Comment:

Topic: Enhanced Wellfield Monitoring (95469)

Potential Issues:

1. High Oxygen

    a) ≥5% O_2 v/v (3x in 12 months)

        Begin enhanced monitoring; perform assessments (200-ft radius) and repair intrusion points; track CO & temperature weekly.

Concerns:

- Oxygen is no longer considered an issue in Federal rules see reasons in Argument Against Column.

Potential Alternative:

EPA Arguments for Removal of Oxygen

The EPA's primary arguments for removing the prescriptive oxygen concentration limits were based on flexibility and effectiveness:

- Arbitrary Limits: The EPA determined that the previous limits (e.g., 5% oxygen or 20% nitrogen as an exceedance trigger) were not always appropriate for all landfill conditions. High oxygen levels can be a natural result of gas production declining in older waste sections, and not necessarily indicative of a fire risk or poor performance in those specific areas.
- Operational Flexibility: The previous, strict limits could hinder the most efficient operation of the Gas Collection and Control System (GCCS). Landfill operators were sometimes forced to take actions that focused on meeting the specific wellhead criteria rather than focusing on optimizing the overall system for maximum gas capture and emission reduction. Removing the rigid limits provides operators with more flexibility to adjust the system to site-specific conditions.
- Focus on Relevant Indicators: The EPA shifted the focus to other operational parameters considered more direct indicators of system performance. The current rules emphasize maintaining negative pressure at the wellhead (to ensure gas is being drawn into the system) and a temperature below 131°F (55°C) (to indicate a potential subsurface oxidation event or fire risk) as key operational standards for triggering corrective action.

- Burdensome Compliance: Industry comments, which the EPA considered, noted that the previous requirements could result in an "overly burdensome compliance exercise" that didn't always translate into actual emission reductions

Remove 5% oxygen requirement from Rule and be consistent with EPA Federal Rule Making. (OP_SWMD-11)

Comment: Under § 95469 (e)(6), recurring high oxygen would trigger enhanced monitoring for temperature, which does not align with EPA regulations. This section requires further explanation or needs to be separated out from high oxygen enhanced monitoring for clarification. We would expect that both the five percent oxygen requirement…be removed and consistency with EPA Federal Rule Making be maintained. (OP_WPWMA-9)

Agency Response to Combined Comments:

CARB made changes in response to these comments. In the 15-Day Changes, several adjustments were made to requirements following high oxygen readings. First, cover integrity and collection system assessments are required if the oxygen is not reduced below 5% within 15 days. Second, the applicability of actions in response to high oxygen readings was changed to only apply to interior wells (perimeter wells are not subject to these requirements). Third, the recurring high oxygen threshold was changed from three to six readings within a 12-month period. Fourth, the increase specified under the trend analysis provision must be sustained for two consecutive monthly monitoring events. Finally, downwell temperature monitoring in response to recurring high oxygen content is only required if the carbon monoxide measured through enhanced monitoring is also elevated. CARB notes that the original proposal (45-Day Changes) already waives actions for high oxygen content in areas where waste has been in place less than two years (this exception does not apply to limitations on oxygen at high temperature wells).

As discussed in the ISOR, high levels of oxygen suggest there may be damaged components or insufficient cover, allowing air intrusion into the waste mass and GCCS. These conditions compromise the ability of the gas collection system to work effectively, can be harmful to electricity generation equipment, disrupt normal biological activity under anaerobic conditions, and can cause or exacerbate elevated temperatures that can in turn damage the collection system. In practice, landfill operating procedures manuals commonly establish a target of no more than 2% oxygen content.

The Proposed Amendments notably do not require oxygen content to be brought below 5% (unless temperatures are also elevated) and so they do not revive the standard in federal rules as commenters claim. Rather, additional assessments or monitoring are required to investigate whether any issues with the collection system or cover integrity are contributing to those levels, and repairs are needed to address any issues found. Wells should not be arbitrarily tuned down to meet a 5% oxygen content at the expense of meeting other requirements, such as remaining in compliance with surface emissions limits. Owners or operators are obligated to meet those other requirements. If an oxygen content below 5% cannot be met while remaining in compliance with other requirements, then a collection system assessment and cover integrity assessment are needed to identify and address the source of air intrusion.

The prevalence of wells with high oxygen content does not provide evidence that these conditions do not warrant further investigation. Staff recognizes that higher levels of oxygen may occur in areas with older waste (where methane-generating potential has largely been exhausted) while maintaining stable conditions and effectively capturing methane. Once any issues identified in the collection system and cover assessments are addressed and (in the case of recurring high oxygen) enhanced monitoring demonstrates that carbon monoxide is below 100 ppmv in four consecutive weekly measurements, there is no requirement to take further action to reduce the oxygen content.

D.7-2 Regulatory partner guidance needed

Comment: §95469(e)(6) Recurring High Oxygen: New oxygen monitoring triggers enhanced monitoring; guidance needed on enforcement, recordkeeping, and verification. (OP_SMAQMD-26)

Agency Response:

No changes were made in response to this comment. The Proposed Amendments include reporting requirements for all wellhead monitoring data, any instances of oxygen content above 5%, and records of any enhanced and downwell monitoring. Together, these reporting items are sufficient for confirming compliance with section 95469(e)(6). Further guidance is outside the scope of this rulemaking, but CARB staff plans to provide guidance and training.

D.7-3 Do not require downwell temperature in response to recurring high oxygen

Comment:

{CARB staff note: Commenter quoted 45-Day Changes text of section 95469(e)(6).}

Conducting enhanced monitoring on wells with recurring high oxygen measurements seems reasonable. Conducting downhole temperature monitoring seems excessive, if the well head temperature is not high. We recommend taking out the downhole temperature monitoring, unless required by the well head temperatures. (OP_YoloCo-25)

Comment:

Topic: Enhanced Wellfield Monitoring (95469)

Potential Issues:

1. High Oxygen

a) ≥5% O_2 v/v (3x in 12 months)

95469(e)(6)Recurring High Oxygen: If, within any 12-month period, there are three instances of oxygen content in landfill gas measured at or above five percent by volume in monthly monitoring at a particular well, the owner or operator shall conduct enhanced monitoring and downwell temperature monitoring within seven calendar days of the third oxygen content reading at or above five percent and conduct enhanced monitoring weekly thereafter. If four consecutive weekly carbon monoxide readings are under 100 ppmv, and temperature is under 131 degrees Fahrenheit, then enhanced monitoring

and downwell temperature monitoring shall be conducted according to the procedure in section 95471(o). Downwell temperature monitoring shall be performed every 10 vertical feet and can be monitored either with a removable thermometer or using temporary or permanent thermocouples installed in the well. This requirement does not apply to wells that collect gas in areas where waste has been in place for less than two years.

Concerns:

- High oxygen recurrence monitoring for temperature - 95469(e)(6) - monitoring every 10 feet is unclear what triggers that. For Federal regulations it is excess temperature, but this appears to be related to oxygen. Needs to be clarified or separated out from high oxygen enhanced monitoring for clarification. (OP_SWMD-12)

Agency Response to Combined Comments:

CARB made changes in response to these comments. In the 15-Day Changes, downwell temperature monitoring in response to recurring high oxygen content is only required if enhanced monitoring shows high carbon monoxide. High carbon monoxide is an indicator of a potential heat-generating subsurface reaction.

D.7-4 Recurring oxygen requirements increase costs

Comment: Recurring oxygen exceedances trigger additional stringent requirements, increasing costs and necessitating more tuning staff. (OP_SacCo-11)

Agency Response:

CARB made changes in response to these comments. In the 15-Day Changes, downwell temperature monitoring in response to recurring high oxygen content is only required if enhanced monitoring shows high carbon monoxide and the threshold was revised from three to six instances.

High levels of oxygen suggest there may be damaged components or insufficient cover, allowing air intrusion into the waste mass and GCCS. These conditions compromise the ability of the gas collection system to work effectively, can be harmful to electricity generation equipment, disrupt normal biological activity under anaerobic conditions, and can cause or exacerbate elevated temperatures that can in turn damage the collection system.

D.7-5 Restrict oxygen in landfill gas sent to landfill gas-to-energy plants

Comment: CARB should also require that landfills sending gas to waste-to-energy plants restrict oxygen to not more than five percent at the delivery point. (OP_EIP-20)

Agency Response:

No changes were made in response to this comment. Provisions designed to limit oxygen content at each wellhead will also help to reduce oxygen content in aggregated landfill gas.

8. Wellhead Parameter Trend Analysis

D.8-1 Revise trend analysis thresholds

Comment: To arrive on a cost-effective regime, WM encourages CARB to revise the wellhead monitoring provisions to:

- Measure trends of temperature and gas constituents over periods of time and within adjacent, rather than individual wells, to allow for statistically significant trend analyses indicating degraded methanogenesis and to prevent requiring corrective action based on anomalies; (OP_WM-32)

Comment:

Wellhead Trends

WM agrees with using trends and thinks the regulation should rely on trends rather than absolute values or discrete, one-time measurements. However, we are unclear as to how CARB arrived at the trend thresholds established in the rule. As discussed elsewhere, this is an evolving area of research that warrants further discussion amongst researchers and industry before deciding on values that trigger enhanced monitoring and downwell temperature monitoring. Trends should mean changes over multiple monitoring periods, not one instance of change. Enhanced monitoring should only be required if the jump in temperature occurs over quarters, rather than months, and should not be required for wells below 131F. WM requests CARB hold a workshop to discuss parameters and trends to monitor for wellhead monitoring before finalizing them in regulation. (OP_WM-41)

Comment: It is very common to get erroneous readings in one month that are ultimately determined to be invalid due to instrument error or other issues. Flow rate data at a wellhead can be very inaccurate and uncertain. As written, such a reading would still trigger extensive additional actions even when the reading was not real in the first place. Therefore, any such actions as part of the Wellhead Parameter Trend Analysis must be based on valid readings, both the current reading as well as for the reading from the previous monitoring period to which the new reading is being compared. Further, the actions should only be triggered after 60 days of confirmed readings, which would cover three consecutive monitoring events, which would confirm the trend is real and ongoing. (OP_L and D-42)

Comment: Section 95469[e](7) of the draft rule includes a requirement for a monthly Wellhead Parameter Trend Analysis. The values prescribed in this section seem somewhat arbitrary with no scientific basis as to why these specific values were selected, how it was determined that those values are relevant to proper wellfield operations and maintenance (O&M), and how these prescriptive numbers will improve compliance.

For example, if a well temperature increases by 20 degrees, but the well is still under the compliance threshold in the rule, then no action should be required. Operators can be required to focus more on readings like that or possibly increase the frequency of monitoring at that well, to confirm if the trend will continue. However, enhanced monitoring and corrective action should not be required unless a temperature limit has been exceeded.

The same applies to changes in wellhead oxygen. As written, a 2% change could be a very small value, for example, 2% of a value of 2% would be a change from 2% to 2.04% oxygen. Even if the rule language intended to imply a 2-percentage point change (from for example 2%

to 4%), the language is unclear, and a 2-percentage point change is very common. The same thought process applies for all the other values prescribed for pressure, methane, methane/carbon dioxide ratio, and flow rate.

Further, it is very common to get erroneous readings in one month that are ultimately determined to be invalid due to instrument error or other issues. Flow rate data at a wellhead can be very inaccurate and uncertain. As written, such a reading would still trigger extensive additional actions even when the reading was not real in the first place. Therefore, any such actions as part of the Wellhead Parameter Trend Analysis must be based on valid data, including both the current reading as well as for the reading from the previous monitoring period to which the new reading is being compared. Further, the actions should only be triggered after 60 days of confirmed readings, which would cover three consecutive monitoring events confirming the trend is real and ongoing. (OP_Ind/Gov Coalition-26)

Comment:

Wellhead Trend Analysis

Section 95469[e](7) of the draft rule now includes a requirement for a monthly Wellhead Parameter Trend Analysis, whereby the owner shall examine monthly records for each well and take the following actions:

If the temperature at a well increases by more than 20° F compared to prior monthly measurement, begin enhanced monitoring and downwell temperature monitoring within seven calendar days.

If the oxygen content at a well increases by more than 2% compared to the previous reading, perform a collection system assessment and cover integrity assessment in a 200-foot radius around the well within 30 days.

When, at a particular well, the difference between the monthly parameter value and average parameter value within a rolling 12-month period is greater than the following values, report the cause of the change in the Annual GCCS System Report:

Wellhead Parameter	Condition
Gauge pressure	Changes by more than 2" w.c. at a well with average vacuum of 1 O" w.c. or less, or changes by more than 20% at a well with an average vacuum of> 1 O" w.c.
Methane%	Changes by more than 5% at a well with a 12-month average of > 30% methane, or changes by more than 10% at a well with a 12-month average of :5 30% methane
Ratio of methane to carbon dioxide	Decreases by more than 10%, or falls below 1.0
Landfill gas flow rate	Changes by more than 30%

The values prescribed in this rule section seem particularly arbitrary with no scientific basis as to why these specific values were selected, how it was determined that those values are relevant to proper wellfield operations and maintenance (O&M), and how these prescriptive numbers will improve compliance.

For example, if a well temperature increases by 20° but the well is still under the compliance threshold in the rule, then no action should be required. Operators can be required to focus more on readings like that or possibly increase the frequency of monitoring at that well, to confirm if the trend continues; however, enhanced monitoring and corrective action should not be required unless a temperature limit has been exceeded. The same applies to changes in wellhead oxygen. As written, a 2% change could be a very small value, for example, 2% of a value of 2% would be a change from 2% to 2.04% oxygen. Even if the rule language intended to imply a 2-percentage point change (from for example 2% to 4%), the language is unclear, and a 2-percentage point change is very common. The same goes for all of the other arbitrary values prescribed for pressure, methane, methane/carbon dioxide ratio, and flow rate. (OP_L and D-41)

Comment: Section 95469[e](7) of the draft rule now includes a requirement for a monthly Wellhead Parameter Trend Analysis, whereby the owner shall examine monthly records for each well and take several actions dependent on results. The values prescribed in this rule section seem particularly arbitrary with no scientific basis as to why these specific values were selected, how it was determined that those values are relevant to proper wellfield operations and maintenance (O&M), and how these prescriptive numbers will improve compliance. (OP_OPAL Fuels-12)

Comment:

Section 95469 (e)(7) – Wellhead Parameter Trend Analysis

This section requires operators to review monthly records for each well and initiate several unnecessary and burdensome follow-on actions. The values prescribed in this section appear arbitrary with no scientific basis as to why these specific values were selected, how it was determined that those values are relevant to proper wellfield operations and maintenance (O&M), and how these prescriptive numbers will improve compliance. For example, if a well temperature increases by 20 degrees, enhanced monitoring is required, even if the temperature remains below the compliance limit. It is very common that set points change frequently due to operational changes (flares/engines online/offline, etc.) and this should be taken into consideration. (OP_Recology-25)

Agency Response to Combined Comments:

CARB made changes in response to these comments. In the 15-Day Changes, the requirement to perform downwell monitoring in response to increased temperature was removed, oxygen content increases must be sustained for an additional month before triggering the follow-up assessments, and trend analysis thresholds for methane content and methane to carbon dioxide ratio were adjusted. No other changes were made in response to these comments.

A major purpose of the trend analysis is to identify when conditions are rapidly changing, even if they are below absolute value thresholds, to enable earlier identification and proactive responses to potentially concerning conditions before they reach those thresholds.

Measuring trends in multiple adjacent wells and/or over a longer period of time would add significantly to the complexity of the provision, both for operator analysis and for compliance determination by CARB and air districts. Existing wellhead monitoring requirements in the LMR and federal rules are based on an individual reading at an individual wellhead, and as such this is an appropriate practice to maintain for the trend analyses for simplicity, especially given the relatively large spatial area covered by each well (typically one well per acre).

Requiring a trend to occur or over a longer period could result in delays in identifying and responding to potentially concerning conditions. Nevertheless, an element of time persistence was added for the oxygen trend change to avoid invoking the requirement due to a temporary fluctuation (e.g., as may occur during repair activities), or a cause that was quickly corrected.

The approaches used to select the trend thresholds are explained on p. 66 of the ISOR. In individual meetings after release of the 45-Day Changes, CARB staff engaged with operators on additional feedback about appropriate adjustments to thresholds, and made some of these adjustments in the 15-Day Changes.

OP_Ind/Gov Coalition-26 suggests that the Proposed Amendments set a threshold of 2% change for oxygen content, however, this threshold is actually “more than two percentage points” (e.g., from 2% to above 4% oxygen by volume), as stated in section 95469(e)(7)(B).

Multiple commenters suggest that multiple months should be used to account for invalid or erroneous readings. The owner or operator is responsible for taking accurate readings and measurement devices must be calibrated. Quality control checks should be performed to ensure data is accurate and valid if an inaccurate reading is suspected. Flow rate measurements are identified by these commenters as particularly prone to inaccurate measurement; accordingly, a wide threshold of 30% is specified for changes in flow rate.

D.8-2 Require analysis of gradual trends

Comment: Wellhead trend analysis framework - § 95469(e)(7): We strongly support CARB’s inclusion of a wellhead parameter trend analysis as a proactive tool to identify emerging issues. Trend analysis provides operators and regulators with an early warning system for wells exhibiting gradual increases in temperature, pressure, or other parameters that may not immediately exceed established thresholds.

However, it is currently unclear whether the Proposed Amendments intend for operators to evaluate all historical monthly records for each well or only the most recent month of monitoring records. Without clarification, there is a risk that slow-developing trends could go unnoticed, undermining the preventative potential of the framework.

Recommendation: CARB should clarify that wellhead trend analysis must evaluate multi-month trends for each well to capture gradual parameter increases. Operators should be required to flag wells exhibiting consistent parameter increases over consecutive months, even if each monthly increase remains below the trend standard established in the framework. This approach would provide earlier identification of wells at risk of developing SET events, allow

for timely interventions, and better inform necessary assessments or corrective actions. (OP_CAW-56)

Comment: Clarify that wellhead trend analysis must evaluate multi-month trends to identify gradual increases in parameters and flag wells at risk of developing SET events. (OP_CAW-63)

Agency Response to Combined Comments:

No changes were made in response to these comments. The requirements in section 95469(e)(7) are meant to identify and respond to rapidly developing changes. However, in requiring monthly data analysis, CARB believes operators will be attuned to the monitoring data and better positioned to recognize even slow-moving trends.

Additionally, when collection system assessments are invoked, owners or operators are required to assess 12 months of data to identify and investigate changes in wellhead parameters outside of normal month-to-month variability. This will help to identify slow-moving trends if underlying conditions manifest any of the several indicators that require collection system assessments.

D.8-3 Do not count short-term changes for trend thresholds

Comment:

Wellhead Trend Analysis

…

We do not think short-term changes in these parameters should be counted toward the triggering criteria in this rule as long as they can be corrected on the same day of the exceedance with a simple valve adjustment. Also, wells that are under corrective action for other wellhead parameters should also not be subject to the thresholds in this section, as it is very common that adjustments to address one parameter can affect others. (OP_OPAL Fuels-13)

Comment:

Wellhead Trend Analysis

…

We do not think short-term changes in these parameters should be counted toward the triggering criteria in this rule as long as they can be corrected on the same day of the exceedance with a simple valve adjustment. Also, wells that are under corrective action for other wellhead parameters should also not be subject to the thresholds in this section, as it is very common that adjustments to address one parameter can affect others. For example, tuning a well down to reduce oxygen can also reduce its gas flow. (OP_L and D-43)

Agency Response to Combined Comments:

CARB made changes in response to these comments. In the 15-Day Changes, oxygen content increases must be sustained for an additional month before triggering the follow-up assessments, allowing the opportunity for simple corrections and limiting the situations where a temporary change caused by corrective actions to address other

parameters would result in the need for follow-up assessments. No other changes were made in response to these comments.

Quickly changing temperature trends are particularly concerning for the impact that elevated temperatures can have on the function of the GCCS and thus more frequent monitoring is important for that parameter. For parameters in section 95469(e)(7)(C), only the cause needs to be reported, which is a simple requirement that does not warrant waiting for multiple months of data.

If a corrective action is the cause of the change in a parameter in section 95469(e)(7)(C), that cause can simply be reported, which is useful information for CARB to better understand how adjustments in one parameter can affect other parameters.

D.8-4 Remove wellhead parameter trends analysis; expensive and unnecessary

Comment: Remove the requirements of § 95469 (e)(7), Wellhead Parameter Trend Analysis, in its entirety. These additional requirements add a significant amount of unnecessary additional reporting and monitoring to all landfills, even those that are in full compliance and do not have SEM exceedances or sub-surface migration issues. (OP_WPWMA-11)

Comment: The draft rule introduces a monthly Wellhead Parameter Trend Analysis, requiring review of records for each well. This new mandate will greatly increase operational costs and staffing needs. (OP_SacCo-15)

Comment:

§95469(e)(7)(C) – Well-Specific Rolling Average Comparisons

This section requires comparisons between rolling average values and current well readings, creating a similarly burdensome requirement. Each well (ReGen operates over 125 active wells) would require separate rolling data values for multiple parameters. Determining whether percentage thresholds are met and tracking each well's status would consume significant staff time and resources. (OP_ReGen-15)

Comment: Recommendation: We suggest removing this section in its entirety. These additional requirements add a significant amount of unnecessary additional reporting and monitoring, especially if the site is in full compliance and does not have SEM exceedances or sub-surface migration issues. (OP_Recology-26)

Comment:

Topic: Wellhead Monthly Trend Analysis 95469 (e)(7) and (e)(8) and (g)(1)

Potential Issues: {CARB staff note: Commenter quoted 45-Day Changes text of section 95469(e)(7).}

Potential Alternative:

- Remove requirements of 95469 (e)(7) in it’s entirety. These additional requirements add a significant amount of excessive reporting and monitoring, with no real impact on reducing GHG from landfills, especially if the site is in full compliance and does not have SEM exceedances or sub-surface migration issues.

- Additionally, Landfills are dynamic and as a technician adds more vacuum to a well, in most cases, the LFG temperature will increase/climb. If a well is tuned up to pull more landfill gas, causing increased temperature increase of 20 degrees F, why should the additional monitoring take place? There are other indicators, outside of temperature, that are indicative of potential to start subsurface oxidation, and so why should an increase of temperature of 20 degrees between one month and then next trigger enhanced monitoring and downwell temperature monitoring? (OP_SWMD-15)

  Agency Response to Combined Comments:

  CARB made changes in response to these comments. In the 15-Day Changes, several modifications were made to the thresholds in the wellhead parameter trend analysis to better focus that analysis on more meaningful events, and the requirement for downwell monitoring in response to increasing temperature was removed. However, CARB respectfully disagrees with removing the trend analysis. Monthly trend analysis is a recognized best practice among operators and consultants to inform decision-making, and data processing tools are widely available to simplify and expedite identification of abnormal conditions or changes. Stable, consistent gas flow and characteristics, together with prompt maintenance or repair, allows for fewer operational disruptions and less downtime, minimizing landfill gas emissions. Significant changes in wellhead parameters can be early indicators of problems. This practice is necessary to ensure operators are aware of changing conditions and potential problems, allowing for timely intervention to prevent increased emissions, GCCS downtime, or other operational complications.

  CARB staff analyzed costs for the wellhead parameter trend analysis in the economic analysis as detailed in the ISOR Appendix B (p. 20). Simple spreadsheet tools can be utilized to automate monthly trend analyses, and many operators already use data management programs with the capability of tracking rolling averages and identifying parameters outside a set range.

  Staff agrees with the commenter that there are other indicators, outside of temperature, that are indicative of a potential subsurface reaction, and therefore enhanced monitoring is required to confirm whether other indicators suggest that risk.

D.8-5 Allow more flexibility in evaluating wellhead data trends

Comment:

{CARB staff note: Commenter quoted 45-Day Changes text of section 95469(e)(7).}

The entirety of Section (7)(C) is overly prescriptive and will create an enormous amount of needless recordkeeping. Rather than percentage changes of a set percent based on recent averages, the regulation should allow for trend evaluations that include what might be the normal fluctuation at an individual well due to other factors. In the County's over 30 years of landfill gas collection, County staff have observed the majority of the fluctuations at a wellhead, of the magnitude cited in this section, to be outside of normal operational control and often due to atmospheric conditions, longer term changes in gas generation, etc. (OP_YoloCo-26)

Agency Response:

No changes were made in response to this comment. Specific numerical values were provided to establish clear and consistent thresholds and enable operators to establish data analysis procedures to identify when these trend conditions are met. As discussed in the ISOR, identifying and reporting the cause of significant changes ensures operators and CARB are aware of the reasons for unstable or fluctuating gas characteristics, creating a broader understanding of what types of operational, meteorological, and other factors affect wellhead parameters.

9. Liquid Level Monitoring

D.9-1 Increase monitoring frequency and include liquid levels in enhanced monitoring

Comment: Liquid level monitoring - § 95469(F): We support CARB's addition of biannual liquid-level monitoring for all wells but are concerned that the current frequency is insufficient given the potential impacts of liquid accumulation. Liquid logging can lead to high shut-in gas pressures, leachate seeps or blow-outs, and reduced gas flow rates. Liquids in collection systems (wells or piping) can also contribute to heat and pressure buildup, potentially exacerbating SET events.

Recommendations:

- Increase the frequency of liquid-level monitoring to quarterly, at a minimum, for wells in active areas or where trends indicate elevated risk.
- Include liquid-level checks in the enhanced monitoring framework for wells exhibiting concerning trends in temperature, oxygen, or other parameters, as excessive liquids can amplify the severity of SET events. (OP_CAW-58)

Comment: Increase the frequency of liquid-level monitoring to quarterly, at a minimum, for wells in active areas or where trends indicate elevated risk. (OP_CAW-85)

Agency Response to Combined Comments:

No changes were made in response to these comments. However, note that in the 15-Day Changes, the default liquid level monitoring frequency was reduced to once per year, and an option was added to further reduce monitoring frequency at wells with low liquid levels.

The Proposed Amendments require quarterly monitoring of wells with liquid levels exceeding 50% of the screened interval length (as originally proposed and maintained in the 15-Day Changes). This appropriately balances the need to periodically confirm functionality with the potential impacts of removing the wellhead to take such measurements, as discussed in the 15-Day Notice.

Liquid level monitoring is a means to identify wells that cannot operate as designed to effectively collect gas due to significant blockage of the screened interval. Enhanced monitoring is focused on gas measurements to identify and track potentially concerning conditions that could indicate a subsurface reaction. See the agency response in section IV.D.5-3 for more information on the relationship between liquid level and enhanced monitoring requirements.

D.9-2 Some wells not physically accessible for measurement

Comment:

§95469(f) – Downwell Monitoring Requirements

This section mandates when downwell monitoring must be performed, but numerous well configurations make this infeasible, including remote monitored wellheads, horizontal collectors, and wells with damage that physically prevents monitoring equipment advancement. (OP_ReGen-5)

Comment: OCWR also requests clarification that the liquid level monitoring requirement applies only to accessible vertical wells, and not to horizontal collectors or remoted vertical wells, which comprise a significant portion of the wellfield at some sites. In many cases, horizontal collectors and remote wells are not physically accessible for traditional liquid level sounding, making monitoring infeasible without major excavation or system redesign. Additionally, determining screened intervals in older wells may not be feasible using sounding devices alone, and alternative methods such as well cameras are significantly more costly and time-consuming. (OP_OCWR-9)

Comment:

Section 95469 (f)

There are horizontal wells and buried vertical wells where the liquid level measurement requirement is not relevant or practical. RCDWR recommends the subject section be revised to reflect these cases. (OP_RIVCO-9)

> **Agency Response to Combined Comments:**
>
> CARB made changes in response to these comments. In the 15-Day Changes, it was specified that the liquid level monitoring only applies to interior vertical wells and that wells with remote or inaccessible wellheads can be omitted so long as the operator documents those conditions. The Proposed Amendments do not specify the method to determine the percentage of the screened interval that is blocked, so owners or operators can rely on records of the screened interval length where available.

D.9-3 Damaged wells should not have to be replaced if still functioning

Comment: Section §95469(f)(1)(A) implies that any damaged well inherently requires replacement. This is incorrect and removes necessary operator discretion. Wells can be partially obstructed, preventing liquid level monitor advancement, while still producing good gas composition and flow. In such scenarios, decommissioning and replacing a productive well makes no operational or environmental sense. A new well may be warranted as an addition, but the damaged well need not be immediately decommissioned if it continues extracting gas effectively. (OP_ReGen-6)

Comment:

Wellhead Monitoring - Liquid Level and Well Decommissioning Requirements

The proposed language regarding the repair or replacement of wells that are "pinched, broken, or otherwise compromised" raises concerns. Many older wells may have minor obstructions or

structural irregularities but continue to function effectively as gas collectors. Replacing such wells could be prohibitively expensive or technically infeasible and may result in the abandonment of otherwise productive wells-ultimately reducing gas collection efficiency and undermining the rule's intent. (OP_OCWR-8)

Comment: Section (f)(1)(A) should allow the operator to assess the gas system performance and select the most appropriate response in the case of a compromised well and not require repair or replacement as the only two alternatives. (OP_YoloCo-28)

Agency Response to Combined Comments:

No changes were made in response to these comments. However, in the 15-Day Changes, the indentation of the requirement referenced in these comments was changed to reflect that it does not only apply to wells with high liquid levels. Note that both the existing Regulation and Proposed Amendments require the collection system to be operated and maintained in accordance with the approved Design Plan. See the agency response in section IV.D.6-3 for more information.

The language specifies that repair or replacement is necessary for wells “determined to be pinched, broken, or otherwise compromised.” This phrasing makes clear that the nature of condition must *compromise* the well to trigger this requirement. If the well continues to effectively operate as designed, repair or replacement is not required.

D.9-4 Remove requirement to install pumps after recurring high liquids

Comment:

§95469(f)(2) – Permanent Liquids Removal Pumps

This section requires operators to install permanent liquids removal pumps in wells based on available perforations, without considering individual well contributions. This approach mandates a costly, permanent "umbrella" solution that may not be warranted for many wells.

ReGen operates hundreds of acres of landfill gas collection devices of varying ages (some dating to the 1980s) and conditions. The proposed requirement would necessitate installing permanent infrastructure (compressed air for pneumatic pumps, electricity, and drain lines) to and from wells that may only recover old, deep, poor-quality gas with low flow rates. This diverts resources to wells providing minimal benefit rather than allowing strategic allocation based on performance. (OP_ReGen-7)

Comment:

{CARB staff note: Commenter quoted 45-Day Changes text of section 95469(f).}

Section (f)(2) is redundant and more prescriptive than needed. If actions taken pursuant to Section 1 are not bringing the well into liquid level compliance within 120 days, Section (f)(2) doesn’t really add anything that isn’t already being done. Also, after the corrective action taken in Section (f)(1), the proper corrective action might be to abandon the well and put in another. (OP_YoloCo-29)

Comment: Based on one of our closed landfills, liquids encountered are often perched and recharge quickly after removal, making sustained dewatering infeasible. OCWR recommends that CARB consider a site-specific, performance-based approach to liquid level monitoring and

well decommissioning requirements, with flexibility for older or closed sites and consideration of operational feasibility. (OP_OCWR-10)

Agency Response to Combined Comments:

CARB made changes in response to these comments. In the 15-Day Changes, the requirement to install a liquids pump in response to repeated high liquid level measurements was removed. This provides operators with the flexibility to address liquids management in the best site-specific manner to maintain compliance with section 95469(f)(1).

D.9-5 Add monitoring frequency step-down

Comment:

{CARB staff note: Commenter quoted 45-Day Changes text of section 95469(f).}

Section (f)(1) could be improved by allowing wells where water is not detected to move to an annual monitoring frequency if no liquid is detected, and to a longer frequency if water continues to not be detected. (OP_YoloCo-27)

Agency Response:

CARB made changes in response to this comment. In the 15-Day Changes, a sampling schedule option was added for low-liquids wells in section 95469(f)(3). This option allows less frequent measurement of wells with two consecutive annual monitoring events not exceeding 50% of the screened interval length.

D.9-6 Only require liquid level monitoring in response to other issues

Comment:

Section 95469(f): Semiannual Well Liquid Level Monitoring

This subsection of the proposed amendments requires liquid level monitoring at least twice a year, with the potential to increase the frequency and dewatering requirement for gas collectors where liquid levels exceed 50% of the perforated area. Since high-level liquid could be caused by other environmental factors, such as diurnal barometric pressure changes, requiring additional liquid monitoring at all wellheads would create an unnecessary and unjustified burden on operators. The Sanitation Districts acknowledge that there is equipment that can automatically measure the liquid level. However, such equipment will require additional infrastructure, including power supply, data collection, and internet connection, which will incur substantial capital costs. Furthermore, some landfill locations may not have stable internet services, which are required for data compilation. Therefore, the Sanitation Districts strongly recommend that CARB require liquid level monitoring only when a gas collector exhibits persistent performance issues, such as elevated temperatures, positive pressure, or complaints of odor. (OP_LACSD-14)

Comment: It is unclear what the purpose of the well liquid level monitoring and, if required, liquid pumping is. Generally speaking, the only reason to pump liquids from LFG wells is to increase LFG extraction from the well in response to surface emissions or LFG migration exceedances. Absent either of those occurrences, there is no reason to pump liquids from LFG

wells - if the focus is on air quality or controlling LFG migration. We ask that the requirement for well liquid monitoring and pumping be removed from the rule or revised to only be required when there have been surface emissions exceedances in the area of the well in question that could not be corrected by other means. (OP_L and D-46)

Comment:

Topic: Wellhead Monthly Trend Analysis 95469 (e)(7) and (e)(8) and (g)(1)

Potential Issues: {CARB staff note: Commenter quoted 45-Day Changes text of section 95469(f).}

Concerns:

- Abatement of liquid issues would be very costly if a LF doesn't have infrastructure in place (especially for closed sites that are no longer accepting waste and have lost revenue stream). Furthermore, if a site is in full compliance with SEM and no sub-surface migration with a downtrend of the LFG production, then why remove the liquids from individual wells as opposed to using the typical leachate extraction system? (OP_SWMD-14)

  Agency Response to Combined Comments:

  No changes were made in response to these comments. However, note that in the 15-Day Changes the default frequency of liquid level monitoring was changed to annual, a sampling schedule for less frequent measurements was added for low-liquids wells, and the requirement to install a pump to remove liquids was removed.

  The Proposed Amendments do not require installation of an automated liquid level measuring system. The owner or operator may choose to use such a system or perform manual measurements.

  A lack of surface emissions exceedances alone is not sufficient to demonstrate that the gas collection system is operating optimally. Temporal variability of emissions from landfills and spatial gaps in surface emissions monitoring coverage are two potential reasons that emissions could occur which are not revealed through surface emissions monitoring. Wells with significant portions of the screened interval (i.e., the area with perforations where gas can be collected) blocked are likely to be less effective at collecting gas, and are often not able to be operated within design specifications (e.g., vacuum applied).

  The Proposed Amendments do not specify how an owner or operator must remove liquids. If the leachate extraction system is able to keep well liquid levels low, it is acceptable to use that system to do so.

D.9-7 Consider a tiered regulatory approach that differentiates by landfill size

Comment: The El Dorado County Air Quality Management District (AQMD) appreciates the opportunity to comment on the proposed methane regulations. The Union Mine Landfill, which only accepts waste generated onsite, is the only County-owned and operated facility in El Dorado County with an active methane extraction system. The AQMD does not currently have a Memorandum of Understanding (MOU) with CARB to implement CARB's Landfill Methane Gas Regulations.

With only an active 6-acre Class II cell expected to begin closure within the next four years, the landfill's gas production has declined significantly—from approximately 450 cubic feet per minute (CFM) at 50% methane in 1997 to about 175 CFM at roughly 25% methane today—indicating that the site is nearing the end of its gas production life.

According to the Union Mine Landfill Site Supervisor, the estimated costs associated with potential compliance measures could be significant. These include up to $30,000 for new pressure-sensing equipment at the flare; up to $7,500 per pump for air-operated (or possibly electric) well pumps; up to $15,000 for an air compressor system; and up to $10,000 to tie into existing gas header lines for leachate. If a separate above-ground leachate collection system is required, the cost could increase by an additional $150,000 or more. Depending on the system configuration and site conditions, total compliance costs could reach over $200,000.

For a small landfill nearing the end of its lifecycle, these requirements would impose an undue financial and operational hardship without providing a proportional environmental benefit compared to large, active landfills.

El Dorado County AQMD respectfully recommends that CARB consider a tiered regulatory approach that differentiates between large, active landfills and smaller, or low-producing sites. Such an approach would maintain strong environmental protections while recognizing the reduced emissions potential and limited resources of small jurisdictions sites. (OP_EDCAQMD-1)

Agency Response:

CARB made changes in response to this comment. In the 15-Day Changes, the requirement to install a liquids pump in response to repeated high liquids levels was removed which addresses the comment related to well pumps, the air compressor system, and the tie-in existing gas header lines for leachate. No other changes were made in response to this comment.

The Proposed Amendments do not require pressure sensing equipment at flares. Refer to ISOR (p. 101) for more information about gas collection system pressure sensors required in section 95464(b)(1)(E)).

The Proposed Amendments retain existing cost-saving measures for well-maintained closed landfills.

10. Continuous Wellhead Monitoring and Automated Tuning

D.10-1 Require continuous wellhead monitoring and automated tuning

Comment: General wellhead monitoring - § 95469(e): We support the requirement for monthly monitoring of pressure, temperature, flow rate, and gas composition at the wellhead. This level of data collection is fundamental to not only maintaining efficient and safe GCCS operations, but increasing our understanding of landfill operational parameters and trends. However, we strongly encourage CARB to consider requiring automated wellhead tuning systems for all landfills.

These systems enable continuous, real-time monitoring of key parameters already identified in the Proposed Amendments and can automatically alert operators when readings exceed regulatory thresholds. They also integrate with data visualization platforms that support early

issue detection and trend analysis, improving operational decision-making and risk assessment. These technologies have also proven successful in reducing system downtime, increasing gas collection efficiency, and improving compliance outcomes. (OP_CAW-47)

Comment: Require automated wellhead tuning at all landfills (OP_CAW-83)

Comment: Specifically, we recommend that CARB:

…

- Require autotuning technology for landfills with persistent problems and those that use an energy recovery control device; (OP_EIP-5)

Comment:

CARB should require installation and operation of automated well tuning at all wells on landfills that use an energy recovery control device.

In our January 2025 Letter, we asked CARB to consider requiring remote wellhead tuning technologies. We pointed to the benefits of these technologies that are able to dynamically adjust GCCS parameters like vacuum pressure and flow rates in response to real-time data collected through continuous monitoring of atmospheric conditions. We also recommended that CARB require automated wellhead tuning at landfills with persistent issues, which CARB included as a proposed concept. However, CARB did not require any automated wellhead monitoring at any landfills.

In the ISOR, CARB describes Alternative 2: Adopting More Stringent Amendments Alternative, which would add to the proposed amendments a requirement to install and operate continuous wellhead monitoring with automated well tuning at all wells on landfills that use an energy recovery control device (e.g., an engine, gas turbine, or boiler that produces heat or electricity). The continuous wellhead monitoring systems provide continuous measurement of wellhead parameters (rather than the typical monthly monitoring required by the Proposed Amendments) and the automated tuning is designed to improve gas collection efficiency and/or gas quality by responding to real-time conditions with wellhead vacuum adjustments.

Automated wellhead tuning technologies, which are in use at many landfills across the U.S., as discussed in our January 2025 Letter, are able to dynamically adjust GCCS parameters like vacuum pressure and flow rates in response to real-time data collected through continuous monitoring of atmospheric conditions. This technology has the potential to actively monitor gas collection wells, notify operators as soon as issues occur, identify out-of-range parameters, and allow for automatic wellhead tuning. Automated wellhead tuning can also allow operators to identify issues much more frequently than once per month, and thus could also result in a more well-functioning GCCS and reduce damage to the GCCS. The automated system is also capable of improving gas quality by optimizing the balance between oxygen and methane content, which reduces air intrusion risks.

Accordingly, we encourage CARB to adopt this more stringent standard in Alternative 2, requiring autotuning technology at landfills that use an energy recovery device. Especially where a number of California landfills already utilize the technology, this more stringent alternative would be appropriate. SCS Engineers estimates that costs would be more affordable over time than traditional manual monitoring. CARB should also require automated wellhead tuning at landfills with persistent issues. (OP_EIP-14)

Comment: We continue to urge CARB, in the final LMR, to require that landfills with persistent issues install and operate an automated wellhead tuning system. We also encourage CARB to adopt Alternative 2 described in CARB's Initial Statement of Reasons ("ISOR"), which are more stringent amendments to require installing and operating automated wellhead tuning at landfills that use an energy recovery control device. (OP_EIP-22)

Comment:

Wellhead tuning requirements

RMI and EDF support the expanded monitoring and reporting of wellhead vacuum, flow, and pressure; the inclusion of trend analyses; and requirements for corrective action in response to out-of-range values. However, we encourage CARB to further incorporate automated wellhead tuning into the rule, especially at landfills with persistent violations, of a certain size threshold, or with an energy project. Automated well-tuning systems can take continuous measurements of LFG composition, flow, temperature, pressure, and liquid levels and make automated adjustments to the gas collection and control system ("GCCS") to increase methane capture and reduce fugitive emissions. In addition, continuous wellhead data can alert operators to other mitigation opportunities, such as remediating an area of damaged cover or de-watering a flooded well. (OP_RMI/EDF-23)

Comment: Further incorporate automated wellhead tuning to improve GCCS uptime and performance (OP_RMI/EDF-12)

Comment: RMI and EDF urge CARB to adopt the Alternative 2 proposal to require installation and operation of continuous wellhead monitoring with automated tuning at all wells that use energy recovery control devices.

A recently published analysis by Energy Vision underscores the significant, cost-effective methane reduction potential of early GCCS installation and automated wellhead tuning. Companies providing this technology include LoCI Controls and Apis Innovation, among others. LoCI Controls deploys its real-time data and control solution at more than 65 landfills, including several landfills in California, both private and county-owned. More than 75 landfills in the U.S. and Canada are actively using Apis Innovation's automated wellhead tuning technology. (OP_RMI/EDF-24)

Comment: We urge the Board to also adopt several enhancements. This includes: … requiring automated wellhead tuning; (T_RMI-10)

Comment: I ask that this version of LMR not be the last word and instead that CARB be vigorous at bringing further technological tools into actual practice quickly, as they achieve proof of concept, for example, applying predictive AI to automated wellhead tuning or to anticipating imminent leaks. (T_ECA/CAC-1)

Agency Response to Combined Comments:

No changes were made in response to these comments. The Proposed Amendments include provisions to reduce traditional barriers to using continuous wellhead monitoring technologies (which are typically paired with automated wellhead tuning systems). These changes are expected to encourage more operators to voluntarily use continuous wellhead monitoring and automated well tuning in situations where these technologies are most useful and applicable. Installing a system to perform continuous wellhead

monitoring is also required in response to recurring pressure exceedances in weekly monitoring. See the ISOR (pp. 138-139) for a discussion of why CARB rejected a regulatory alternative for adopting continuous wellhead monitoring with automated tuning.

11. General Items and Comments Combining Multiple Topics Related to Wellhead Monitoring and Standards

D.11-1 General support

Comment: Pressure monitoring - § 95469(e)(1) and (2): We support the pressure monitoring and response framework that CARB has proposed. These requirements ensure that operators promptly identify and address positive pressure events that could indicate systems failures or leaks, and we believe they will contribute to improved GCCS performance overall. (OP_CAW-48)

Agency Response:

No changes were made in response to this comment. CARB appreciates the comment and thanks the commenter.

D.11-2 Allow approvals of time extensions to comply with wellhead standards

Comment: We recommend the addition of an express textual provision for requesting and granting additional time for corrective actions related to an exceedance of the 131 F temperature threshold. While the provisions contained within *Section 95468 – Alternative Compliance Options* would appear to anticipate such requests, we believe a specific reference such as the text included for corrective actions associated with temperatures above 145 F should be included in *Section 95469 – Monitoring Requirements (e)3*. (OP_Recology-22)

Comment: To arrive on a cost-effective regime, WM encourages CARB to revise the wellhead monitoring provisions to:

…

- Allow for applications to the Executive Officer for extended time periods for individual wells. (OP_WM-35)

Comment: The time frames in which remediation of an elevated temperature or oxygen content reading is to be addressed should be re-assessed. While some elevated readings can be mitigated in a short period of time, others may take an extended period due to location, access issues at certain times of the year and subcontractor availability. The regulation does not allow for the request for additional time in the event of a single temperature reading that exceeds 131°F (either instantaneous or over a 60-day period) if that threshold is kept in the rule. It is allowed for temperature readings above 145°F (Section 95464(e)(4)D). Our request is that provisions to request additional time be added in text referencing corrective actions related to an exceedance of the 131°F temperature threshold. While the provisions contained within Section 95468 – Alternative Compliance Options would appear to allow for this request, we believe a specific reference such as the text included for corrective actions associated with temperatures above 145°F should be included in Section 95464(e)(3), as our experience has

been recently that districts and CARB are rejected all requests for alternatives. (OP_OPAL Fuels-8)

Agency Response to Combined Comments:

No changes were made in response to these comments. Operators may request additional time allowance for repairs pursuant to section 95468. Such request must include the reason for delay, demonstrate that efforts were promptly initiated, and include the expected timeline to complete the repair.

D.11-3 Ensure corrective actions for one parameter does not conflict with others

Comment: It is also important to note that the balance between oxygen, carbon monoxide content and temperature (and other variables) is such that attempting to mitigate one variable could cause the other to move in a negative direction. As such, mitigating all the parameters being considered within the 60-calendar day period noted above may not be practical or achievable. To that end, we request that an operator be given the opportunity to provide an alternative compliance approach to a specific situation versus being bound to mitigate the situation in its entirety within a 60-calendar day period. (OP_OPAL Fuels-9) (OP_L and D-27)

Comment: The proposals present significant concerns about timing. While some elevated readings can be mitigated in a short period of time, others may take an extended period due to location, access issues at certain times of the year, and subcontractor availability. The regulation does not allow for operators to request additional time in the event of a single temperature reading that exceeds 131°F (either instantaneous or over a 60-day period), however, it does allow requests for temperature readings above 145°F (Section 95469(e)(4)D). It is also important to note that the balance between oxygen, carbon monoxide content and temperature (and other variables) is such that attempting to mitigate one variable could cause the other to move in a negative direction. As such, mitigating all the parameters being considered within the 60-calendar day period noted above may not be practical or achievable. (OP_Recology-19)

Comment:

Section 95469(e) - Wellhead Monitoring

CARB's intent is to have the revised LMR contain enhanced monitoring, reporting and assessment criteria as well as prompt initiation of correct measures. While we can be supportive of this approach, it is imperative that the remedies associated with exceedances of certain thresholds do not conflict with one another. Additionally, having the LMR align with federal rules is important in terms of various thresholds and specific criteria. For instance, under the revised NESHAP rules, the U.S. EPA is implementing an initial temperature standard of 145 degrees Fahrenheit (°F). (OP_Ind/Gov Coalition-22)

Comment: CARB's intent is to have the revised LMR contain enhanced monitoring and assessment as well as prompt initiation of correct measures. While we can be supportive of this approach, it is imperative that the remedies associated with exceedances of certain thresholds do not conflict with one another. (OP_L and D-21)

Agency Response to Combined Comments:

No changes were made in response to these comments.

The only well parameters that are required to be returned to below a specified standard are temperatures above 145 °F and positive pressure (and oxygen when the temperature exceeds 131 °F). Landfills in California are already required to correct temperature pursuant to federal rules, and positive pressure pursuant to the LMR. Federal rules also specifically state that the owner or operator must not attempt corrective actions for high temperature or positive pressure that cause exceedances of other operational or performance standards.[30] Thus, operators are already required to perform corrective actions in such a way as to not cause exceedances of other wellhead parameters.

For oxygen, a period of time is provided to correct high oxygen before triggering additional assessments, which provides the opportunity to appropriately balance and tune the system to ensure all parameters are within acceptable thresholds, or if they cannot do so, the reason for the high oxygen could be something unrelated to the well tuning such as a broken component or deficient surface cover where the further assessments are warranted even if the high oxygen reading resulted from adjustments to correct temperature or pressure.

For all other wellhead monitoring parameters, only reporting on trend changes is required, and these adjustments can simply be reported as the cause.

The Proposed Amendments generally have more stringent standards for wellhead monitoring than federal rules to provide earlier and more comprehensive detection of conditions that could impact GCCS effectiveness and achieve additional emissions reductions. For more information on the temperature thresholds, see the agency response in section IV.D.2-1.

D.11-4 Allow more time for temperature and oxygen remediation; do not count temporary elevated readings

Comment: The time frames in which remediation of an elevated temperature or oxygen content reading is to be addressed should be re-assessed. While some elevated readings can be mitigated in a short period of time, others may take an extended period due to location, access issues at certain times of the year and subcontractor availability. Also, high temperatures or oxygen readings don't necessarily indicate that a subsurface oxidation event or other occurrence is imminent. Many landfills have individual or small numbers of wells that continually function above the 145-degree F and 5% oxygen content thresholds, and no existence of other impacts are present. (OP_Ind/Gov Coalition-24)

Comment: We request that the timeframes proposed to remedy an elevated temperature or oxygen content reading be reassessed. Additionally, we request that an operator be given the opportunity to provide an alternative compliance approach to a specific situation versus being bound to mitigate the situation in its entirety within a 60-calendar day period. We understand CARB's intent is to have prompt initiation of corrective measures, to which we agree. However, as operators we have extensive knowledge of our facilities and understand that situations can differ vastly and may require a different corrective approach. (OP_Recology-23)

[30] 40 C.F.R. § 63.1960(a)(4)(i); 40 C.F.R. § 63.1960(a)(3); 40 C.F.R. § 60.765(a)(5); 40 C.F.R. § 60.765(a)(3); 40 C.F.R. § 60.36f(a)(5); and 40 C.F.R. § 60.36f(a)(3).

Comment:

Section 95469(e)(3&4) – Wellhead Monitoring

CARB's intent is to have the revised LMR contain enhanced monitoring, reporting, and assessment of wellheads as well as prompt initiation of corrective measures. It is imperative that the remedies associated with exceedances of certain thresholds are reasonable, do not conflict with one another, and are based on the latest guidance.

The current draft of the revised LMR would appear to require an operator to initiate corrective actions, cover integrity assessments, and collection system assessments immediately following the occurrence of a single elevated temperature reading (i.e., greater than 131°F and 145°F) Operators are also required to follow prescriptive requirements for oxygen content. The timeframes proposed to remedy an elevated temperature or oxygen content reading do not consider unique circumstances such as seasonal access issues or subcontractor availability that may warrant additional time.

Together, these proposed requirements are excessive and unduly burdensome. Intermittent high temperature or oxygen content readings may occur sporadically at any facility, and a single elevated reading is not an immediate indicator of a problem. Many landfills have individual or small numbers of wells that continually function above the 145-degree F and 5% oxygen content thresholds, while no other impacts are present.

U.S. EPA's NESHAP rulemaking approach is illustrative and provides a better alternative. U.S. EPA studied the wellhead temperature issue during the rulemaking for the NESHAP rule and concluded that LFG extraction system components, including high-operating-value (HOV) wells, are capable of safely operating at temperatures up to 145°F without posing a combustion or subsurface fire risk. As a result, EPA elected to establish a 145°F wellhead temperature limit to replace the 131°F limits found in earlier New Source Performance Standard (NSPS) and Emission Guideline (EG) rules. This change is expected to reduce the monitoring and reporting burden on regulated entities and the administrative and review requirements for the agency. (OP_Recology-18)

Comment: The time frames in which remediation of an elevated temperature or oxygen content reading is to be addressed should be re-assessed. While some elevated readings can be mitigated in a short period of time, others may take an extended period due to location, access issues at certain times of the year and subcontractor availability. The regulation does not allow for the request for additional time in the event of a single temperature reading that exceeds 131°F (either instantaneous or over a 60-day period) if that threshold is kept in the rule. It is allowed for temperature readings above 145°F (Section 95464(e)(4)D). Our request is that provisions to request additional time be added in text referencing corrective actions related to an exceedance of the 131° F temperature threshold. While the provisions contained within Section 95468 - Alternative Compliance Options would appear to allow for this request, we believe a specific reference such as the text included for corrective actions associated with temperatures above 145°F should be included in Section 95464(e)(3), as recent industry experience has been that districts and CARB are rejecting all requests for alternatives. (OP_L and D-26)

Agency Response to Combined Comments:

CARB made changes in response to these comments. In the 15-Day Changes, collection system and cover integrity assessments are not required when oxygen

content is brought below 5% within 15 days. Additionally, in the 15-Day Changes, the number of high oxygen readings needed in a 12-month period to trigger recurring high oxygen requirements was changed from 3 to 6. No other changes were made in response to these comments, but note that several additional modifications were made in the 15-Day Changes to better target enhanced and downwell monitoring to where it is needed.

Note that the Proposed Amendments require temperatures over 145 °F to be corrected, but oxygen content over 5% is not a violation provided that the required assessments are conducted and any issues found in those assessments are corrected, and enhanced monitoring is conducted if the recurring threshold is met. Note that while any repairs needed as a result of assessment findings must be completed within 60 days, owners or operators have 120 days to reduce temperatures over 145 °F before a violation has occurred, not 60 days as suggested by OP_Recology-23.

For more information about the selection of 145 °F as the corrective standard for temperature, please see the agency response in section IV.D.2-2.

All wellheads must be accessible year-round for monthly wellhead monitoring, so corrective actions should also be able to occur year-round. The timelines for correcting elevated temperature readings and for assessing and repairing issues that may be responsible for elevated oxygen are long enough for most corrective actions and allow adequate contractor availability. Operators may request additional time allowance for repairs pursuant to section 95468. Such request must include the reason for delay, demonstrate that efforts were promptly initiated, and include the expected timeline to complete the repair.

Intermittent or sporadic high oxygen readings are addressed by the 15-Day Changes described above. Intermittent or sporadic high temperature readings warrant further investigation.

The Proposed Amendments do not prescribe the specific corrective actions the operator must take, providing flexibility for operators to implement the best site-specific actions based on their facility's characteristics.

D.11-5 Align with federal regulations

Comment: Very extensive temperature monitoring requirements are added for all landfills subject to the amended LMR. It is recommended that landfills regulated under the LMR should comply with only with the provisions required under the respective Federal Landfill Regulations. If exceedances of the respective standards impacting temperature result in either detection of offsite landfill gas, or the local air district verification of a public nuisance that results in the issuance of a notice of violation (NOV), then the more enhanced provisions outlined in Section 95469 (e)(3) may apply. (OP_SWANA-10)

Comment: Provisions in the amended LMR for monitoring well head temperature and procedures for mitigating temperature exceedances for every landfill regulated under this provision are excessive. Minor exceedances of wellhead temperature (e.g., 131 degrees) are generally not indicative of any major problems with the gas collection system. The focus should be on situations where major and prolonged temperature excursions cause significant problems on- and off-site.

It is recommended that landfills regulated under the LMR should comply with the provisions required under their respective Federal Landfill Regulation. If exceedances of the respective temperature standards result in either detection of offsite landfill gas, or the local air district verification of a public nuisance that results in the issuance of a NOV, then the enhanced provisions outlined in Section 95469 (e)(3) can apply. (OP_SWANA-21)

Comment: §95469(e)(3)(B) Oxygen Limits and Temperature Scope: Clarify applicability and reconcile with federal standards. (OP_SMAQMD-25)

Comment: To arrive on a cost-effective regime, WM encourages CARB to revise the wellhead monitoring provisions to:

…

- Better align with existing regulatory requirements that require the same work; (OP_WM-33)

  Agency Response to Combined Comments:

  No changes were made in response to these comments. As discussed in the ISOR, the Proposed Amendments generally have more stringent standards for wellhead monitoring than federal rules in order to provide earlier and more comprehensive detection of conditions that could impact GCCS effectiveness and achieve additional emissions reductions. Only triggering assessments and additional monitoring in the case of major and prolonged temperature excursions, public nuisance violations, or offsite migration as suggested by the commenters would negate the intended benefit of early detection. See agency response in section IV.D.4-5 for more information regarding alignment with temperature monitoring in NESHAP.

D.11-6 Methods, verification, and enforcement guidance for regulatory partners

Comment: §95469(e-g) New Monitoring and Reporting: Monthly wellhead monitoring, weekly monitoring for recurring positive pressures, enhanced temperature monitoring, semiannual liquid level monitoring, wellhead parameter trend analysis, continuous system pressure monitoring—all increase operational and administrative workload. Guidance needed on methods, verification, and enforcement. (Note: Landfills currently perform monthly checks for methane concentration, O2, Static Pressure, and Temperature) (OP_SMAQMD-24)

Agency Response:

No changes were made in response to this comment. The Proposed Amendments provide specific methods for parameters where a specific method(s) must be used, and recordkeeping and reporting requirements are specified for these parameters to allow compliance verification. Further guidance is outside the scope of this rulemaking.

D.11-7 Explicitly allow higher wellhead monitoring frequency

Comment:

§95469(e) – Wellhead Monitoring Frequency
TrelliSense recommends allowing operators to perform wellhead monitoring “monthly or more frequently” to meet the standard. Explicitly allowing daily or continuous monitoring here, rather

than specifically requiring a monthly frequency, could incentivize proactive site management while aligning with fixed and continuous wellhead controls technologies. (OP_TrelliSense-10)

Agency Response:

No changes were made in response to this comment. In section 95469(e)(8), the Proposed Amendments specifically envision and address how monitoring that is occurring more frequently than weekly would be treated regarding compliance with thresholds in section 95469(e). Thus, daily or continuous monitoring can be used. Additionally, as a general matter, the LMR sets the minimum requirements, but owners or operators are not restricted from performing more monitoring.

D.11-8 Ensure regulators have data to track SET events

Comment:

We also need to make sure that CARB, and the local resource boards, and other oversight agencies have data and tracking and stringent record keeping requirements on gases that given indications -- that give indications if subsurface reactions are trending in bad directions, and the ability to provide corrective guidance, and really, you know, force action to happen. (T_Schiavo-5)

Agency Response:

No changes were made in response to this comment. The Proposed Amendments require collecting additional data more frequently when certain thresholds are exceeded in regular monthly wellhead monitoring data to help operators and regulators identify potential signs of subsurface reactions. The Proposed Amendments require all wellhead and downwell measurements to be reported quarterly, and require records of exceedances, re-monitoring data, and corrective actions to be included in annual reports so this data will be available to CARB. For more information regarding sharing data with partner regulatory agencies, refer to the agency response in section IV.M.1-1.

E. Gas Collection and Control System Installation

1. Gas Collection and Control System Design Plans

E.1-1 Clarify whether CARB or district has final approval for design plan

Comment: §95464(a) Design Plan for MSW Landfills: Clarify who has final approval of the design plan—CARB or Districts. (OP_SMAQMD-9)

Agency Response:

No changes were made in response to this comment. Authorities delegated to local air districts are specified in separate agreements to implement and enforce the Regulation, per the allowance in section 95473.

E.1-2 Require that design plans identify non-gas-collection wells

Comment: Recommend requiring a design plan to explicitly identify non-gas-collection wells to avoid tying compliance solely to well purpose. (OP_SMAQMD-34)

Agency Response:

No changes were made in response to this comment. The purpose of the well is an appropriate basis for determining whether the well must comply with requirements in the Proposed Amendments.

E.1-3 Accelerate timeline for developing a design plan

Comment: § 95464(a) on p. 5 allows a year to submit a plan. It needs to be done in 30 days, with another 30 days in rare circumstances. (OP_Burke-8)

Agency Response:

No changes were made in response to this comment. A GCCS Design Plan is a complex document prepared and certified by a professional engineer that dictates how the gas collection and control system will be built, operated, and monitored, along with other relevant information about the landfill. Preparing a document of this nature within 30 or 60 days as the commenter suggests is not feasible given the complexity of the plan requirements.

2. Timeline to Install GCCS after Design Plan Approval

E.2-1 General support

Comment: Early installation of GCCS - § 95464(a)(3) and (4): We strongly support CARB's decision to accelerate the required installation and operation timelines for GCCS following design plan approval. The proposed reduction from 18 months to 6 months (180 days) for active landfills and from 30 months to 18 months for closed or inactive landfills represents a major improvement that our coalition celebrates as a significant win for emissions reductions. We particularly appreciate that this requirement applies to all landfills, not only large facilities as previously proposed, and that CARB went beyond our prior recommendations by adopting an even shorter timeline for active sites. This change will significantly reduce uncontrolled emissions from new and expanding disposal areas and ensure that gas collection infrastructure is operational sooner. (OP_CAW-42)

Agency Response:

No changes were made in response to this comment. CARB thanks the commenter and notes that in the 15-Day Changes the installation timeline for active landfills was changed from 6 months to 12 months.

E.2-2 Extend GCCS installation period after design plan approval

Comment:

Operators should have more time to install and operate GCCS.

As currently written, operators of active MSW landfills will have only six months to install and operate GCCS following the approval of their Design Plan. See Section 95464(a)(2). This timeframe is not technically feasible, because a GCCS cannot be constructed in six months. Operators will necessarily be required to design and begin constructing a GCCS before the submission date of their Design Plan, which is due one year after detecting any leak on the

surface exceeding 200 ppmv in accordance with Section 95463(b)(2)(B). In this respect, operators will be obligated to construct a system that has not yet been approved, and could be subject to change following CARB's review. Operators should not be required to make what may amount to millions of dollars of capital investment to construct a GCCS, only for CARB to require material, expensive changes following submission of the Desing Plan. The proposed timeline does not consider local agency permitting timelines, inclement weather, supply chain limitations, contractor availability, or other factors.

WM requests that CARB provide operators with 15 months following approval of the Design Plan to construct and operate GCCS in order to allow adequate time for the items noted above. Additionally, in the event that any required permits authorizing construction to commence are not issued in a time frame that allows for this deadline to be met, an owner or operator should be able to request and automatically receive additional time for commencement of operation of the GCCS. (OP_WM-72)

Comment:

Section 95464(a)(3) - Gas Collection & Control System Requirements – Design Plan & Installation

This section requires the owner or operator of an active MSW landfill to install and operate a gas collection and control system within 6 months after approval of the design. This reduces the current timeline by one year and does not consider inclement weather, local AQMD permitting delays (most notably authority to construct permits for flares), supply chain limitations, contractor availability and other factors. Issuance of permits from some AQMD's has been of particular concern as several projects are delayed due to Authority to Construct authorizations being issued even after design approval has occurred. The associated absence of a concrete start date results in corresponding delays in availability of subcontractors and component procurement/delivery.

We request that this time threshold be revised to 15 months to allow adequate time for the items noted above. Additionally, if any required permits authorizing construction to commence are not issued in a time frame that allows for this deadline to be met, an owner or operator can request additional time for commencement of operation of the GCCS. (OP_Ind/Gov Coalition-8)

Comment:

Timeframe for Installation and Operation of Gas Collection and Control System Must Be Adjusted

Section 95464(a)(3) reduces the time an owner/operator of an active landfill has to install and operate a gas collection and control system from 18 months to six months after the system design plan is approved.

While we understand ARB's interest in expediting system installation, RCRC is deeply concerned that six months is not enough time for a public agency to comply with existing state contracting and procurement laws to issue proposals, select a contractor, and construct the system. Some landfills are impacted by adverse weather conditions that limit construction season to limited times of year that could delay installation of a gas collection and control system. In addition, some gas collection and control systems may require changes to the Solid Waste Facility permit which will trigger a lengthy process for CalReycle and the Regional

Water Quality Control Board review – often at least 180 days. Adding to the complexity, many rural county facilities are owned by different federal or local agencies whose approval may be required and extend the project delivery timeframe. While private owners/operators are not subject to all of these requirements, we understand that six months may still be too aggressive a timeframe for them.

For these reasons, RCRC suggests retaining the 18-month project completion timeframe for public facilities or providing not less than a 12-month compliance window with an ability to extend that deadline for owners/operators making a good faith effort to comply. (OP_RCRC-6)

Comment:

LFG System Installation Timeline

CARB proposes reducing the installation timeline for LFG systems to six months (from 18) for active landfills and to 18 months (from 30) for closed sites. Six months is insufficient for design, procurement, installation, startup, and testing, especially since operators await regulatory approval before proceeding. (OP_SacCo-23)

Comment:

Topic: GCCS Install/Construction 95464(a) and (c)

Potential Issues:

- 6 months to install and operate a gas system on active sites without GCCS
- Time frame is different for closed landfill. For closed landfills, requires 18 months to install and operate a GCCS.
- Shortened timeframes overall

Concerns:

- Governmental Agencies, as opposed to private entities, must adhere strictly to a regulatory-prescribed procurement and contracting processes (State Public Contracting Code) and require time for review by elected officials and public notice of a governing board action. A 6-month schedule is simply not tenable for municipality to complete the bidding and award process followed by a construction period.
- Flare procurement generally takes 8 months to 1 year out for delivery.
- What if Executive Officer has an adjustment to the design plan that could modify the design and affect permitting and GCCS construction/installation.
- Over the past few years, some AQMDs have generally taken longer than 6 months to approve a permit application. How does this affect 6-month timeline to install a GCCS?
- New rule could trigger simultaneous installations causing a supply shortage similar to the issues we saw with the SJVAPCD implementation of the 4311 Flare Rule or SCAQMD Implementation of Rule 1118.1.

Potential Alternative:

- For active sites update requirement to 15 months to install GCCS.
- For closed sites change requirement back to 30 months to install GCCS. (OP_SWMD-3)

Agency Response to Combined Comments:

CARB made changes in response to these comments. In the 15-Day Changes, the timeline to install a GCCS following design plan approval at an active landfill was changed to 12 months. If there are permitting delays, weather-related issues, delays due to public bidding processes, supply chain disruptions, or other good reasons why this extended installation timeframe cannot be met, the owner or operator can apply for an alternative compliance option under section 95468 of the Proposed Amendments.

The Proposed Amendments do not modify the conditions that trigger GCCS installation, so there is no expected increase to the number of GCCS installations that could result in supply shortages.

The GCCS installation timeframe starts when the Executive Officer approves the design plan, so there will not be further modifications that the owner or operator will need to respond to after that approval as suggested by one commenter.

The Proposed Amendments retain the 18-month installation timeline for closed landfills as proposed in the 45-Day Changes. The commenter requesting this be changed back to 30 months has not provided a rationale for why 18 months is not achievable, and the change was made to reduce the time that the landfill is emitting uncontrolled.

E.2-3 Align GCCS installation timeline with air district permitting process

Comment: Installation timelines for gas control systems are arbitrary and inconsistent with previous experience with active and closed landfills. CARB should align with or defer to air districts' permitting processes for construction requirements. (OP_South Coast AQMD-5)

Agency Response:

CARB made changes in response to these comments. In the 15-Day Changes, the timeline to install a GCCS at an active landfill was changed from 6 months to 12 months. This timeline better recognizes the barriers and constraints to constructing a GCCS – including permitting timelines and construction requirements – while maintaining the goal of reducing methane emissions by reducing the installation timeline (from 18 months in the current LMR).

3. Early Gas Collection in Areas of New Waste Deposition

E.3-1 General support

Comment: Required installation of horizontal collectors or Caisson wells in new cells § 95464(5): We support CARB's requirement that landfills accepting at least 200,000 tons of solid waste per year install horizontal collectors or caisson wells in new waste placement areas. We also commend CARB for coupling this requirement with sensible safeguards– specifically, the condition that collection begin only after 15 vertical feet of waste is placed and positive pressure is detected. These conditions appropriately balance emissions control objectives with operational safety by ensuring adequate gas generation prior to vacuum connection to prevent subsurface elevated temperature events. (OP_CAW-37)

Comment:

Earlier GCCS Well Installation

RMI and EDF also applaud CARB's proposal for earlier GCCS installation in new cells for landfills accepting over 200,000 tons of waste per year and reducing the timeline for installation from 18 months to 6 months for open landfills and from 30 months to 18 months for closed landfills.

The proposal also includes the options for horizontal collectors or caisson wells once 15 feet of waste is placed over a collector. CARB should maintain these protective requirements. This is a strong proposal that will cut emissions from incoming waste and make California a national leader in protective GCCS regulation. Earlier installation of GCCS systems is one of the biggest ways to substantively cut landfill emissions to capture fugitive gas. (OP_RMI/EDF-21)

Comment: We urge the Board to maintain the following: … earlier GCCS installation including the use of horizontal wells which are widely used across the industry today. (T_RMI-4)

Agency Response to Combined Comments:

No changes were made in response to these comments. CARB appreciates the comments. Note that in the 15-Day Changes, the requirements for gas collection in areas of new waste deposition were modified and the timeline for GCCS installation at an active landfill was changed to 12 months. These modifications were necessary to provide appropriate flexibility and account for the time it takes to design, procure, permit, and install equipment, while maintaining significantly more stringent requirements than the current LMR.

E.3-2 Reduce gas collector installation period for new waste placement areas

Comment: We recommend further limiting the early GCCS installation requirement for active landfills to 90 days after initial waste placement, which would complement our recommended reduction of the SEM exclusion for the working face to 90 days. Together, these changes would enable more timely monitoring and mitigation of emissions during the period when generation begins most rapidly. (OP_CAW-43)

Comment: Accelerate early GCCS installation to 90 days after initial waste placement for active landfills. (OP_CAW-45)

Agency Response to Combined Comments:

No changes were made in response to these comments. In the 45-Day Changes, staff proposed to require installation of gas collection devices from the beginning of filling operations in areas of new waste placement. However, in the 15-Day Changes, the timeline to install gas collectors in these areas was changed to 180 days. This was necessary to ensure operational feasibility at all landfills subject to early gas collection requirements by providing appropriate flexibility and recognizing that anaerobic conditions typically do not develop for 3 to 6 months after waste placement.

E.3-3 Allow additional gas collector types in new waste placement areas

Comment:

Early gas collection requirements must provide greater flexibility.

Section 95464(a)(5) would require operators to install either horizontal collectors or caisson wells in areas of "new waste placement," and begin operating the components once 15 feet of waste has been placed and positive pressure is detected. While WM recognizes the benefits of earlier gas collection, there are practical limitations to doing so that the Draft Regulation should account for.

For example, the proposed requirements would necessarily trigger horizontal or caisson well installation at the working face, which presents safety concerns in light of active waste placement and traffic. There are other options for early collection that would alleviate these concerns and be more beneficial over a longer period of time, including utilizing the leachate collection and control system, or installing collection layers in bottom lines using shallow vertical wells. (OP_WM-64)

Comment:

Section 95464(a)(5) - Gas Collection and Control System Requirements – Working Face

While we recognize the intent of accelerating timelines associated with gas collection system installation within active areas of landfills, there are practical limitations to some of the timeframes and activities proposed in this section. Installation of gas control infrastructure in the working area of landfills while waste is being placed presents specific operational and safety challenges. The draft rule notes that either horizontal collectors or caisson wells shall be installed in areas of new waste placement (subsection (a)5). The operation of these features is required to begin after 15 feet of waste has been placed and positive pressure is detected in either component.

Concerns over employee and contractor safety, efficient traffic control and collateral impacts associated with oxygen intrusion into the gas collection system are primary when addressing the issue of gas collection in areas where waste is placed. Limiting the gas collection or control options to these two means of infrastructure greatly limits the ability of a given facility to function safely and install equipment that will be of use over a practical time period.

There are other alternatives for early landfill gas collection and the rule should allow any other options. These include collecting landfill gas from the leachate collection and control system (LCRS), installing collection layers in bottom liners, using shallow verticals, etc. The rule should not limit the options an operator can use for early collection. (OP_Ind/Gov Coalition-7)

Comment:

ARB Should Provide Flexibility for Alternatives to Requirement to Install Caisson Wells or Horizontal Collectors

For landfills that "accept" more than 200,000 tons of solid waste per year, Section 95464(a)(5) requires an owner/operator to install horizontal or caisson wells in areas of new waste placement after 15 vertical feet of solid waste has been placed over the collector or bottom of the well *and* positive pressure exists.

RCRC strongly urges ARB to provide additional flexibility for owners/operators to integrate early gas collection procedures. Horizontal collectors and caisson wells are just two of many options available and may not be suitable for use in all situations. Stakeholders have suggested that facilities may instead effectively collect from the leachate collection and control system, install collection layers in bottom liners, or use shallow vertical wells. (OP_RCRC-9)

Comment:

Early Collection Requirements

The rule mandates early installation of horizontal or caisson wells at landfills accepting 200,000 tons/year. Operators should be allowed flexibility, including use of LCRS, bottom liner collection layers, or shallow vertical wells. Design decisions should remain with the professional engineer. (OP_SacCo-21)

Comment: Section 95464(a)(5) of the draft rule requires early installation of horizontal or caisson wells at certain landfills accepting 200,000 tons per year of refuse. While we recognize the intent of enhancing timelines and gas collection system installation within active areas of landfills, there are practical limitations to some of the timeframes and activities proposed in this section. Installation of gas control infrastructure in the working area of a landfill while waste is being placed presents specific challenges. (OP_L and D-7)

Comment: There are other options for early collection, and the rule should allow any other options, such as collecting from the leachate collection and control system (LCRS), installing collection layers in bottom liners, using shallow verticals, etc. The rule should not limit the options an operator can use for early collection. (OP_L and D-9)

Agency Response to Combined Comments:

CARB made changes in response to these comments. In the 15-Day Changes, the requirements were generalized regarding which types of gas collectors must be installed. Instead of requiring horizontal collectors or caisson wells, any types of collectors capable of active gas extraction are allowed.

E.3-4 Revise conditions that require installation and/or operation of early gas collectors

Comment: In any event, efficient early collection is dependent on a host of factors, but primarily on waste composition and age. CARB should establish the deadline to install and operate GCCS to be consistent with the time period in which waste decomposition will occur and begin to generate methane. For example, landfills with an annual waste acceptance rate below 300,000 tons per year could be required to install GCCS in areas where waste has been in place for 36 months. At landfills with an annual solid waste acceptance rate of 300,000 tons per year or more, operators could be required to install GCCS in areas where waste has been in place for 24 months. In addition, gas collection should become operational following the detection of at least 30% methane in two consecutive samplings of landfill gas. These timelines would result in greater likelihood of initiating collection and destruction of landfill gas that is of sufficient methane content so as to allow for continuous operation of the system without the need for supplemental fuel. Use of supplemental fuel would result in greater emissions not contemplated by CARB, and generally is an indicator that landfill gas is not at the volume or quality necessary to support continuous active gas collection.

Accordingly, CARB should revise the Draft Regulation to impose early collection deadlines based on solid waste acceptance rates, age of waste, and landfill gas quality to ensure that the GCCS can operate in a manner most efficient for emissions reduction purposes. (OP_WM-65)

Comment: Finally, the draft provision requires operation of these collection devices after 15 feet of waste is placed, which may not be enough waste to prevent the well from "short-circuiting" with ambient air and causing compliance issues with other provisions in the rule. We believe the rule should allow discretion to the design engineer and LFG system operator as to when the best time is to operate these collectors. This shouldn't be based solely on the presence of positive pressure but also on the fact that there is sustainable gas quality without air intrusion when under vacuum.

An alternative means of approaching this issue is to set timelines for installation and operation of gas collection relative to the commencement of waste placement as well as gas composition metrics (ie. 12-15 months from initial placement of waste in each area). These could include caisson wells or horizontal collectors but would also allow for installation of vertical wells or other types of collectors once filling in each area is completed. This approach would avoid safety and oxygen intrusion issues associated with placement of horizontal collectors as well as difficulties associated with placement of caisson wells in geometric cell configurations that don't lend themselves to that application. (OP_Ind/Gov Coalition-12)

Comment: Additionally, stakeholders have raised concerns that 15 feet of vertical depth may not be enough waste to prevent the well from pulling in ambient air and causing compliance problems with other aspects of the proposed rule.

Rather than impose prescriptive requirements, we suggest ARB provide greater discretion to the system engineer and operator as to what gas collection systems should be used and when they should be integrated into the system. Similarly, rather than only triggering system installation when a certain depth of waste is deposited, we suggest also providing a deadline-based option for owners/operators. (OP_RCRC-10)

Comment:

Section 95464(a)(5) – Gas Collection and Control System Requirements – Working Face

While we recognize the intent of enhancing timelines for gas collection system installation within active areas of landfills, there are practical limitations and concerns with some of the timeframes and activities being proposed in this section. Installation of gas control infrastructure in the working area of landfills while waste is being placed presents operational and safety challenges.

The draft rule notes that horizontal collectors or caisson wells shall be installed in areas of new waste placement. The operation of these features is required to begin after 15 feet of waste has been placed, and positive pressure is detected in either component.

When addressing the issue of gas collection in areas where waste is placed, some of the primary concerns are employee and contractor safety, efficient traffic control, and adverse impacts from oxygen intrusion into the gas collection system or subsurface oxidation. Limiting the types of gas collection or control options that may be used limits the ability of facilities to select infrastructure that meets the unique needs and safety considerations of the landfill.

Recommendation: Rather than creating prescriptive requirements around the types of components that may be used, set timelines for installation of sufficient gas collection or control components relative to the commencement of waste placement. These could include caisson wells or horizontal collectors during cell construction or as waste is placed but would also allow for installation of vertical wells depending on site conditions. Providing operators the flexibility to expand the gas collection system to be most compatible with site conditions would avoid the safety and oxygen intrusion issues inherent in aggressive prescriptive system expansion and gas collection while meeting the intent of earlier collection of methane. (OP_Recology-3)

Comment: Concerns over employee and contractor safety, efficient traffic control and collateral impacts associated with oxygen intrusion into the gas collection system are primary when addressing the issue of gas collection in areas where waste is actively being placed. A potential means of approaching this issue is to set timelines for installation of sufficient gas control components relative to the commencement of waste placement but not have the regulation dictate the specific design choice. The specific design option employed should be at the discretion of the professional engineer, not dictated by CARB. These could include caisson wells or horizontal collectors during cell construction or as waste is placed but would also allow for installation of vertical wells once filling in a given area is completed. The latter approach would avoid the safety and oxygen intrusion issues associated with placement of horizontal collectors as well as difficulties associated with placement of caisson wells in geometric cell configurations that do not lend themselves to that application.

This approach (i.e., time bound vs. pre-determined infrastructure criteria) is aligned with the pending Colorado LMR and allows more flexibility in design and construction. Specific timelines can be discussed but should allow for design, approval and preconstruction activities to take place. (OP_L and D-12)

Agency Response to Combined Comments:

CARB made changes in response to these comments. In the 15-Day Changes, the timeline for installing gas collection devices in areas of new waste placement at landfills over the waste deposition threshold was changed to 180 days after initial waste placement. Additionally, the types of collectors that can be used was generalized to include any collection devices capable of active gas extraction and the depth of waste was to 30 feet. While horizontal collectors and caisson wells are proven strategies to collect landfill gas from active filling areas, this time-bounded and collector-generalized approach allows more flexibility to ensure safe and effective gas extraction, and provides the operator with the option of completing filling in an area within 180 days before installing gas collectors.

Specific criteria for when operation of the gas collectors begin is needed to ensure gas collection commences once significant methane generation has started. This is

necessary to reduce methane emissions from active areas, which research shows is a significant source of methane emissions.[31,32,33]

E.3-5 Allow operator to determine when early gas collectors should be operated

Comment: The draft provision requires operation of these collection devices after 15 feet of waste is placed. Again, this is an arbitrary threshold dictated by CARB, which may not be appropriate for many sites. Fifteen (15) feet may not be enough waste to prevent the well from "short-circuiting" with ambient air and causing compliance issues with other provisions in the rule. We believe the rule should allow discretion to the design engineer and LFG system operator as to when the best time is to operate these collectors based not just on the presence of positive pressure but that there are sustainable gas quality and no air intrusion when under vacuum. (OP_L and D-11)

Agency Response:

CARB made changes in response to this comment. In the 15-Day Changes, the waste depth criterion was changed from 15 feet to 30 feet. This better ensures that sufficient waste is in place to prevent ambient air intrusion and is based on the figure provided in the Landfill Methane Outreach Program's LFG Energy Project Development Handbook.[34] Additionally, a criterion was added regarding methane content to indicate anaerobic conditions and ensure sufficient gas quality.

E.3-6 Adjust conditions that require early gas collection

Comment:

Trigger for Installing Horizontal Collectors or Cassion Wells Must Be Clarified

Section 95464(a)(5) requires an owner/operator of a landfill that accepted at least 200,000 tons of solid waste per year in any of the three prior calendar years to install horizontal collectors or caisson wells in areas of new waste placement. RCRC is concerned that the 200,000 ton trigger is not limited to solid waste accepted for disposal, but could also include organic waste accepted for processing at an on-site composting facility, alternative daily cover materials, etc. We do not believe this is ARB's intent and so suggest clarifying that the trigger is 200,000 tons of solid waste accepted for disposal. (OP_RCRC-8)

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[31] Scarpelli, T. R., Cusworth, D. H., Duren, R. M., Kim, J., Heckler, J., Asner, G. P., ... & Thorneloe, S. (2024). Investigating Major Sources of Methane Emissions at US Landfills. *Environmental Science & Technology, 58*(49), 21545-21556. *https://doi.org/10.1021/acs.est.4c07572*.

[32] CARB. (2024, April). *Summary Report of the 2020, 2021, and 2023 Airborne Methane Plume Mapping Studies*. *https://ww2.arb.ca.gov/sites/default/files/2024-04/2020-2021-2023%20Airborne%20Summary%20Report_FINAL.pdf*.

[33] Hanson, J.L., Yesiller, N., & Manheim, D.C. (2020, March 25). *Estimation and Comparison of Methane, Nitrous Oxide, and Trace Volatile Organic Compound Emissions and Gas Collection System Efficiencies in California Landfills: Final Report*. California Polytechnic State University. *https://ww2.arb.ca.gov/sites/default/files/2020-12/CalPoly_LFG_Study_03-30-20.pdf*.

[34] Landfill Methane Outreach Program (LMOP). (2024, January). *LFG Energy Project Development Handbook*. *https://www.epa.gov/system/files/documents/2024-01/pdh_full.pdf*.

Comment: Another concern is related to the acceptance of disaster debris, which could result in a landfill that historically accepted less than 200,000 tons per year exceeding that threshold, possibly for two years in a row. That landfill would be required to install horizontal collectors, caisson wells, or other collection systems because of that unique situation. This additional gas system infrastructure would be a significant cost to add to a community already significantly impacted by the disaster. We recommend creating an exemption when the exceedance is due to disaster debris and unlikely to continue in perpetuity. (OP_RCRC-11)

Comment: Section 95464(a)(5) of the draft rule requires early installation of horizontal or caisson wells at certain landfills accepting 200,000 tons per year of refuse.

…

the provision should say refuse "disposed" not just "accepted," as landfills can accept waste that is not later disposed in the landfill. (OP_L and D-8)

Comment: Section 95464(a)(5) of the draft rule requires early installation of horizontal or caisson wells at certain landfills accepting 200,000 tons per year of refuse.

…

CARB provides no scientific basis and/or cost effectiveness analysis to justify the 200,000-ton threshold; the value seems completely arbitrary. (OP_L and D-10)

Agency Response to Combined Comments:

CARB made changes in response to these comments. In the 15-Day Changes, the waste threshold was changed from the amount of waste “accepted” to the amount “deposited.” No other changes were made in response to these comments.

The basis for the 200,000 ton threshold was provided in the ISOR (p. 22).

Staff did not propose an exemption for disaster debris as suggested by the commenter because the LMR provides a process to request and evaluate alternative compliance options to address unique circumstances with consideration of site-specific information.

E.3-7 Remove early gas collection requirement

Comment:

Gas Collection and Control System (GCCS) - Operational Concepts (Horizontal Collectors)

Newly disposed trash requires six to eighteen months, under anaerobic conditions, to decompose and generate methane. Although horizontal collectors laid under active areas previously helped control potential methane emissions, if these collectors are installed too shallow, they may introduce atmospheric air into the system, disrupting anaerobic conditions and reducing gas collection efficiency. Therefore, OCWR recommends that CARB consider excluding this requirement in the Gas Collection and Control System operational guidelines. (OP_OCWR-11)

Agency Response:

CARB made changes in response to this comment. In the 15-Day Changes, a 180-day period was provided before gas collectors must be installed in areas of new waste

placement. Additionally, a criterion was added for methane content and the waste depth was increased to 30 feet. Together, these changes help ensure that gas collection only begins after anaerobic conditions have developed and sufficient waste is placed to minimize ambient air intrusion.

E.3-8 Do more to address working face emissions and increase SEM frequency

Comment: In formulating these stricter requirements, CARB should consider incorporating recommendations derived from Industrious Labs' recent study on California landfill methane emissions, such as limiting the size of the working face of the landfill, requiring earlier installation of gas wells, and requiring horizontal wells in the working face. {Footnote: *Industrious Labs. Golden Opportunity: California's Roadmap to Slashing Methane Emissions from Landfills* (March 2025). Note that the report modeled outcomes from compliance with SB 1383's mandate to divert organic waste away from landfills and found that these additional regulatory requirements are needed to meaningfully reduce landfill methane emissions in the short and medium term; diversion of organic waste alone will not be sufficient to meet the state's methane emissions reduction targets.} We also encourage CARB to adopt stricter requirements based on the recommendations from the U.S. Environmental Protection Agency's white paper on working face emissions. Finally, the amended LMR should require landfill operators to conduct monthly monitoring rather than the current annual requirement, enabling rapid correction of leaks and other exceedances to limit negative impacts for communities, the environment, and the climate. Although the proposed amendment to require quarterly monitoring represents an improvement over the current LMR, we believe monthly monitoring is more appropriate given the serious effects of methane exceedances. At a minimum, we encourage CARB to adopt these stricter requirements for landfills adjacent to vulnerable communities. (OP_IHRC-4)

Agency Response:

No changes were made in response to this comment. Staff proposed multiple provisions addressing emissions from the working face and other sources of landfill methane emissions described by the commenter, including limiting the number and duration of wells offline for repair and construction, requiring earlier installation of a GCCS after design plan approval, requiring earlier expansion of the gas collection system in areas of new waste placement, and limiting the period of time the working face can be excluded from SEM. The proposal requires monthly SEM where performance indicators suggest an increased risk or potential for emissions. The Proposed Amendments are expected to deliver improved air quality and public health benefits for neighboring communities through a number of strategies designed to reduce emissions including methane, odors, and co-pollutants.

F. Gas Collection and Control System Operational Standards and Monitoring

1. Gas Control System Downtime

F.1-1 General support

Comment: Preventing emissions during GCCS downtime - § 95464(b): We fully support CARB's new requirement that operators automatically shut down the gas mover system when collection or control is not feasible, and that all affected valves be immediately closed. This measure will prevent uncontrolled venting of untreated landfill gas during system outages.

Additionally, we support CARB's proposal to limit total gas control system downtime to no more than 120 hours per calendar year, as well as the new requirements for gas flow measurement devices on control systems and pressure measurement devices on collection systems. Together, these amendments establish critical performance baselines and best practices to minimize downtime-related emissions. (OP_CAW-38)

Comment: Minimizing emissions during component repairs and temporary shutdowns § 95464(e): We appreciate CARB's detailed and pragmatic approach to minimizing emissions during necessary component repairs and temporary shutdowns. Specifically, we support: (1) the requirement that shutdown components be returned to service within five calendar days; (2) the notification requirement when a component cannot be returned to service within that timeframe; (3) the use of SEM data to demonstrate that the shutdown is not creating excess emissions and; (4) the limitation on the amount of wells that can be offline at one time. These provisions strike an important balance between reasonable operational flexibility and meaningful emissions reductions. (OP_CAW-41)

Agency Response to Combined Comments:

No changes were made in response to these comments. CARB appreciates the comments. Note that adjustments were made to some of the provisions cited by the commenter in the 15-Day Changes, while maintaining protective standards to reduce methane emissions.

F.1-2 Increase allowance and exclusions for annual control system downtime

Comment:

GCCS downtime provisions should account for practical realities faced by landfills.

GCCS downtime events may result from unplanned circumstances such as weather events, earthquakes, wildfires, or equipment malfunction. Other circumstances warranting shut down include system and equipment maintenance (to minimize unplanned equipment failure), or low gas quality triggering semi-continuous operation. The proposed 120-hour limit of downtime under Section 95464(b)(1)(A), therefore, does not properly account for the realistic amount of downtime that GCCS across regulated landfills that will be necessary on an annual basis. The limit should be removed or revised to allow for 240 hours of total system downtime, consistent with Bay Area Air District's rule 8-34, and the exceptions listed under Section 95464(e) should apply to the total system as well as individual components. (OP_WM-62)

Comment:

Section 95464(b)(1)(A) - Gas Collection and Control System Requirements – System Shut Down

The amended rule allows for 120 hours of gas control system shutdown annually. We presume this allowance is for total system shutdown but that is unclear. Additionally, there is no indication as to whether this threshold is net of any uncontrollable circumstances such as weather events, earthquakes, wildfires or planned/unplanned power system shutdowns. The exclusions allowed in subsection (e) refer only to “individual components” and not an entire system shutdown due to some of these occurrences.

It is worth noting that only one AQMD rule contains a similar provision and that is the Bay Area Air District’s rule allowing for a total of 240 hours for total system shutdown. While we would prefer that no total hour limit be in place, should CARB believe that a threshold is warranted we propose that 240 hours of total system downtime be allowed under the revised LMR. Additionally, any limit on total gas collection and control system downtime should include provisions for exclusion of the uncontrollable circumstances outlined above. (OP_Ind/Gov Coalition-9)

Comment:

120-Hour System Downtime Is Unrealistic and Must Accommodate Situations Beyond the Facility’s Control

Section 95464(b)(1)(A)(2) requires owners/operators to limit gas control system downtime to 120 hours in a calendar year. While we understand and agree with ARB’s intent to minimize system downtime, this limit is unrealistic in many of the areas in which rural landfills are located and far more restrictive than the most aggressive air pollution control district regulations.

California has seen a dramatic decline in energy reliability over the last few years, particularly rural areas in Pacific Gas and Electric’s service territory. Some communities continue to experience planned Public Safety Power Shutoffs (PSPS) that can last one or more days. Far more common are the more than 2,000 Enhanced Powerline Safety Settings (EPSS or Fast Trip) shutoffs that occur each year in PG&E territory. These EPSS shutoffs often last several hours to a full day. Some circuits have experienced 30 outages in a single year and up to 9 outages in a 30-day period. Our member counties have also experienced power outages related to lightning strikes on utility infrastructure, cars crashing into utility poles, severe storms that damage utility infrastructure, and wildfires. These outages often take utilities several hours to a few days to address before power is restored. Wildfire-related outages can last even longer. Unfortunately, the proposed regulations fail to anticipate or accommodate these types of events that are beyond the control of the owner/operator.

For these reasons, RCRC strongly urges ARB to modify the proposal to limit system downtime to 240 hours in a calendar year and specify that system downtime resulting from power outages or disasters that are beyond the control of the owner/operator do not count towards those limits. (OP_RCRC-5)

Comment:

Section 95464(b)(1)(A) – Gas Collection and Control System Requirements – System Shut Down

The amended rule allows for 120 hours of gas control system shutdown annually. We presume this allowance is for total system shutdown, but that is unclear. Additionally, there is no indication as to whether this threshold is net of any uncontrollable circumstances such as earthquakes, fires or planned/unplanned power system shutdowns. The exclusions allowed in subsection (e) – *Repairs and Temporary Shutdown of Gas Collection System Components*, refer only to "individual components" and not an entire system shutdown due to these occurrences.

With many landfills experiencing power outages, including power safety shutdowns for fire prevention, which can last multiple days, 120 hours a year is not a reasonable limit. Currently, only the Bay Area Air District has a rule with a similar provision limiting total hours for system shutdown, allowing for a total of 240 hours for total system shutdown. The proposal in the LMR is more restrictive than the Bay Area Air District's Rule and lacks adequate justification and understanding of what is practical, net of any uncontrollable circumstances such as earthquakes, fires or planned/unplanned power system shutdowns.

Recommendation: We request that CARB reconsider creating total hour limits across all landfills. If CARB believes that these limits are warranted, we request that a more reasonable timeframe, such as 240 hours of total system downtime, be allowed. Additionally, we suggest the text be edited to clearly reflect this threshold be reflective of total system downtime, and includes provisions for exclusion of the uncontrollable circumstances outlined above. (OP_Recology-4)

Comment: Section 95464 (b)(1)(A)(2): Gas control system downtime is limited to 120 hours per year. Included in the 120 hours should not be issues beyond the control of the operator, such as utility issues, power shutoffs, or natural disasters. (OP_SWANA-23)

Comment:

§ 95464 Gas Collection and Control System Requirements

(b)(1)(A)(2) Instances out of the owner's control, such as power outages or periods when the Gas Collection and Control System (GCCS) is down for maintenance should be exempt from a proposed GCCS downtime limited to 120 hours in a calendar year. (OP_WPWMA-2)

Comment: The draft regulation places new limits on GCCS downtime as well as individual well downtime (Section 95464(b)(1)(A)). These are generally lifted from Bay Area Air District's (BAAD) Rule 8-34. However, CARB has made the GCCS downtime limit 50% of the 240 hours in the SAAD rule, only allowing 120 hours per year, which is even more restrictive. CARB has not supplied scientific justification for the 120-hour limit, especially since the current rule does not have a numeric hour limit. Further, with many landfills experiencing power outages, including power safety shutdowns for fire prevention, which can last multiple days, 120 hours for a year is not reasonable limit. Additionally, there is no indication as to whether this threshold is net of any uncontrollable circumstances such as earthquakes, fires, floods, or other disaster-type events. (OP_L and D-28)

Comment: It must allow us to include both planned and unplanned events under the downtime allotment in the rule. (OP_L and D-30)

Comment: The exclusions allowed in subsection (e) refer only to "individual components" and not an entire system shutdown due to these occurrences. We believe the text should be edited to clearly reflect this threshold is reflective of total system downtime and that it does not include uncontrollable circumstances as outlined herein. Additionally, we request that the time frame be extended to 240 hours, to be consistent with the BAAD Rule 8-34 limit, which is the most stringent of its kind in the state. (OP_L and D-31)

Comment:

Topic: GCCS downtime 95464(b)(1)(A)2.

Potential Issues:

- Only 120 hours allowed per year

Concerns:

- Does not define what is included specifically in the 120 hours
- Maintenance should not be included
- What about power outages that are out of the owner's control?

Potential Alternative:

- Alternative 1: Remove 120 hour limit.
- Alternative 2: Allow for a total of 240 hours for total system shutdown.
- Include variances in the 240 hours limitation/restriction:
- Ex: Do not include Power Outages or periods when the GCCS is down for maintenance as part of the 120 hours limit. (OP_SWMD-5)

Comment:

Section 95464 (b)(1)(A)2.

A defined limit on the number of allowable downtime hours per calendar year is not practical. RCDWR has experienced increased instances where our electrical utility provider could not supply power or elected to curtail power for safety reasons. Requiring backup power at our landfills would result in substantial and unanticipated economic impacts far beyond those considered in the proposal's analysis. RCDWR recommends that this limit be removed from the proposed LMR. (OP_RIVCO-1)

Comment:

Limits on GCCS and Well Downtime (Impact = greater risk of violations and increased planning for outages)

Construction at Kiefer Landfill often requires temporary system shutdowns for safety. The draft regulation imposes stricter limits on landfill gas (LFG) system and well downtime, based on Bay Area Air District (BAAD) Rule 8-34. However, CARB proposes cutting the LFG system downtime allowance to 50% of BAAD's 240-hour limit, without justification. This is overly restrictive, especially given that the current rule lacks a numeric limit. Power outages, including

multi-day safety shutdowns, make the proposed 120-hour annual limit unreasonable. (OP_SacCo-3)

Comment:

Limits on GCCS and Well Downtime (Impact = greater risk of violations and increased planning for outages)

Clarification is needed to ensure this applies only to full GCCS downtime—not individual control devices—and that both planned and unplanned events count toward the downtime allowance. (OP_SacCo-4)

Comment: The rule should clarify that this should only be applied to downtime of the entire GCCS, not just a single control device, as many landfills have redundant control system and multiple control devices that can act as back-up. (OP_L and D-29)

Comment: As local governments and operators, we want to ensure that the LMR is implementable for our communities, not unnecessarily burdensome, while also protecting the communities that are host to those landfills. We really appreciate the staff's extensive outreach and conversations with all stakeholders. So while we support the overarching goals of the LMR, we remain deeply concerned with some of the specific measures included in the regulation. We appreciate your direction to staff to continue working on these measures to make it more implementable for local governments.

Some of the unique challenges that we face will be State-imposed contracting and procurement requirements that delay our project delivery time frames, operational challenges associated with facilities that are in atypical locations, challenges bringing people out to the site when we have facilities in remote locations, and especially when it comes to a systemwide shutdown, we have a lot of energy reliability challenges in many of our communities. PSPS events are one thing, but we've also had 2,400 fast trip outages annually in our member counties over the last few years.

So, appreciate the opportunity to be here today to continue working with the staff and hope to continue to refine these issues that we've observed and other local governments have observed going forward. (T_RCRC-2)

Comment: ...having the annual hours of total gas system downtime be addressed with the thought of uncontrollable circumstances not being included in that time. Pleased to see that may be part of a 15-day change. (T_RS-4)

Agency Response to Combined Comments:

CARB made changes in response to these comments. In the 15-Day Changes, the gas control system downtime limit was raised to 240 hours per year for a GCCS collecting less than 12,000 metric tons of methane per year. Additionally, an allowance was added to exclude hours during utility power outages and due to catastrophic events, so long as those circumstances were outside the control of the owner or operator and efforts to resume GCCS operation were initiated and completed to minimize downtime.

Maintenance is not excluded from the control system downtime limit. One of the purposes of the limit is to promote expeditious repairs and maintenance when such actions will take the entire control system offline. Landfills continuously generate

methane and any time that the entire control system is offline represents periods of uncontrolled emissions.

The use of “gas control system” in the regulatory language (rather than, for example, “gas control device”) conveys that the gas control system downtime limits apply only to time when the entire control system is offline, not when individual devices are offline.

OP_WM-62 requests that the conditions described in section 95464(e) be added to total system downtime allowances. Those circumstances describe when individual components can be taken out of operation temporarily, subject to limits and other requirements. Adding those items as exclusions from the whole system downtime would undermine the downtime limit as those circumstances are relatively broad and not designed to be reasons for whole system downtime that has a much greater impact than individual component downtime.

OP_L and D-28 contends that “CARB has not supplied scientific justification for the 120-hour limit.” In the ISOR, staff described the qualitative factors behind proposing this limit and have responded with adjustments based on the comments received and additional analysis as explained in the 15-Day Notice.

F.1-3 Clarify timeline to close all valves contributing to venting

Comment:

The Draft Regulation would also require operators to close all valves in the gas collection and control system contributing to venting of the gas to the atmosphere “immediately” in the event that the GCCS is not operating. GCCSs are equipped with automatic closure devices, that are programmed to close valves as soon as possible. However, it is not clear whether valve closure would happen “immediately” even where automatic, because “immediately” is not defined. CARB should provide operators with a clearer obligation, such as one hour, that allows for site-specific configurations and acknowledges the dynamic nature of GCCS. Moreover, a one-hour period is consistent with the federal rules and is sufficiently protective. (OP_WM-63)

Agency Response:

CARB made changes in response to this comment. In the 15-Day Changes, the time allowed for automatic valve closure was changed to one hour. This sets a clear and objective requirement.

F.1-4 Clarify which pathways contribute to venting

Comment: §95464(b)(1) Gas Collection and Control System Requirements: Clarify which valves or pathways “contribute to venting” and require automatic closure; specify that all pathways allowing landfill gas escape when the gas mover stops must automatically close. (OP_SMAQMD-10)

Agency Response:

No changes were made in response to this comment. The phrase “contribute to venting” means any pathway that allows landfill gas to escape to the atmosphere from the gas

collection and control system. Because every GCCS is unique, it would not be possible to explicitly specify in the Proposed Amendments which valves or pathways exist.

2. Individual Component Downtime Limit

F.2-1 Extend component downtime limit before EO notification is required

Comment:

- Section: 95464(e)(2) – Gas collection system component downtime limit before EO notification
- Current: 5 days
- Proposed: 30 days
- Rationale: Allow for routine maintenance and other operations-related downtime. Avoid inundating EO with reporting. (OP_WM-1)

Comment:

{CARB staff note: Commenter quoted 45-Day Changes text of section 95464(e).}

The notification requirement in (2) includes items that are unlikely to be available at the outset of a component operation that lasts longer than 5 days. It is unlikely that surface emissions monitoring will have been conducted in the shutdown area within 5 days of taking components offline. Generally, components are offline when there is filling or other construction that makes surface emissions monitoring more difficult also. We recommend changing this requirement to reporting the requested information in the Annual Report.

County staff's experience is that when a gas well is taken offline because it's within the active fill area, 5 days is an unrealistic timeline for reconnection. Staff believes an aggressive but achievable reconnection timeline would be between 14 and 21 calendar days from the date of disconnection. During the wet weather season, County staff recommends extending this to 5 weeks. (OP_YoloCo-8)

Comment: The five-day restoration requirement is wholly incompatible with any sort of construction going on at a landfill, including daily fill operations that require piping filled with flammable landfill gas not present. (OP_SacCo-6)

Comment:

Section 95464 (e)(2)

The requirement to return components to operation within five calendar days is not practical in all cases. Landfill gas system components are not always stocked in duplicate or readily available for purchase and installation within that timeframe. RCDWR recommends that this timeframe be expanded to 10 calendar days.

Additionally, RCDWR recommends expanding this exemption to explicitly include SET events for the same reasons noted above. (OP_RIVCO-4)

Comment: There are additional requirements if wells cannot be brought back online within five days…This can be problematic for active landfills, with ongoing active face operations, which are also undergoing on-site construction, so we request an additional exemption from the well

downtime limit during construction activities (such as phased closures) at active landfills. (OP_L and D-33)

Agency Response to Combined Comments:

CARB made changes in response to these comments. In the 15-Day Changes, the time allowable for well raising was increased to 30 days, and 15 days was provided to perform surface emissions and component leak monitoring before reporting downtime in excess of 5 days.

The surface emissions screening procedures in section 95471(d) can be used for unsafe-to-walk areas.

The ISOR (pp. 29–30) provides the rationale and basis for the 5-day downtime limit. The proposal recognizes there may be cases where repair within the 5-day window is not feasible, and therefore provides a path to demonstrate that effective mitigation measures are used to minimize methane emissions during periods of shutdown. As described in the ISOR, the notification is necessary to inform CARB when excess downtime is occurring and to demonstrate the effectiveness of those minimization measures.

Annual reporting as suggested in OP_YoloCo-8 would not allow for prompt oversight to ensure mitigation measures are in place.

Refer to agency response in section IV.F.2-3 regarding the suggestion in OP_RIVCO-4 to exempt SET events from subsection (e)(2).

Regarding phased closures, the downtime limits encourage faster completion or breaking down closure into smaller individual sections that can be completed more quickly to limit the total area without gas collection at any one time. In the case that downtime beyond 5 days results, the downtime requirements ensure that regulatory agencies are aware, that minimization procedures are in place, and that SEM and CLM is used confirm the effectiveness of those minimization procedures.

F.2-2 Clarify minimum well reconnection time required

Comment: §95464(e)(2)–(3) Component Shutdown: Clarify how long a well must remain connected before disconnecting again; implementing this adds new monitoring/reporting workload. (OP_SMAQMD-18)

Agency Response:

No changes were made in response to this comment. In section 95464(e)(2), the requirements do not apply to wells that are reconnected to vacuum at the end of each work day. Therefore, it is clear that the well would need to be reconnected until repair work resumes that necessitates shut down.

In section 95464(e)(3), the proposed text is clear that the provision applies only to wells that are offline for more than 24 hours.

The additional workload for regulated entities and implementing air districts was accounted for in the ISOR economic analysis (updated for air districts in the 15-Day Notice as part of the category “GCCS expansion and operational standards.”)

F.2-3 Provide well downtime exemption for SET events

Comment:

Section 95464 (e)

RCDWR recommends expanding the exemptions to include subsurface elevated temperature (SET) events. While operating gas collection wells during SET events is generally advisable, there are situations where temporarily shutting down components may be necessary to assess the event or mitigate oxygen intrusion. (OP_RIVCO-3)

Agency Response:

No changes were made in response to this comment. Proposed section 95464(c)(3) allows wells to operate at positive pressure in case of a fire or elevated wellhead gas temperature, and section 95464(e) (both in the current Regulation and Proposed Amendments) recognizes the need to extinguish fire as an allowable reason for shut down of individual collection system components. Proposed section 95464(e)(3) excludes wells shut down to prevent or extinguish fire from the limit to the number of offline wells simultaneously. This provides the flexibility to reduce or eliminate vacuum being applied to wells with elevated temperatures (or other indicators of a SET event).

The requirements of section 95464(e)(2) apply to all components that cannot be returned to operation within five days, except for well raising as provided in that subsection. This is necessary because landfill gas emissions are not able to be captured when collection system components are not connected to vacuum, as discussed in the ISOR, and the monitoring and notification requirements of subsection (e)(2) are necessary in the case of a SET event for the same reasons as discussed in the agency response in section IV.F.2-1 and the ISOR (pp. 29–30).

F.2-4 Require periodic SEM during well downtime

Comment:

Periodic monitoring during GCCS downtime

Proposed Section 95464(e)(1) of the LMR requires that operators minimize gas collection system component downtime and use mitigation measures to minimize emissions. However, the proposed rule does not include any requirements that would ensure that the mitigation measures are functioning. CARB should require periodic monitoring before and during GCCS downtime to ensure that the mitigation measures are effective. Monitoring activities such as those proposed for unsafe-to-walk areas in Proposed Section 95471(d) could be used to safely assess the effectiveness of the mitigation measures. (OP_EIP-16)

Agency Response:

CARB made changes in response to these comments. In the 15-Day Changes, component leak monitoring records were added to the reporting for components shut down longer than five days. Together with the required records of surface emissions monitoring (as proposed in the 45-Day Changes) the reporting will demonstrate the shutdown is not resulting in excess methane emissions indicating whether the mitigation measures are effective. Note that the screening methods for unsafe-to-walk areas in

section 95471(d) can be used for the surface emissions monitoring if the area meets the definition of an “unsafe-to-walk surface area.”

3. Number of Wells Simultaneously Offline Limit

F.3-1 General support

Comment: RMI and EDF strongly support CARB’s proposal to reduce emissions caused by gas collection system downtime by creating a 5-day limit for system downtown and limiting the number of wells offline at any one time.

CARB research found 43% of landfill methane plumes were caused by downtime. The Board should maintain these reasonable time limits for downtime and repair requirements for GCCS compliance.

RMI and EDF strongly support the requirements to monitor the gas collection system pressure every 15 minutes. The level of available system vacuum directly influences methane capture, and maintaining stability is critical to improve gas collection performance and reduce methane emissions. Significant changes in system vacuum can be early indicators of large problems, and more frequent monitoring is a low-cost intervention to assess the performance of the overall GCCS and enable faster and more effective mitigation. We urge the Board to retain this requirement. (OP_RMI/EDF-22)

Comment: We urge the Board to maintain the following: … limits on well field downtime. (T_RMI-5)

Agency Response to Combined Comments:

No changes were made in response to these comments. CARB appreciates the comments and thanks the commenters. Note that in the 15-Day Changes, the number of wells offline simultaneously was changed to 10 wells, only counting those offline in excess of 24 hours.

F.3-2 Oppose limiting wells offline simultaneously

Comment:

Limits on GCCS and Well Downtime (Impact = greater risk of violations and increased planning for outages)

Limits on the number of wells offline at once are impractical for large, active landfills. (OP_SacCo-5)

Agency Response:

No changes were made directly in response to this comment. However, CARB notes that changes were made to the limits on wells offline at once in the 15-Day Changes, including setting the limit at 10 wells and only counting those offline in excess of 24 hours. Increased planning to reduce the area that is not under active gas extraction at any one time is the expected compliance response for this provision, such as performing construction or filling in smaller areas at a time.

F.3-3 Relax requirement and add exemptions/flexibility to the limit

Comment:

Section 95464(e) – Repairs and Temporary Shutdown of Gas Collection System Components

The draft rule proposes to limit the amount of well downtime to no more than five wells or five percent of the total number of wells at the landfill, whichever is greater, except in cases where wells are being shut down to prevent or extinguish fire. While we appreciate the intent of the requirements, there are additional activities occurring at landfills that should be included in the exemption, including during construction activities at active landfills, with ongoing active face operations.

Recommendation: We request the exemption for the well downtime limit to be expanded to include cases where construction activities are occurring at active landfills. (OP_Recology-6)

Comment:

§95464(e)(3) – Limitations on Offline Wells

This section regulates the number of wells that can be offline simultaneously. In practice, operators sometimes must isolate portions of the gas collection system to install major collection components. This temporary isolation protects critical infrastructure, such as gas destruction devices, from damage when tying in new valves or headers. These shutdowns typically last only a few hours, contribute minimally to overall emissions, and often result in net benefits to overall gas extraction. The prescriptive limit of 5% of wells offline at any given time is overly restrictive and needs broader exceptions to allow operators to make necessary system improvements. (OP_ReGen-4)

Comment:

{CARB staff note: Commenter quoted 45-Day Changes text of section 95464(e).}

The number of wells offline being capped at 5% of the total, is very restrictive. In our operation this would be 7 or 8 wells. We often have 5 wells offline right around the active face area, if any other wells need to be offline (for other construction, expansion of LFG system) we could easily be over the 5% limit. We recommend either increasing the percentage able to be offline to 7% of total wells) or adding some flexibility for numbering wells on and offline. (OP_YoloCo-9)

Comment:

§ 95464 Gas Collection and Control System Requirements

(e)(3) Limiting the number of wells offline to 5 at any time greatly restricts operations at the active face of a landfill. We suggest the requirement be no more than 10 wells or 10 percent of the total number of wells. (OP_WPWMA-7)

Comment: In terms of well downtime, there are limits on the number wells that can be offline at one time, which also derived from BAAD Rule 8-34 (Section 95464(e)). These proposed requirements limit the amount of well downtime to no more than five wells or five percent of the total number of wells at the MSW landfill, whichever is greater, except in cases where wells are being shut down to prevent or extinguish fire…This can be problematic for active landfills, with ongoing active face operations, which are also undergoing on-site construction, so we request

an additional exemption from the well downtime limit during construction activities (such as phased closures) at active landfills. (OP_L and D-32)

Comment:

Topic: GCCS Install/Construction 95464(a) and (c)

Potential Issues:

- No more than five wells or five percent of the total number of wells at the MSW landfill, whichever is greater, are offline at any one time, except in cases where wells are being shut down to prevent or extinguish fire. Decommissioned wells do not count toward this limit or the total number of wells.

Concerns:

- Limiting the number of wells offline to 5 total can greatly restrict operations at the active face of the landfill.

Potential Alternative:

- No more than 10 wells or 10 percent of the total number of wells can be offline at one time. (OP_SWMD-4)

Agency Response to Combined Comments:

CARB made changes in response to these comments. In the 15-Day Changes, the limit to the number of wells offline at once was changed to 10 wells. This allowance provides sufficient capacity for filling and appropriately-planned maintenance and construction activities while reducing emissions by limiting the size of areas without active gas collection.

Additionally, the 15-Day Changes added that only wells offline in excess of 24 hours are counted toward this limit, in response to the concern brought up by OP_ReGen-4 about short-term larger disconnections.

4. Well Decommissioning

F.4-1 General support

Comment: Decommissioned wells - § 95464(c)(2): We appreciate CARB's work to establish a clear definition and criteria for "decommissioned wells." In previous iterations of the regulation, the lack of definition allowed operators to inappropriately classify malfunctioning or poorly maintained wells as "decommissioned," leading to avoidable emissions. By defining a decommissioned well and providing clear criteria for meeting this definition, CARB strengthens regulatory clarity, prevents misuse, and ensures consistency with the original intent of the federal rule. (OP_CAW-40)

Agency Response:

No changes were made in response to this comment. CARB appreciates the comment and thanks the commenter.

F.4-2 Remove or revise the well decommissioning criteria

Comment:

Well decommissioning procedures must be revised to minimize risk of SSO events.

Section 95464(c) of the Draft Regulations provides that a well may be decommissioned if (1) the methane content exhibits a long-term declining trend (at least 60 months) and is below 20% by volume; and (2) the full radius of influence of the decommissioned well is covered by the radii of influence of other wells such that active gas extraction is maintained in the area.

Limiting well decommissioning to wells experiencing 60-month decline in methane content will be problematic for several reasons. First, enclosed flare control devices require 30% methane to function continuously. If methane content is below 30%, the flare will need supplemental fuel to operate, which will result in emissions not contemplated by CARB. Second, wells with declining landfill gas will need to be decommissioned sooner than 60 months to avoid oxygen intrusion where gas quality is especially low. Operators should be able to make a site-specific determination as to whether decommissioning is warranted prior to 60 months, especially if doing so would prevent SSO and SET events. Moreover, CARB has not provided any evidence that it is necessary to ensure that the full radius of influence of the decommissioned well is covered following decommissioning. (OP_WM-44)

Comment:

§95464(c)(2) – Well Decommissioning Restrictions

The proposed stipulations on when decommissioning a well is allowed limit operators' ability to phase wells in and out strategically. Operators are incentivized to keep productive wells in service to minimize surface emissions, even when some damage is identified. As long as a well produces gas without pulling ambient air, it is considered productive and should remain in service until a replacement can be installed.

Conversely, unrepairable damage that causes poor gas quality is the primary reason for decommissioning, often necessary to prevent oxygen intrusion and thermal events. It is not always feasible to install a replacement well prior to decommissioning. In some cases, continuing to operate a damaged well can cause thermal events or damage downstream destruction devices if the well continues operating after exhibiting poor quality or high temperatures. These site-specific scenarios require operator discretion rather than prescriptive mandates. (OP_ReGen-3)

Comment:

Topic: Well Decommissioning 95464(c)(2)

Potential Issues:

- A well can be permanently decommissioned only if it meets one of the following criteria, and provided that surface emissions monitoring is performed within 30 calendar days after disconnecting the well from vacuum that shows no exceedances of the standards in section 95465 in the grid in which the well is located:
- The wellhead methane content exhibits a long-term (at least 60 month) declining trend and is below 20 percent by volume.
- Prove radius is covered by other component

Concerns:

- What about wells that do not have 5 years of monitoring data available?
- What if a well is damaged, pinched or has silt plugging the perforations? Why shouldn't the owner be allowed to decommission immediately and remove the penetration as a possible SEM exceedance?

Potential Alternative:

- Allow decommissioning a well when it can be demonstrated that the well is not functioning as intended (ie. Video footage showing pinch, shear, damage or plugged perforations).
- Remove requirements for SEM at 30 calendar days after disconnecting well from vacuum.
- Distinguish between well replacement or decommissioning a well without replacing.
- What will be considered sufficient proof that radius is covered by other components/well? How far must the well be to prove radius? 100 ft away? 150 ft away? 200 ft away? (OP_SWMD-8)

Comment:

§ 95464 Gas Collection and Control System Requirements

…

(c)(2) To prevent a possible Surface Emission Monitoring (SEM) exceedance, the regulations should allow for decommissioning of a well – including those without five years of monitoring data – that have been demonstrated to not be functioning as intended (i.e. video footage showing a pinch, shear, damage or plugged perforations). (OP_WPWMA-5)

Comment:

§ 95464 Gas Collection and Control System Requirements

…

A distinction should be made between well replacement or decommissioning a well without replacement, with details on what will be considered sufficient proof, including required distance, that radius of influence is being maintained by other active gas extraction equipment. (OP_WPWMA-6)

Comment:

Section 95464 (c)(2)

The two specified criteria for well decommissioning are too limited and do not account for the variable conditions found across landfills. Additional operational factors may justify decommissioning, such as:

- Newly constructed well – A newly constructed well could prove to be inefficient (i.e. low methane concentration) immediately or shortly after connecting to the gas collection and control system. Such a well should not be required to operate 60 months before decommissioning.

- Damaged well – Wells installed within active fill areas are prone to damage during landfill operations and are often determined to be no longer functional. In addition, landfill settlement can result in wells becoming inefficient or nonfunctional. It is unclear whether a replacement well must be installed before decommissioning a damaged well under Section 95469 (f)(1)(A). In practice, a damaged well should be decommissioned as soon as it is determined to be nonfunctional, as it may pose an operational hazard and increase the potential for surface emissions.

The two instances described above warrant well decommissioning but are not addressed in the proposed criteria. RCDWR recommends that the criteria be removed or revised to allow for other operational circumstances where well decommissioning is warranted. (OP_RIVCO-2)

Agency Response to Combined Comments:

CARB made changes in response to these comments. In the 15-Day Changes, the period over which methane content must be low to establish a long-term trend was changed to 36 months and an option to immediately decommission a well that poses a hazard to safety or gas system reliability was added.

The decommissioning criteria do not limit an operator's ability to strategically replace wells or remove wells from service when surrounding wells can maintain active gas extraction. The criteria for well decommissioning apply a performance standard that ensures control is maintained in areas with active gas generation, but do not limit how to meet that standard (besides describing how compliance is demonstrated). Similarly, this approach avoids the need to provide for highly specific cases as suggested by OP_RIVCO-2 (e.g., a newly constructed, inefficient well).

In the 15-Day Changes, the timeline to perform SEM after removing a well from service for decommissioning was changed to 120 days so that landfills using the default quarterly SEM schedule can simply demonstrate this in the next SEM event. This SEM is needed to show that compliance with the surface emissions standard can be maintained after the well has been decommissioned, as discussed in the ISOR (p. 27).

In the 15-Day Changes, methods were added in section 95471(p) to clarify how coverage of the radius of influence can be determined to show that active gas extraction is maintained in the area. In response to the comment OP_SWMD-8, the Proposed Amendments do distinguish between decommissioning with or without a replacement Note that section 95464(c)(2) specifies that one of the criteria in (A)–(C) must be met; therefore, the radius of influence provision (B) does not need to be met if in the wellhead methane content meets the declining methane content criteria in (A).

Subsection (C) was added in the 15-Day Changes and expressly requires replacement if a well is being decommissioned due to damage or lack of functioning.

OP_WM-44 contends that setting a 20% methane threshold for a low generating well to be decommissioned could lead to the need for supplemental fuel at the control device. However, control devices destroy the aggregate gas from multiple wells and as such any single low generating well will have little impact on the overall gas quality. Please note that the Proposed Amendments do not require that the gas is below 20% methane for at least 36 months (as updated in the 15-Day Changes). Instead, the requirement is that the methane content has been trending downward over that period and has reached below 20% prior to decommissioning.

In response to the comment about wells that do not have a long enough history of monitoring data available to show a long-term declining trend per section 95464(c)(2)(A), staff notes that although monthly wellhead methane content monitoring has not been required prior to the Proposed Amendments, staff's understanding is that this is already an industry-standard practice and therefore is expected to be available at most wells. Staff did not propose an exemption for such circumstance because the LMR provides a process to request and evaluate alternative compliance options to address unique circumstances with consideration of site-specific information.

F.4-3 Rely on SEM results rather than radius of influence

Comment:

Section 95464(c)(2)(b) – Wellhead Gauge Pressure Requirements

This section states, "The full radius of influence (ROI) of the decommissioned well is covered by the radii of influence of other wells such that active gas extraction is maintained in the area". However, there is no accepted testing procedure or calculation method for determining the ROI of an extraction point. Further, there is no process or specific requirements outlined in the proposed rule for operators to reference when determining well coverage or how to prove that a specific area is being collected by another extraction point.

Recommendation: We suggest CARB base the allowance for well decommissioning on the subsequent SEM conducted within the area of the removed well, which is a much better determinant as to whether a well in location was necessary. In addition, other references to ROI should be removed from the rule as well. (OP_Recology-5)

Comment: The rule references the concept of "radius of influence" (ROI) for LFG extraction wells. There is no accepted testing procedure or calculation method for the determination of ROI. Further, there is large uncertainty in such calculations, such that the concept of ROI should not be used in a regulation. Rather than require an ROI assessment for permanent well decommissioning, CARB should instead base the allowance for well decommissioning on the subsequent SEM conducted in the area of the removed well, which is a much better determinant as to whether a well in location was necessary. Other references to ROI should be removed from the rule as well. (OP_L and D-14)

Agency Response to Combined Comments:

CARB made changes in response to these comments. In the 15-Day Changes, methods were added in section 95471(p) to clarify the how coverage of the radius of influence can be determined. One of these methods is performing surface emissions monitoring at 10-foot spacing in the grid in which the well is located.

F.4-4 Well decommissioning requirements add review workload for regulators

Comment: §95464(c)(2) Decommissioned Wells: Require verification of appropriate decommissioning and post-decommissioning monitoring; adds significant review workload. (OP_SMAQMD-16)

Agency Response:

No changes were made in response to this comment. Well decommissioning does not need to be approved ahead of time by regulators. However, regulators may request records demonstrating compliance with the requirements (as added in section 95470(a)(1)(GG) of the 15-Day Changes). The 15-Day Notice was updated to reflect those types of costs for implementing air districts as part of the category "GCCS expansion and operational standards."

5. Collection System Monitoring

F.5-1 Extend the one-day time limit for well field re-tuning

Comment:

Gas Collection System Pressure Monitoring

Under Section 95469(g) of the Draft Regulation, operators would be required to record the gas collection system gauge pressure on the vacuum side of the blower every 15 minutes and establish a pressure setpoint.

Each time the pressure set point is changed, operators would be required to re-tune all wells within one calendar day. At many large landfills, there are upwards of 480 wells—it would be impracticable, if not impossible, for operators to be able to re-tune all of them within one calendar day of pressure set point change, especially in circumstances where unplanned events trigger set-point reset. There are three general categories of unplanned events that might trigger set-point reset. First, there are short term events, such as vacuum line tie-ins, flare/blower maintenance, sump cleanouts, or carbon vessel changeouts. At large sites, these situations may occur up to twice a week. Second, there are long-term events such as equipment failure, clogged header systems, wellfield upgrades, flare refractory replacement, carbon vessel repairs, or weather events. These situations may occur once a quarter at larger sites. Third, there are unplanned events resulting from coordination with renewable natural gas plants or flares. Where these unplanned events are occurring, operators must focus their attention primarily on resolving the issue. In any event, mobilization of gas technicians cannot reasonably be expected to occur within 24 hours. Accordingly, CARB should provide operators with at least 5 calendar days. (OP_WM-42)

Comment:

- Section: 95469(g)(1) – Wellhead tuning
- Current: Re-tune all wells within a day each time GCS pressure setpoint is changed
- Proposed: Re-tune all wells within 10 days
- Rationale: Not feasible to re-tune entire wellfield in one day. (OP_WM-14)

Comment:

Section 95469 (g)(1)

Re-tuning all wells within one calendar day of a pressure setpoint change is not feasible. Some RCDWR landfills have up to 150 wells, and re-tuning is a multi-day effort. RCDWR recommends the timeframe be expanded to five business days. (OP_RIVCO-10)

Comment:

{CARB staff note: Commenter quoted 45-Day Changes text of section 95469(g).}

This requirement is entirely impractical and unrealistic from a staffing standpoint. Please consider the proposed revision to the language below:

> *The owner or operator shall establish a gas collection system pressure setpoint. This setpoint can be changed as often as needed to respond to operational conditions. Each time the gas collection system pressure setpoint is changed for a period of greater than 3 hours, the owner or operator shall re-tune all wells with flow rates greater than 5 SCFM within one calendar day of the system pressure change*. (OP_YoloCo-30)

Comment: Remove the requirements of § 95469 (g), Gas Collection System Pressure Monitoring, which includes requirements of 95464(b)(1)(E) commented on above, in its entirety. Set points can require frequent adjustment due to operational changes and there must be flexibility within regulations to run the system optimally. It is unreasonable to require that the entire gas collection system be re-tuned in one day of the system pressure change. (OP_WPWMA-12)

Comment:

Section 95469(g)(1): Gas Collection System Pressure Monitoring

This subsection of the proposed amendments requires all wells to be re-tuned within one calendar day of the system pressure change. The Sanitation Districts agree that the collection system pressure is a vital component of effective landfill gas management. However, we are greatly concerned about requiring all well to be re-tuned within one calendar day. For a landfill with a large number of wells, many of which exceed 2,000, this requirement is simply impossible to meet. Furthermore, it's unclear how re-tuning every well after each pressure adjustment would improve the effectiveness of the landfill gas collection system performance. We believe that this requirement would impose an unjustified burden on operators without any added benefit. Therefore, the Sanitation Districts strongly urge CARB to remove this subsection of the proposed amendment. (OP_LACSD-15)

Comment:

Potential Issues: {CARB staff note: Commenter quoted 45-Day Changes text of section 95469(g)(1).}

Concerns:

- Monitoring required for changes in vacuum set point for collection system. Set points change frequently due to operational changes (flares/engines online/offline, etc.). Need some flexibility to run system optimally without having to re-monitor whole landfill in one day. Need to do an average or something not daily. Need a longer re-monitoring time for whole wellfield especially if very large (ie. 2 weeks or 1 month).

Potential Alternatives:

- Remove requirements of 95469 (g)(1) in it's entirety as it is not reasonable to expect the entire gas collection system can be re-tuned in one day whenever the vacuum set point is adjusted (especially in the winter months when there is heavy rain and the cover is saturated).

- What defines a vacuum set point is adjusted? Adjusted by 1'' W.C.? 2'' W.C.? 15'' W.C.? (OP_SWMD-16)

Agency Response to Combined Comments:

CARB made changes in response to these comments. In the 15-Day Changes, the time limit for re-tuning wells after changing the collection system pressure setpoint was extended to 10 calendar days to ensure compliance is feasible at sites with many wells. Additionally, CARB notes that the "pressure setpoint" is a value determined by the operator, which serves as a baseline for the gas collection system pressure monitoring and deviation reporting. Operators are permitted to make physical adjustments to the system pressure without establishing a new "setpoint" pursuant to the Proposed Amendments. If frequent or short-term adjustments need to be made, deviations can be reported as specified in section 95470(a)(1)(Z) (via section 95470(b)(3)(H)) without changing the setpoint.

OP_YoloCo-30 requests that re-tuning only apply for changes that last at least 3 hours and only at wells with a flow rate greater than 5 standard cubic feet per minute. Staff did not propose to exclude wells based on flow rate because each well must be operated under vacuum as specified in section 95464(c).

CARB staff did not propose to remove the re-tuning requirement in its entirety as requested by OP_LACSD-15. Re-tuning wells after changing the system pressure is necessary to ensure that wells are not over- or under-drawing since the vacuum at each well is dependent on the system pressure available.

F.5-2 Ensure flexibility to use either vacuum control or flow control

Comment:

§95469(g) – Extraction Control Strategy

This section effectively mandates a vacuum-controlled strategy for gas extraction over a flow-controlled strategy. Operators need flexibility to switch between both strategies as necessary to ensure gas destruction devices operate efficiently. Equipment controls or system maintenance may require using one extraction control method over another at different times. The proposed regulations do not accommodate this operational reality. (OP_ReGen-8)

Agency Response:

No changes were made in response to this comment. According to LMOP, flow rate control "typically occurs only for short periods of time when the system has reached a minimum or maximum limit for the LFG end use" and a vacuum-controlled strategy is generally preferred over a flow-controlled strategy for purposes of efficient collection.[35] The Proposed Amendments allow flexibility for the owner or operator to use a flow-controlled strategy. Pressure is not required to be maintained within the specified range, but periods when the pressure fluctuates outside of the range must be reported.

[35] Landfill Methane Outreach Program (LMOP). (2024, January). *LFG Energy Project Development Handbook*. *https://www.epa.gov/system/files/documents/2024-01/pdh_full.pdf*.

F.5-3 Recording pressure can require updating chart recorders

Comment:

§ 95464 Gas Collection and Control System Requirements

…

(b)(1)(E) The requirement to record system pressure on the vacuum (negative pressure) side of the blower every 15 minutes should be removed as this will require existing chart recorders to be updated, resulting in additional cost. (OP_WPWMA-3)

Agency Response:

No changes were made in response to this comment. Staff's understanding based on discussions with operators and technology providers is that most blowers are already equipped with pressure-sensing devices.

6. Control Device Operation and Monitoring

F.6-1 Error in minimum flare temperature unit conversion

Comment: In multiple places in the rule, CARB continues to make an error in converting 28 degrees Celsius to Fahrenheit. Since the temperature requirement is based on a change or drop in temperature of 28 C (not an absolute 28 C), then this equates to 82 F not 50 F. This was a mistake in the original federal LFG rules that the U.S. Environmental Protection Agency (EPA) later corrected, but CARB has not. This mathematical error should be corrected. (OP_OPAL Fuels-3)

Comment: In multiple places in the rule, CARB continues to make an error in converting 28° Celsius to Fahrenheit. Since the temperature requirement is based on a change or drop in temperature of 28° C (not an absolute 28° C), then this equates to 82° F not 50° F. This was a mistake in the original federal LFG rules that the U.S. Environmental Protection Agency (EPA) later corrected, but CARB has not. This mathematical error should be corrected. (OP_L and D-13)

Agency Response to Combined Comments:

No changes were made in response to these comments. CARB agrees that converting absolute temperatures requires a different calculation method than converting changes in temperatures, but the commenter has reversed the calculation approach for these two scenarios.

The equation to convert from degrees Celsius (°C) to degrees Fahrenheit (°F), is:

$$C \times \frac{9}{5} + 32 = F$$

Where,

C = temperature in °C

F = temperature in °F

Thus, a change of 28 °C is equivalent to a change of 50 °F, calculated as follows:

$$\left([C + 28] \times \frac{9}{5} + 32\right) - \left(C \times \frac{9}{5} + 32\right) = 50$$

This result can be tested using an example scenario. Suppose a flare has been source tested at a temperature of 800 °C, and thus has a minimum allowable temperature of 772 °C (i.e., 800-28). 800 °C is equivalent to 1472 °F while 772 °C is equivalent to 1422 °F. The difference between 1472 °F and 1422 °F is 50 °F.

F.6-2 Specify calibration procedures for enclosed flare temperature sensor

Comment: §95464(b)(2)(A)(2) Sensor Calibration: CARB should provide a list of approved calibration methods; relying solely on manufacturer specifications may not be feasible. (Note: calibration is a requirement of the federal regulations also) (OP_SMAQMD-11)

Agency Response:

No changes were made in response to this comment. Calibration methods could vary depending on sensor type. The manufacturer's recommendations will be most directly applicable to the type of sensor and its specific needs and methods for calibration. Regarding federal rules, NSPS, EG, and NESHAP all require that the sensor is calibrated "according to the manufacturer's specifications."[36]

F.6-3 Concerns about lack of flexibility and costs of monitoring engine/turbine exhaust

Comment:

§95469(d)(4) – Continuous Generator Exhaust Monitoring

This section would require ReGen to continuously monitor oxygen and temperature of exhaust on its four LFG electrical generators. These costs may discourage continued energy recovery operations, potentially shifting facilities toward flaring, a less sustainable outcome inconsistent with California's renewable energy and emissions reduction goals. (OP_ReGen-16)

Comment:

{CARB staff note: Commenter quoted 45-Day Changes text of section 95469(d).}

The County landfill has heretofore been exempted from the requirement to install a Continuous Emissions Monitoring System. Adding this system will require a significant outlay of capital resources for the County. (OP_YoloCo-24)

[36] 40 C.F.R. § 60.766(b); 40 § C.F.R. 60.37f(b); and 40 C.F.R. § 63.1961(b).

Comment:

{CARB staff note: Commenter quoted 45-Day Changes text of section 95464(b)(3)(A)3.}

For older gas control systems with internal combustion engines, this requirement may require an implementation schedule or flexibility by CARB. Installation of this monitoring equipment will require a substantial modification to the existing exhaust systems and addition of electronic recording equipment. (OP_YoloCo-6)

Comment: Section 95464(b)(3) of the draft rule requires oxygen or methane monitoring in the exhaust of engines and turbines. This is presumably to demonstrate that those devices are continually meeting methane destruction requirements. Oxygen and methane may not be the only relevant parameters that could be used to determine the efficiency of combustion that will ensure methane destruction. The rule should allow any parameter recommended by the manufacturer as a means to demonstrate adequate combustion efficiency ensuring methane destruction. (OP_OPAL Fuels-2)

Agency Response to Combined Comments:

CARB made changes in response to these comments. In the 15-Day Changes, the requirement to install an oxygen sensor in the exhaust stream of an internal combustion engine or gas turbine was removed and the compliance date for installing a temperature sensor was changed to July 1, 2027. Under the current Regulation, owners or operators using a gas control device other than an enclosed flare must "demonstrate compliance by providing information describing the operation of the gas control device, the operating parameters that would indicate proper performance, and appropriate monitoring procedures" (section 95469(b)(2) of the current Regulation). Staff added the requirement to monitor exhaust temperature in the Proposed Amendments to improve compliance with the existing requirement to monitor unspecified operating parameters that would indicate proper performance. Staff ultimately chose exhaust gas temperature alone as proposed in the 15-Day Changes as this was the most common continuously-measured parameter on a sample of reviewed landfill gas engine and turbine permits, and parallels the combustion temperature monitoring required in the current Regulation for enclosed flares.

OP_OPAL Fuels-2 refers to methane monitoring in engine and turbine exhaust. The Proposed Amendments did not add methane monitoring for engine and turbine exhaust.

F.6-4 Oppose the requirement to identify causes of gas flow deviations

Comment:

- Section: 95469(d)(2)(A) – Change in gas flow
- Current: Document cause of any 3-hr period of operation w/ >20% gas flow
- Proposed: Recommend removal
- Rationale: Excessive data review requirement (OP_WM-12)

Comment:

Section 95469(d) - Gas Control System Equipment Monitoring

Identifying the cause of changes greater than 20% over the average in the total gas flow rate to all devices in a 3-hour period in the prior 12 months is required to be included in the annual report. This analysis is excessive, especially given the impact weather conditions can have on the landfill collection system. Overlap with reporting downtime of the system for maintenance, repair and expansion activities is also redundant. (OP_Ind/Gov Coalition-20)

Comment:

{CARB staff note: Commenter quoted 45-Day Changes text of section 95469(d).}

In Section (d)(2)(A), please note that 20 percent changes to gas control systems flow rate is a common occurrence. The County does not believe that this recordkeeping exercise would add any value to County efforts to manage the gas system effectively and recommends striking this section of text. The County would like to clarify that CARB intends that the 12-month rolling average would be based on monthly and not daily averages. (OP_YoloCo-23)

Comment:

§95469(d)(2)(A) – Rolling Average Flow Monitoring

This section requires monitoring additional data parameters, including a rolling 12-month flow average (sum of all components, updated every 15 minutes), a rolling 3-hour flow average (sum of all components, updated every 15 minutes), continuous comparison of the two, and a log tracking all instances when flow changes ±20%.

Monitoring these two "moving targets" would require significant staff time or consultant time. ReGen previously paid a consultant $5,000 per month solely to monitor the 3-hour rolling temperature for its dual-zone flare. The proposed requirements would substantially increase these costs. (OP_ReGen-14)

Agency Response to Combined Comments:

CARB made changes in response to these comments. In the 15-Day Changes, the assessment periods were changed from 3-hour periods to each calendar day. This significantly reduces the workload for tracking these periods and reduces the likelihood that very short-term events will trigger this reporting requirement.

If weather causes a change of significant enough magnitude, even after the change to the calendar day basis, the owner or operator will simply need to provide that reason. Even when the reason is outside of the operator’s control, knowing more about major impacts of weather conditions on gas collection rates could be useful data for operators and future regulatory or technology development.

One commenter contends overlap with downtime reporting. Reporting the cause of flow rate deviations only applies during “operation,” so this does not overlap with downtime reporting.

One commenter discusses the costs of monitoring flare temperatures. Monitoring the flare temperature must be done in real-time so that periods of low temperature can be restored to proper operation to maintain regulatory compliance. By contrast, the flow rate reporting does not require constant attention as it only informs reporting requirements, not changes to the operation of the system. These two requirements are

not comparable in resource demands, especially after the 15-Day Changes to convert the period to calendar days.

The Proposed Amendments do not specify whether the 12-month average must be recomputed daily or monthly, so the owner or operator can choose either approach. This provides flexibility to use the approach that is best aligned with the owner or operator's data management system and processes. It is unlikely that either approach would significantly change the average.

F.6-5 Only require engine/turbine exhaust sensors if required by the manufacturer

Comment: Section 95464 (b)(3)(A)(3+4): In subsection 3, ICEs or gas turbines are required to be equipped with an oxygen sensor and temperature sensor in the exhaust stream upstream of any add-on exhaust treatment equipment. These should be installed only if required by the manufacturer. (OP_SWANA-26)

Agency Response:

No changes were made in response to this comment, though CARB notes that the requirement to install an oxygen sensor was removed in the 15-Day Changes. Source tests occur either annually or every three years. Monitoring exhaust gas temperature provides a continuous proxy indicator (between source tests) of destruction efficiency through normal operation of the engine or turbine. Therefore, it is necessary to require this monitoring to evaluate ongoing proper operation.

F.6-6 Oppose control device monitoring

Comment:

The control device monitoring provisions do not serve to reduce emissions and are infeasible.

Section 95459(d)(2)(A) would require operators to record the gas flow rate to each gas control device at least every 15 minutes. If there is any 3-hour period of operation during which the total gas flow rate changes by more than 20% over the average in the prior 12- month rolling period, the cause must be reported in the Annual Gas Collection and Control system Report.

Similarly, the combustion temperature of enclosed flares must be monitored every 15 minutes, and any 3-hour period during which the average temperature difference was more than 28 degrees Celsius below the average combustion temperature during the most recent source test is an exceedance of the combustion temperature. Section 95469(d)(3)(A).

Likewise, under Section 95469(d)(4)(A), the oxygen content and temperature of the exhaust gas stream of internal combustion engines and gas turbines must be recorded every 15 minutes. If there is any 3-hour period of operation during which the average oxygen content or temperature is outside the range of the manufacturer's specifications, it will be considered a violation.

For each of these provisions, CARB has failed to explain the purpose and goal of the monitoring requirement, the emission reduction objective it would serve, how the 3-hour period was chosen, and why the same goal cannot be achieved using a longer time period, such as one day or one week. With respect to flow rates, the addition of these requirements would

seem to imply that flow rate fluctuations are actionable or result from a compliance problem, which often is not the case. Gas quality at the outlet of internal combustion engines is clearly beyond the purview of this Rule. Finally, the 3-hour monitoring period also imposes unduly burdensome monitoring requirements that are not proven to reduce emissions. (OP_WM-66)

Agency Response:

CARB made changes in response to these comments. In the 15-Day Changes, the analysis period for gas flow rate deviations was changed from 3-hour periods to each calendar day, and oxygen monitoring of engine and turbine exhaust was removed.

The purpose and rationale for each of these changes was described in the ISOR (pp. 56-57), except for the 3-hour period of operation for engine and turbine exhaust measurements, which was subsequently explained in the 15-Day Notice. The 3-hour period for enclosed flares was already established as a reporting item in the current Regulation section 95470(a)(1)(K)1., and the same period was used for engine and turbine exhaust measurements for consistency. CARB notes that this is consistent with the 3-hour analysis periods for enclosed combustors in federal rules.[37]

F.6-7 Revert to operating within last source test range rather than manufacturer's range

Comment: In subsection 4, the requirement to operate a gas control device within the parameters of the most recent source test has been changed to ranges provided by the manufacturer. Very often, manufacturer parameters are modified because of actual field conditions, in which case it is more appropriate to use the parameter range established in a source test. The device should be operated by the most representative range, which is usually parameters established in a source test. (OP_SWANA-27)

Agency Response:

CARB made changes in response to this comment. In the 15-Day Changes, this requirement was reverted to relying on the most recent compliant source test.

F.6-8 Allow one flow meter for each flare station rather than each flare

Comment: Section 95464 (b)(1)(D): Requires each control device to have one gas flow rate measuring device. This should not include smaller flares that are part of a flare station. Typically, these flares do not have room for the proper location of a gas flow rate measuring device. In these situations, a gas flow rate measuring device typically serves the entire flare station; flow is balanced to each flare using pitot tubes and pressure measurements to set the flows. (OP_SWANA-24)

Comment:

Section 95464(b)(1)(D): Gas Collection and Control System Requirement, General Requirements

[37] 40 C.F.R. § 63.1983(c)(1)(i), 40 C.F.R. § 60.768(c)(1)(i), and 40 C.F.R. § 60.39f(c)(1)(i).

The proposed amendments in this subsection require all individual control devices to be equipped with a flowmeter. Since flowmeters require specific lengths of straight piping for accurate readings, requiring a flowmeter for each individual device may not be feasible. There may be instances where, at existing flare stations and to obtain accurate readings, individual flowmeters can't be placed at each flare, but rather there would be a single flowmeter for the entire station. The Sanitation Districts understand the importance of flow metering as a crucial component in determining the effectiveness of a collection and control system. Therefore, the Sanitation Districts recommend that the LMR allow for one flowmeter per station with multiple devices where individual flowmeters for each device for existing collection systems are not feasible. (OP_LACSD-3)

Agency Response to Combined Comments:

CARB made changes in response to these comments. In the 15-Day Changes, the control device flow rate metering requirement was changed to allow a single flow rate measuring device for a group of gas control devices of the same type (e.g., a flare station or engine bank).

F.6-9 Clarify methane destruction requirement for lean burn engines

Comment: Section 95464 (b)(3)(A)(1): As written, lean burn internal combustion engines (ICEs) would have to meet a 99% methane destruction efficiency and have an outlet methane concentration less than 3,000 ppm. This should be corrected since these engines do not have to meet the 99% destruction efficiency. It is written correctly in Section 95471 (i). (OP_SWANA-25)

Agency Response:

CARB made changes in response to these comments. In the 15-Day Changes, staff clarified that lean burn internal combustion engines are not subject to the 99% destruction efficiency by specifying that the outlet methane concentration must be met "instead." As the commenter suggests, this was the existing intent and implementation of the current Regulation, but the new language improves clarity.

F.6-10 Engine/turbine monitoring requirements potentially conflict with federal rules

Comment: Key concerns include:

…

- Potential conflicts with federal regulations, especially for oxygen and temperature limits for engines. (OP_SMAQMD-6)

Comment: §95470(4) Engine Oxygen and Temperature Records: New requirement for internal combustion engines and turbines – adds reporting burden; federal regulations exempt treated fuel engines. (OP_SMAQMD-27)

Comment: §95464(b)(3)(A)(3): Clarify whether engines using treated landfill gas or other treated fuels are exempt from oxygen and temperature sensor requirements or provide guidance for alternative monitoring. (OP_SMAQMD-12)

Comment:

95464(b)(3)(A)(3) – Combustion Monitoring at Engines and Turbines

Monitoring requirements for oxygen and temperature are inconsistent with federal rules. The gas control infrastructure is the treatment system under 40 CFR 60 Subpart XXX, 40 CFR 63 Subpart AAAA) exempting engines and turbines that combust treated gas. Also, other federal NSPS/NESHAP rules apply to internal combustion engines and turbines (such as 40 CFR 60 JJJJ, 40 CFR 63 ZZZZ; 40 CFR 60 GG and KKKK, 40 CFR 63 YYYY). The California LMR should be consistent with federal requirements for monitoring and not create new requirements that could conflict with these federal rules and do not directly mitigate methane emissions. (OP_Ind/Gov Coalition-10)

Comment:

Section 95469(d) - Gas Control System Equipment Monitoring

…

For engines and turbines - Federal NSPS and NESHAP requirements already apply to landfill gas fired engines and turbines (40 CFR 60 JJJJ, 40 CFR 63 ZZZZ, 40 CFR 63 YYYY, 40 CFR 60 Subparts GG and KKKK). This rule should not create duplicative and potentially inconsistent requirements or add additional costs beyond NSPS/NESHAP requirements. Further, the requirement is redundant where engines and turbines combust treated gas as recognized by the federal landfill NSPS and NESHAPs (40 CFR 60 XXX and 40 CFR 63 AAAA). The gas treatment system requirements would apply to these devices, and our view is that treated gas should not be subject to two control requirements. (OP_Ind/Gov Coalition-21)

Agency Response to Combined Comments:

No changes were made in response to these comments. Landfill gas engines and turbines are subject to the LMR (refer to the definitions of “gas control device” and “gas control system” in section 95475, and section 95464(b)(3)(A) in the current Regulation as well as the Proposed Amendments). The minimal gas cleaning steps (e.g., dewatering, filtering, compression) that commonly occur prior to combustion in a landfill gas engine or turbine do not constitute a treatment system that processes the gas for subsequent sale.

Engines and turbines combusting landfill gas are subject to operational and monitoring requirements under the LMR to ensure that collected gas is continuously routed to devices that achieve the required methane destruction efficiency, and that the control devices are monitored quarterly for component leaks. The requirements of the Proposed Amendments do not conflict with or impede compliance with existing federal requirements as discussed in the ISOR chapter X.

F.6-11 Clarify measurement point requirements for gas treatment systems

Comment: §95464(b)(3)(B)(1): Clarify whether “inlet” and “outlet” points apply to individual wells and engines/flares, or only to overall system points. (OP_SMAQMD-13)

Agency Response:

CARB made changes in response to this comment. In the 15-Day Changes, staff clarified that the requirements in section 95464(b)(3)(B) apply to gas upgrading processes, which are complex treatment processes involving several steps to refine landfill gas by removing carbon dioxide and other impurities to meet standards for use in natural gas equipment and pipelines. Additionally, the 15-Day Changes clarified that the flow rate measurement points for gas treatment systems only need to include the inlet to the system and the outlet from the system as a whole, not intermediate points. The 15-Day Notice further clarified that the requirements in section 95464(b)(3)(B) do not apply to simple gas cleaning processes (such as water vapor and hydrogen sulfide removal) that commonly occur prior to routing the landfill gas to a combustion device.

F.6-12 Clarify enforcement framework for unintentional venting

Comment: §95464(a)(3)(B) – Prohibition on venting landfill gas to the ambient air TrelliSense suggests clarifying the applicable penalty framework and/or corrective actions for (a) unintentional venting or (b) brief operational releases during maintenance, especially if different. Guidance on enforcement discretion or thresholds for material releases would provide helpful certainty to operators. (OP_TrelliSense-4)

Agency Response:

No changes were made in response to this comment. CARB's enforces regulations according to its *Enforcement Policy* and the penalty framework of the LMR is set forth in section 95472 (which was not amended as part of this rulemaking).

F.6-13 Require more frequent source tests

Comment: § 95464(b)(4) on p.13 allows component testing every 1 or 3 years. These need to be monthly or 3-monthly. Missing a problem for 3 months is bad enough. Missing it for 3 years is unreasonable. (OP_Burke-9)

Agency Response:

No changes were made in response to this comment. The referenced requirement is for source testing a gas control device. This comment is out of scope of the rulemaking because the Proposed Amendments did not modify the source test frequency. A source test is a comprehensive test to evaluate the performance of a control device. The Proposed Amendments require continuous monitoring of control devices (enclosed flares, internal combustion engines, and gas turbines) for proper operation.

7. Semi-Continuous Operation and Shutdown of Gas Collection and Control System

F.7-1 General support

Comment: Additionally, the proposed standards for requests and approvals of semicontinuous operation will help ensure that all options for continuous operation are exhausted prior to the allowance of a semicontinuous operation. Our air basin has many closed landfills that have previously been approved for semicontinuous operation of their GCCS as an alternative

compliance option, and Air District staff looks forward to working with CARB to implement the proposed standards to ensure landfills implement the most appropriate GCCS operations. (OP_BAAD-4)

Agency Response:

No changes were made in response to this comment. CARB appreciates the comment and thanks the commenter.

F.7-2 Exclude SEM exceedances found during remote plume notification inspections for semi-continuous operation criteria

Comment: Based on our experiences with remote satellite monitoring we provided several suggestions for revising the rule:

Applicability for GCCS installation or decreased operation or system removal

A detection above the SEM threshold conducted in response to a remote detection should not … be used as a prohibiting criterion for semi-continuous operation or conditional permanent shutdown under 95463. (OP_WM-48)

Agency Response:

No changes were made in response to this comment. CARB sees no reason why a surface methane concentration exceedance should be disregarded based on whether it is found during routine SEM or in response to a remotely-detected emission plume notification, and the commenter provides no rationale for their request.

F.7-3 Relax the stringency of criteria for semi-continuous operation

Comment:

The provisions allowing semi-continuous GCCS operation are prohibitive.

The Draft Regulation would only allow for semi-continuous operation of a GCCS at closed MSW landfills with robust final cover and low methane generation. However, the same issues warranting semi-continuous operations, such as reduced landfill gas flow rate and methane content, may occur at only portions or areas of the overall landfill site. Accordingly, CARB should revise Section 95467(a) to allow for semi-continuous operation at both closed MSW landfills and areas of closed or inactive MSW landfills that achieve the same criteria.

Further, operators would also be required to demonstrate that there have been no exceedances of the SEM limits specified in Section 95465 during the previous three years. See Section 95467(a)(3). SEM detections above the relevant thresholds may not always be related to GCCS efficiency or operation but may instead be the result of a temporary cover issue that can be fixed quickly and easily. On this basis, a prolonged period of three years is inappropriate and will inhibit most operators from taking advantage of the semi-continuous provisions instead of utilizing supplemental fuel to maintain GCCS operation. CARB should instead impose a requirement of one year without SEM detections.

Indeed, methane content is a better indicator of gas quality required to maintain operation of GCCS, and WM therefore supports the inclusion of methane content considerations imposed by Section 95467(a)(4); however, requiring that methane content does not exceed 30% by

volume for at least five consecutive years will also render the semi-continuous provisions unusable. Further, subsection (a)(4) is dependent on the use of continuous flow rate measurements for a minimum of one year. This requirement is impracticable because it does not seem to allow for system upsets or periods where monitoring cannot be conducted.

CARB also proposes to allow semi-continuous operation only where a professional engineer has certified that there are no available modifications to any control device that would allow for the control device to operate continuously at the methane flow rate and gas composition being collected, and where there is no adjacent facility that can use the landfill gas as supplemental fuel to their own control device. See Section 95467(a)(5). This requirement is stringent to the point of being prohibitive of semi-continuous operation because operators will always have the option to utilize supplemental fuel to allow for continuous operation of the control device. However, doing so will result in additional emissions not contemplated by CARB. Moreover, presuming that the landfill gas will be of high enough quality and that the infrastructure exists to transport it to an adjacent facility fails to account for the operational realities associated with control device operation. This requirement should be revised to indicate that the use of supplemental fuel should not be considered an "available modification," and remove the requirement to consider the existence of an adjacent facility. (OP_WM-69)

Comment:

95467. Semi-continuous Operation and Permanent Shutdown of the Gas Collection and Control System.

This section is written as if only applicable to an entire landfill and the collection system. We recommend an addition to allow for closed areas of otherwise operating landfills to use the semi-continuous operation option. For example, we have some waste management units (WMUs) with final cover that are not contiguous to other WMUs. These should be allowed semi-continuous operation when they meet the criteria. (OP_YoloCo-10)

Agency Response to Combined Comments:

No changes were made in response to these comments. The process for requesting semi-continuous operation applies to cases where it is not feasible to operate the entire GCCS continuously. Section 95467 does not apply to declining methane in individual wells, provided that the gas control system is able to maintain continuous operation as specified in section 95464(b)(1)(A). (Instead, refer to section 95464(c)(2)(A) for requirements relevant to well decommissioning).

Regarding SEM exceedances resulting from surface cover issues, the surface cover integrity is a key factor in effective operation of the GCCS and this provision is necessary to demonstrate that the landfill is not losing gas through the surface cover instead of capturing it, which could be exacerbated by switching to semi-continuous operation. One year is insufficient to establish a reliable record, especially because closed landfills may qualify for a relaxed SEM frequency (once every three quarters). The requirement to demonstrate three years with no exceedances ensures that landfills will have at least one monitoring event in each season included in that historical record.

The 30% methane allowance in section 95467(a)(4) is based on annual average concentration each year. Although the methane content is required to be measured at least every three hours, a temporary period of measurement device malfunction would typically have a minimal effect on the annual average. Periods of missing data and other

unique circumstances could be addressed through the ACO process in section 95468 to provide for consideration of site-specific information.

The Proposed Amendments specifically state that the control device assessment is based on "the methane flow rate and gas composition being collected." Therefore, it is not required that the professional engineer consider supplemental fuel in making this determination. Additionally, nothing in the Proposed Amendments limits the operator's option to utilize supplemental fuel, and staff recognizes that this may be necessary and appropriate in some circumstances.

Regarding adjacent facilities, multiple landfills currently send gas to adjacent facilities for control. The Proposed Amendments only require this if the adjacent facility "will accept the landfill gas."

F.7-4 Reduce period with no SEM exceedances in permanent shutdown criteria

Comment:

The GCCS shutdown criteria should not impose overly stringent SEM requirements.

The Draft Regulation would allow for permanent shutdown of GCCS where there no SEM exceedances occurred during the previous five years. See Section 95467(d)(3). Consistent with WM's comments with respect to semi-continuous operation criteria, SEM detections above the relevant thresholds may not always be related to GCCS efficiency or operation but may instead be the result of a temporary cover issue that can be fixed quickly and easily. On this basis, a prolonged period of five years is inappropriate and will inhibit most operators from taking advantage of the shutdown provisions. Accordingly, CARB should reduce the timeframe in which landfills must be without SEM detections above the applicable threshold to three years. (OP_WM-70)

Agency Response:

CARB made changes in response to this comment. In the 15-Day Changes, the period without surface methane exceedances to request conditional permanent shutdown was changed to three years.

F.7-5 Increase or better explain the permanent shutdown methane flow rate threshold

Comment: Under Section 95467(d)3), CARB would also require operators to measure the methane content to the inlet of each control device at least every three hours to show that the measured methane content is below 125 metric tons per year methane for at least three years is too stringent. 125 metric tons per year of methane is equivalent to 13 scfm—an impossibly low standard to meet. Instead, CARB should require operators to use weekly GEM recordings for a period of one year and evaluate that data in order to meet the permanent shutdown criteria. (OP_WM-71)

Comment: Section 95467 (d)(3): It is required that one of the conditions for permanent shutdown of a landfill gas collection system is that the measured methane collection is below 125 metric tons of methane. It is not clear what the significance of this value is and how it

relates to issues of a declining gas collection that cannot be operated effectively anymore. This should be clarified. (OP_SWANA-28)

Agency Response to Combined Comments:

No changes were made in response to these comments.

Staff described how the methane collection rate threshold was established on p. 37 of the ISOR, with appropriate supporting citations:

> *Staff proposes a methane collection rate threshold of 125 MT CH_4/yr, which equates to approximately 25% methane content at a flow rate of 50 scfm, or 0.75 MMBtu/hr, because low-capacity flares have been shown to control this quantity of gas at California landfills (e.g., see Perennial, 2022) and LMR report data shows that this quantity of gas can effectively be controlled using semi-continuous operation.*

F.7-6 Make semi-continuous operation and permanent shutdown criteria less stringent

Comment:

Section 95467(a)(d)(f) – Semi-Continuous Operation and Permanent Shutdown of the Gas Collection and Control System

In the proposed rule, CARB added extensive requirements that must be met for both semi-continuous operation and for permanent shutdown. These new requirements are not only more costly and time-consuming but also create significant challenges in meeting the necessary criteria. In some instances, compliance may prove infeasible for some closed landfills.

Recommendation: We request that CARB meet with landfill operators and technical experts to evaluate whether closed landfills can reasonably fulfill these requirements and to consider more feasible alternatives. (OP_Recology-7)

Comment: Semi-continuous operation of closed sites and inactive areas at active landfills with separate gas treatment systems is an important tool for landfill operators to effectively collect landfill gas of sufficient quality and quantity that can be managed in conventional devices, such as flares. The requirements outlined in the revised LMR are extensive and may discourage this important practice.

The LTF recommends that requirements to allow semi-continuous operation of landfill gas systems at closed sites, or qualified inactive areas at active sites, be streamlined and encouraged, subject to prior approval of the appropriate regulatory agencies. (OP_SWANA-20)

Comment: Under Section 95467, CARB added extensive requirements that must be met for both semi-continuous operation as well as for permanent shutdown. The collective process would make it much more difficult, time-consuming, and costly for a closed landfill to achieve the noted statuses. In some instances, it may prove impossible for a closed landfill to ever meet these criteria. We request that CARB first evaluate the ability of closed landfills to actually meet these requirements before imposing such draconian criteria for permanent shutdown. (OP_L and D-34)

Agency Response to Combined Comments:

CARB made changes in response to these comments. In the 15-Day Changes, the period with no surface methane exceedances prior to requesting conditional permanent shutdown was reduced from five years to three years. No other changes were made in response to these comments.

CARB added specificity to the requirements for requesting and approving semi-continuous operation and permanent shutdown to promote clarity, improve the ability of operators to plan ahead, and ensure that these operating allowances are granted only where appropriate and necessary. The ISOR (pp. 32–36) describes the significant evidence and analysis undertaken to confirm that the standards are achievable, and these comments do not provide specific information about which aspects of the processes might prove infeasible (to the extent that any of these comment letters further described what aspects they view as infeasible or overly restrictive, those specific comments are responded to elsewhere in this FSOR).

F.7-7 Clarify whether GCCSs currently approved for semi-continuous operation must apply through section 95467

Comment:

Section 95467: Semi-Continuous Operation and Permanent Shutdown

The proposed amendments in this subsection add requirements for semi-continuous operation for low-methane closed landfills and permanent shutdown. It is unclear whether existing collection systems, which are already operating on a semi-continuous basis, will be addressed. Requiring all systems to operate continuously when they're already operating on a semi-continuous basis may cause unintended consequences such as over-pulling of LFG, which may disrupt the anaerobic digestion process. Therefore, the Sanitation Districts request clarification to allow landfills that are currently operating on a semi-continuous basis without any emissions or odor issues to continue operating in this manner. (OP_LACSD-4)

Agency Response:

CARB made changes in response to this comment. In the 15-Day Changes, staff clarified in section 95467(a) that the process therein only applies to landfills without an approved alternative compliance option for semi-continuous operation.

F.7-8 Clarify if a carbon adsorption system can be used instead of semi-continuous flaring

Comment:

Topic: Closure/Intermittent Operation/non-flare operation 95467

Potential Issues:

- Multistep processes for Semi-continuous operation, Conditional Shutdown, to permanent Shutdown
- May need to look at full process and pull out any elements that could be problematic for sites close to closure.

Concerns:

- Can continuous operation using GAC be used in lieu of semi-continuous flaring? This way the GCCS is operated consistently and prevents the build up of methane/Landfill Gas when the system is down intermittently/semi-continuously which could lead to SEM exceedances and/or subsurface migration/GW impacts while the GCCS is down intermittently.

Potential Alternative:

- Allow use of GAC treatment system in lieu of semi-continuous flaring operation. (OP_SWMD-9)

  Agency Response:

  No changes were made in response to this comment. Granular activated carbon (GAC) systems (referred to as "carbon adsorption" in the LMR) remove volatile organic compounds from landfill gas, but do not destroy methane and do not meet the LMR definition of a gas control system. Therefore, operating a gas collection system and routing the gas to a GAC system does not provide methane control.

  As discussed in the ISOR, semi-continuous operation involves periodically shutting down the collection system for short periods of time to allow gas to build up within the waste mass. The collection system must not be operated while there is no control device operating to control methane. Therefore, a landfill that is subject to sections 95464 to 95476 must first meet the criteria for permanent GCCS removal in proposed section 95467(d)–(f) in order to operate a GAC instead of a methane control device.

G. Cover and Collection System Plans and Assessments

1. General Support

G.1-1 General support

Comment: We appreciate the work CARB has done and their acknowledgement of cover as a critical component of effective landfill gas collection. Proper cover management is essential not only for preventing surface emissions, but also for maintaining slope stability and reducing the risk of landfill fires and SET events, as cover erosion allows oxygen to enter the waste mass, a key precursor to fire risk.

We commend CARB for several important advancements in cover-related requirements in the Draft Amendments, including:

- Monthly Cover Integrity Monitoring - § 95464(b)(6): CARB's requirement for regular, monthly inspections is essential for ensuring consistent cover performance and that repairs are completed in a timely manner.
- Cover Integrity Assessment Plans - § 95464(b)(6): We support the requirement for operators to develop and implement cover integrity assessment plans for multiple purposes, including addressing recurring surface exceedances, temperature or oxygen exceedances, and demonstrating robust final cover for relaxed monitoring eligibility.
- Recordkeeping on Cover Materials - § 95470(b)(3)(E)(1): We strongly support the

requirement for operators to track cover material types and to identify areas under daily, intermediate, and final cover.

- Clear Definitions of Cover Types - § 95475(a)(10): We support CARB's clear definitions for "cover material," including daily, intermediate, and final cover, which helps standardize monitoring and compliance expectations.
- Clear Criteria for Correcting Deficiencies - § 95471(k)(1): We especially appreciate the specificity provided for what constitutes a corrected deficiency, including:
    - Adding and compacting material to achieve required thickness, eliminate cracks, prevent erosion, or repair well boot seals.
    - Replacing alternative daily cover with soil daily cover, or upgrading daily cover to intermediate cover.
    - Adding and compacting intermediate cover to meet fines content, particle size, permeability, and thickness requirements, or replacing intermediate cover with final cover.
    - Incorporating compost or biochar into final cover, maintaining soil moisture, or adding erosion control measures in areas prone to erosion.
      (OP_CAW-73)

Agency Response:

No changes were made in response to this comment. CARB appreciates the comment and thanks the commenter.

2. Cover Integrity Monitoring Plans

G.2-1 Oppose cover integrity monitoring plans

Comment:

Section 95464(b)(5) and (6) – Component Leak and Cover Monitoring Plans

…

For cover monitoring plans, CARB should delete 95464(b)(6)(B) as it is not appropriate to reference and enforce another program's regulation. (OP_Ind/Gov Coalition-12)

Comment: Requiring a separate cover integrity program is very costly and duplicative of current cover inspection required in the surface gas monitoring program and could conflict with approved cover design and operation requirements established and approved by CalRecycle and the State Water Resources Control Board. (OP_SWANA-6)

Comment:

{CARB staff note: Commenter quoted 45-Day Changes text of section 95464(b)(6).}

This section is redundant with existing regulation that landfills (open or closed) must already comply with. Regulations from the Regional Water Quality Control Board and CalRecycle have requirements for regular (weekly and monthly) monitoring of the landfill surface cover type/thickness, vegetative cover, erosion control, leachate seeps, and exposed waste. (OP_YoloCo-7)

Comment: Section 95464 (b)(6) requires a Cover Integrity Plan to "*to monitor cover integrity and address issues such as exposed waste, leachate breakouts, and erosion gullies.*" The LTF objects to this requirement for two primary reasons. First, as noted in this section, cover requirements are regulated by the California Department of Resource Recycling and Recovery. Landfill operators currently must comply with requirements pursuant to these regulations. Second, a separate program to require cover integrity checks is unnecessary and may conflict with other programs. Surface monitoring requirements contained in the current LMR already require that landfill technicians walk all parts of the landfill and not only measure but observe cover conditions that can lead to surface emissions. Landfill surfaces, especially at larger landfills, can cover hundreds of acres. A second layer of monitoring through a Cover Integrity Program, over and above existing surface requirements is onerous and unnecessary given the current surface monitoring requirements.

The LTF recommends that all references to a separate Cover Integrity Plan or Program be removed. (OP_SWANA-15)

Agency Response to Combined Comments:

CARB made changes in response to these comments. In the 15-Day Changes, the scope of the cover integrity monitoring plan was revised to apply only to daily and intermediate cover. In addition to operator feedback, research shows that final cover is generally less prone to leaks and experiences fewer integrity issues due to its more durable design compared with daily and intermediate cover.

Additionally, the 15-Day Changes clarify that repair and maintenance activities are performed in accordance with existing regulations to maintain consistency, avoid duplicative requirements, and prevent unnecessary permitting conflicts.

G.2-2 Explicitly allow more frequent cover monitoring

Comment:

§95464(a)(6) – Cover Monitoring Plan

TrelliSense recommends allowing operators to perform cover integrity monitoring "monthly or more frequently" to meet the standard. Explicitly allowing daily or continuous monitoring here, rather than specifically requiring monthly surveys, could incentivize proactive site management while aligning with the capabilities of new monitoring technologies and methods that may operate continuously. (OP_TrelliSense-5)

Agency Response:

No changes were made in response to this comment. The regulation establishes a requirement for monthly repair and maintenance monitoring. However, operators may choose to conduct monitoring more frequently.

G.2-3 Clarify cover monitoring plan review and approval procedure

Comment:

§ 95464 Gas Collection and Control System Requirements

…

(b)…(6) New Plan requirements for…Cover Monitoring – Clarify whether there is a requirement to submit to the local Air District for review and approval. The review process should be clearly outlined with additional timelines in place to prevent landfills from being subject to any penalties as a result in delay of review and approval once submitted to the regulating authority. (OP_WPWMA-4)

Comment:

Topic: New Plans – 95464(b)…(6)

Potential Issues: Cover Monitoring Plans due within 90 days of the rule promulgation.

Concerns:

- Will the AQMD need to approve the plan? Would the landfill be subject to any penalties as a result of delays from the AQMD in approving the plan?

Potential Alternative: N/A (OP_SWMD-7)

Agency Response to Combined Comments:

No changes were made in response to these comments. The Proposed Amendments do not require cover integrity monitoring plans to be proactively submitted for review and approval. However, CARB or an implementing air district can request a cover integrity monitoring plan which then must be provided by the owner or operator.

G.2-4 Require aerial imagery as part of cover integrity monitoring plans

Comment:

§ 95465(b)(4)(A) - Cover Integrity

Issue:

Without a defined method, this regulation will present CARB and the Air Districts with a patchwork of data in bespoke formats that will be impossible to audit and do not provide transparency.

Recommendation:

Drones are now pervasive and commodity; please consider mandating aerial imagery at 2 inches / pixel ground sampling density, stitched together (photogrammetry). Within that full site aerial image you can then apply the requirements in the original regulation – which can be a) audited by CARB, b) automated with machine vision.

Suggested Regulatory Language:

(Replace § 95465(b)(4)(A) with the following)

“The cover integrity monitoring plan shall include site-wide aerial imagery acquired at a ground sampling distance of no more than 2 inches per pixel, covering the full permitted waste boundary and any areas of intermediate or final cover. Individual images shall be ortho-rectified and stitched to produce a site-wide mosaic for each monitoring event.

The operator shall evaluate the stitched aerial dataset to identify exposed waste, leachate breakouts, erosion gullies, or other cover failures and shall document the location, corrective action taken, and post-repair verification.

All aerial imagery, mosaics, and associated evaluations shall be retained under § 95470 and shall be made publicly available." (OP_Sniffer-2)

Agency Response:

No changes were made in response to this comment. The cover integrity monitoring plans allow owner or operators the latitude to use methods that work best for their facility while achieving the performance outcomes described in the Proposed Amendments.

3. Cover Integrity Assessments

G.3-1 Support cover integrity assessments and suggest further improvement

Comment: CARB has proposed cover integrity monitoring, recordkeeping, and reporting requirements that will help to reduce fugitive emissions and fire risk. The cover integrity assessment criteria is a strong proposal, and improving cover monitoring is critical to catching leaks and other problems at landfills. To improve upon this proposal, we recommend that CARB establish minimum performance standards for alternative daily cover (ADC) to ensure effective control of methane, odor, and NMOCs. CARB should also build out specific minimum requirements for cover including permeability, and we continue to recommend biocover as a supplement to GCCS to capture fugitive emissions or to reduce emissions at closed landfills. (OP_RMI/EDF-27)

Comment: We urge the Board to maintain the following: … more robust cover assessments. (T_RMI-6)

Agency Response to Combined Comments:

No changes were made in response to these comments. The cover integrity assessments are designed to identify and repair deficiencies, not set new specifications that covers must meet.

G.3-2 Remove detailed cover integrity assessment requirements; too onerous

Comment:

Section 95469(e)(3 & 5) - Monitoring Requirements with Reference to Sections 95471(k)

This and other subsections refer to the initiation of cover integrity assessments if certain temperature and oxygen thresholds are exceeded. While the cover integrity assessment is a reasonable next step, there is concern that the requirements of the cover integrity assessments within Section 95471(k) are impractical and may conflict with the requirements in Title 14 and 27 regulations administered by CalRecycle.

More specifically, the references related to measuring thickness of cover, grain size and fines content in subsection (k) are not specific to any location and could be interpreted to cover an undetermined expansive area. On their own they are impractical to assess even within a

limited spatial extent. Additionally, Section 95471(k)1(D) goes into extensive detail relative to compaction and maximum particle size requirements, etc.

It is important to note that many landfills are short on cover material and import the material from a variety of sources. The material they do receive is highly variable and intimating that it should meet a certain unspecified set of parameters for grain size, fines content, etc. would not be an efficient use of time. Additionally, disturbance of final cover as part of the cover integrity assessment would require prior approval from the Regional Water Boards as well as introduce a host of potential concerns related to the integrity of the final cover itself (i.e., impacts on synthetic liner systems).

The intent of the cover integrity assessment is to identify areas that may be deficient and augment them so the occurrence that led to the assessment is mitigated. There are many measures an operator can implement to address a given exceedance. The means by which the occurrence is remedied should be left to the facility operator if the threshold exceedance has been remedied or the corrective action plan has been followed. In closing, incorporating prescriptive provisions of the nature contained within these subsections may not be plausible given on-site material sources, spatial expanses that a cover integrity assessment could involve and unanticipated impacts to final cover systems. (OP_Ind/Gov Coalition-27)

Comment:

Requirements for Cover Integrity and Remediation are Over-Prescriptive and Will Create Additional Operational Challenges

Section 95471(k) imposes overly-prescriptive requirements for cover integrity assessment and remediation.

First, RCRC is concerned that the trigger for performing a cover integrity assessment is unreasonably low and could require an owner/operator to frequently conduct assessments several times a year.

Second, RCRC is concerned that the cover remediation requirements create regulatory overlap and risk further complicating an already complex regulatory environment. This will inhibit compliance. Overlapping regulatory authority among multiple state and federal regulatory agencies is partly to blame for some of the state's worst recent environmental challenges, including the Exide battery recycling facility and the Chiquita Canyon Landfill. Both disasters were exacerbated by an overly-complex regulatory environment without effective coordination among different agencies. That fragmentation can inhibit effective response actions once problems are detected. CalRecycle and local enforcement agencies (LEAs) already have regulatory and enforcement authority over landfill covers. Those covers are designed and approved in accordance with standards established by CalRecycle, the LEA, and (frequently) regional water control boards. Any changes to the covers may trigger additional regulatory review and approval by ARB's sister agencies, which will complicate compliance and completion. Corrective action measures proposed in the regulations could require a significant change to the solid waste facility permit that is subject to approval by CalRecycle and the Regional Water Quality Control Board.

Third, RCRC is concerned that Section 95471(k)(1) is overly prescriptive in terms of the types of remedial actions that must be performed in order for deficiencies to be considered corrected. Doubling the amount of material may be unnecessary to address the underlying cause of the exceedance, as may forcing the use of soil or intermediate daily cover in place of

alternative daily cover. Furthermore, owners/operators cannot modify the final cover without first obtaining approval from other state, local, and/or regional agencies.

Rather than overly complicating the regulatory environment for cover maintenance, imposing arbitrary requirements (like doubling the required thickness of material), or undermining CalRecycle's regulatory authority by precluding the use of alternative daily cover, ARB should simply provide owners/operators with greater discretion as to how to remediate any cover deficiencies. (OP_RCRC-12)

Comment:

Section 95469(e)(3 & 5) – Wellhead Monitoring with Reference to Section 95471(k)

This and other subsections refer to the initiation of cover integrity assessments if certain temperature and oxygen thresholds are exceeded. While initiating a cover integrity assessment is a reasonable next step in some cases, there is concern that the requirements of the cover integrity assessments within *Section 95471(k)* are impractical and may conflict with the requirements in Title 14 and 27 regulations administered by CalRecycle or with final cover requirements from Regional Water Boards.

Specifically, the references relative to measuring thickness of cover, grain size and fines content are not specific to any particular location and could be interpreted to cover an undetermined expansive area. On their own, they are impractical to assess even within a limited spatial extent. Further, the material that landfills receive for cover is highly variable and dependent on availability from surrounding areas.

The intent of the cover integrity assessment is to identify areas that may be deficient and augment them, so the occurrence that led to the assessment is mitigated. Incorporating prescriptive provisions as outlined in the draft rule is excessive, as many of the proposed requirements may not be plausible given availability of on-site material sources and spatial expanses that a cover integrity assessment could involve.

Recommendation**:** We request that the prescriptive cover requirements be removed from the rule to allow facility operators to determine the means by which the occurrence is remedied. Instead, the rule may require operators to initiate a cover integrity assessment, in consultation with a professional engineer, to make improvements to cover based on site-specific conditions and considerations. (OP_Recology-24)

Comment:

§95471(k)(1) – Cover Integrity Assessment Requirements

This section requires cover integrity assessment (thickness, grain size, and soil classification) without establishing a standard frequency for test pits, and imposes very strict intermediate cover requirements.

Performing this assessment retroactively on a 65+ year-old landfill without a frequency standard would be extremely costly. The intermediate cover requirements stated in §95471(k)(1)(C) would not be feasible for existing operations, as they would necessitate importing fill soil to meet the specifications, a significant and potentially prohibitive expense. (OP_ReGen-19)

Comment: The draft rule requires a Cover Integrity Assessment be performed under various circumstances, including under the semi-continuous operation provisions (Section 95467(a)); recurring SEM exceedances (Section 95469(a)(4)); wellhead temperatures over 131° F or 145° F (Section 95469(e)(3) and (4)); wellhead oxygen over 5% (Section 95469(e)(5)); and under the Wellhead Parameter Trend Analysis requirements (Section 95469(e)(7)). Collectively, there are numerous instances which commonly occur at landfills, where a Cover Integrity Assessment would be triggered. As such, this requirement will affect many landfills in the state, multiple times throughout the year. Specific proposed requirements of a Cover Integrity Assessment are summarized in Section 95471(k).

This is an extremely onerous requirement that will have massive operational and financial impacts on the landfill industry and would be practically unworkable for many landfills. (OP_L and D-16)

Comment:

{CARB staff note: Commenter quoted 45-Day Changes text of section 95471(k).}

This is redundant with the cover monitoring and repairs landfills are required to do by the RWQCB, and CalEPA. In addition, portions of this are quite prescriptive and may not always be the best practice to control the portions of the landfill surface. (OP_YoloCo-39)

Comment: We request that the prescriptive cover requirements should be removed from the rule. Instead, if CARB is concerned about cover integrity under certain circumstances, it could require that the frequency of cover integrity inspections be increased in the areas of concern as well as direct the landfill operator, in consultation with the professional engineer, to make improvements to cover based on site-specific conditions and considerations. (OP_L and D-20)

Comment: Specific proposed requirements of a Cover Integrity Assessment are summarized in Section 95471(k).

…

The cover requirements are arbitrary and capricious, and CARB has not adequately addressed the operational, financial, other environmental impacts in the ISOR or in the CEQA documentation. CARB has provided no scientific evidence that the very prescriptive cover requirements being imposed will actually reduce surface emissions and/or improve wellhead gas composition. (OP_L and D-18)

Comment: The references related to measuring thickness of cover, grain size and fines content in subsection (k) are not specific to any particular location and could be interpreted as covering an undetermined expansive area of the landfill. On their own, they are impractical to assess even within a limited spatial extent. Additionally, subsection (k)(1)(D) goes into extensive detail relative to compaction and maximum particle size requirements, etc. Many landfills simply do not have the available cover materials to meet the prescriptive requirements to, for example, double the amount of soil cover or replace daily cover with intermediate cover. Further, requiring landfills to replace daily cover with intermediate cover is unworkable. Daily cover, by its nature, is designed to be added each working day as a landfill disposes waste in the specific area. Intermediate cover is placed in areas where landfill filling has ceased for an extended period, and is designed not to be disturbed, certainly not by additional daily filling operations. Similarly, final covers are designed to never be disturbed by landfill operations, and they are not appropriate for use as intermediate covers.

CARB has not investigated the impact that additional cover thickness/low permeability layers will have on leachate, including the potential to exacerbate leachate seeps and leachate accumulation in the waste mass by creating low permeability layers within where the leachate cannot move vertically as designed. CARB has also not investigated the impact that additional cover thickness/low permeability layers will have on LFG collection, including impeding vertical movement of gas, reducing the influence of gas wells, allowing gas to accumulate in low permeability pockets within the waste, and other issues. There has been research on this topic at California landfills, which resulted in recommendations not to increase the thickness of or create low permeability daily cover layers within the waste mass as these actually reduce gas recovery.

The intent of the cover integrity assessment is to identify areas that may be deficient and augment them so the occurrence that led to the assessment is mitigated. The means by which the occurrence is remedied should be left to the facility operator as long as the threshold exceedance has been remedied. Incorporating prescriptive provisions of the nature contained within these subsections may not be plausible given on-site material sources and spatial expanses that a cover integrity assessment could involve. Additionally, adhering to the testing criteria outlined in this section is not practical on the scale under consideration. (OP_L and D-19)

Comment:

Cover Integrity Requirements

The draft rule requires Cover Integrity Assessments under various conditions. These assessments are burdensome and impractical for Kiefer, adding numerous hours for compliance. (OP_SacCo-18)

Comment:

Section 95471: Test Methods and Procedures

This subsection of the proposed amendments outlines the requirements for cover integrity assessment, which includes the thickness of cover and grain size. The assessment, as described in the amendment, will likely require the use of equipment to penetrate the cover, which may compromise the final cover. Furthermore, it may introduce air into the waste mass. Therefore, the Sanitation Districts strongly urge CARB to provide flexibility for cover integrity assessment. (OP_LACSD-19)

Agency Response to Combined Comments:

CARB made changes in response to these comments. Numerous adjustments were made to cover integrity assessment requirements to address concerns raised by commenters. The 15-Day Changes provide additional flexibility by allowing operators to choose among one of three options for assessing properties of cover (soil classification, gas profile, or saturated hydraulic conductivity) and provide an alternative to measuring cover thickness. The changes also remove certain prescriptive repair specifications (e.g., doubling thickness), expanding the options available to address cover deficiencies. Options for repairing final cover have also been updated to maintain consistency with other regulations. Finally, the 15-Day Changes specify that new measurements are not required if they were performed for the same area in the past 12 months to reduce the need for repetitive testing that is likely to show the same results.

In each circumstance where such assessments are required, the rationale for the assessment and the triggering conditions was provided in the ISOR. Note that in the 15-Day Changes, the requirements to perform a cover integrity assessment in response to elevated and increasing oxygen content were revised to allow a period to correct those conditions before triggering the assessment.

These assessments are targeted at areas of the landfill where performance metrics have indicated the need for further investigation to ensure effective methane emission control. The assessments require targeted investigation and repair that do not conflict with or duplicate existing requirements.

Regarding correcting deficiencies, the type of corrective action needed depends on the nature of the deficiency found (or if no deficiencies are found, then no correction is needed). With respect to cover type, the actions in section 95471(k)(5)(A) are intended to apply to any cover type, while those in sections 95471(k)(5)(B)-(D) apply to specific cover types.

The spatial extent of each assessment is governed by the provision that triggers the assessment, not an "undetermined expansive area of the landfill" as suggested by one commenter.

The proposed requirements for cover integrity assessments are based on existing best practices and research findings as documented in the ISOR (see, e.g., ISOR pp. 50, 63-64, 101-102, 119, 124), and are appropriate for fully characterizing and repairing deficiencies in areas with identified performance issues. CARB respectfully disagrees that the cover requirements are arbitrary and capricious.

The comments do not identify which existing requirements they believe are redundant or overlapping, though CARB believes the commenters are likely referencing California Code of Regulations, Title 27, subchapters 4 and 5. These requirements have different purposes than the LMR. As identified in the Updated Informative Digest, CARB conducted a review of existing state regulations and did not identify any inconsistent nor incompatible requirements. The comment lacks specificity and therefore, CARB is not required to respond further.

Please see agency response in section IV.N.6-1 for the response related to the California Environmental Quality Act (CEQA).

G.3-3 Factor in alternative final cover to cover integrity assessment requirements

Comment:

Cover Integrity Requirements

…

The measures also do not consider the utilization of alternative final cover methods, which are ubiquitous. (OP_SacCo-19)

Agency Response:

CARB made changes in response to this comment. In the 15-Day Changes, the cover integrity assessment requirements relating to final cover were revised to provide non-

destructive testing options, and repair options were added to account for engineered and synthetic covers and improve consistency with other regulations.

G.3-4 Final cover cannot be quickly installed to address issues found in a cover integrity assessment

Comment:

Cover Integrity Requirements

…

Final cover cannot be simply installed on inactive areas. Inactivity in a landfill area triggers intermediate cover, not final cover. Final cover requires approval of the Regional Water Quality Control Board, typically a 12–18 month process followed by a multi-month construction project. This means compliance with the proposed air regulations violates existing water board regulations. (OP_SacCo-20)

Agency Response:

CARB made changes in response to these comments. In the 15-Day Changes, the option to replace intermediate cover with final cover to address cover deficiency has been removed in recognition that the timeline to design and construct the final cover cannot be completed within the corrective action timelines specified in the Proposed Amendments. CARB notes that this was simply one option to address issues discovered in the cover integrity assessment, and one or more of the options in section 95471(k)(5)(A) and (C) may be used to address deficiencies discovered in intermediate cover.

4. Surface Cover Materials and Design

G.4-1 Require slope stability evaluation

Comment: Require slope stability and risk evaluations: CARB should require quantitative slope stability evaluations for landfills with a history of or susceptibility to slope failure. These assessments are particularly important for facilities that have used leachate recirculation, a practice that significantly increases instability and subsurface heating risks and should be prohibited statewide. (OP_CAW-77)

Comment: Require quantitative slope stability evaluations for landfills with a history of or susceptibility to slope failure. (OP_CAW-87)

Agency Response to Combined Comments:

No changes were made in response to these comments. Slope stability assessments are already required under other State regulations.

G.4-2 Add stronger cover material requirements

Comment: Specifically, we recommend that CARB:

…

- Include stronger cover requirements; (OP_EIP-6)

Comment:

CARB should include stronger cover requirements in the LMR.

Previous recommendations

As explained in EIP's January 2025 Letter, a Cal Poly field investigation of methane gas emissions from a representative set of California landfills analyzed all operational parameters at landfills and emissions measured on the ground. The researchers found that the type of cover on a landfill was a significant factor impacting the flux of emissions. Specifically, they found higher methane emissions with the use of intermediate and daily covers and lower methane emissions as the percentage of the landfill area with final cover increased. The report recommended (1) limiting the working face; and (2), installation of intermediate cover within days—not weeks—of waste placement to avoid the higher emissions from daily cover. Specific recommendations included:

- for daily cover: minimize the area and duration of coverage and avoid highly porous and open structure bulk materials;
- for intermediate cover: increase thickness up to one (1) meter (about three (3) feet) with fines content over 30%, and minimize area; and
- for final cover: thickness of over 150 cm (about 4.9 feet), fines over 60%, clay over 12%, and plasticity over 20%.

Moreover, in their white paper, EPA states that "additional regulatory measures would be needed to ensure the ongoing maintenance and durability of landfill covers. Bare soils, in particular, are especially vulnerable to damage from precipitation, which can compromise cover effectiveness and increase the potential for emissions." Thus, CARB should include in the final a new section for landfill cover, enumerating specific requirements for daily, intermediate and final cover. CARB should ensure that these requirements are also in concert with any solid waste requirements for MSW landfills. The requirements should set standards for cover material and outline specific required actions to ensure cover integrity maintenance, such that every month the landfill operators must visually inspect the entirety of the landfill cover, both interim and final.

Where visual investigations indicate elevated concentrations of landfill gas, the owner or operator should conduct SEM.

CARB included some proposed amendments that addressed the recommendations in our January 2025 Letter. CARB defines cover material in 95475(a)(10) as:

soils/earthen materials or alternative materials used in covering compacted solid wastes in a disposal site. Cover material may serve as daily, intermediate or final cover.

- "Daily Cover" means cover material placed on the entire surface of the active face at least at the end of each operating day in order to control vectors, fire, odors, blowing litter and scavenging.
- "Intermediate Cover" means cover material placed on all fill surfaces where additional cells are not to be constructed for 180 days or more to control vectors, fires, odors, blowing litter, scavenging, and drainage.
- "Final Cover" means cover material that represents the permanently exposed final

surface of a fill

CARB should include more specific requirements for cover, especially daily cover.

First, EIP appreciates that CARB defined cover materials to consist of soils/earthen materials. However, we maintain that CARB should not allow alternative materials. Alternative daily cover ("ADC") should rarely, if ever, be used. Although ADCs are designed to meet daily regulatory requirements, many of the materials used do not sufficiently oxidize methane and allow more liquid infiltration, which leads to higher leachate levels. In its recent white paper series, EPA states that "[f]or landfills subject to NSPS/EG control requirements, minimum standards and test methods for NMOC and methane mitigation from ADCs could be established to ensure equivalency to six inches of soil, or a stricter standard. This would not conflict with state approval of ADC for all landfills in the solid waste context, but rather would be establishing further standards for landfills required to mitigate their NMOC and methane emissions under the NSPS/EG framework." Several states have already identified performance-based standards for evaluation of suitability of ADC. CARB should require that any operator using ADC submit demonstration that the ADC controls odors, methane and NMOC. CARB should establish a test method for operators to ensure that the permeability of ADC is equivalent to six (6) inches of compacted soil, or a stricter standard. CARB should also require more frequent cover performance monitoring for landfills that choose to use ADC.

Next, CARB should establish minimum requirements for permeability in covers that will be in place for an extended period of time (intermediate and final covers). Selection of soils should also consider properties that would promote oxidation such as texture, porosity, and pH.

Third, improvements to intermediate and final landfill covers can mitigate landfill gas emissions by promoting methane oxidation and enhancing the efficiency of gas collection systems. Beginning with intermediate cover, CARB should consider whether to require that intermediate covers incorporate a high permeability layer near the surface. CARB should also increase the required thickness of intermediate cover to ensure proper methane mitigation.

Three feet of soil cover, as recommended by Hanson et. al., would more effectively control methane emissions. While the Cover Monitoring Plans and Cover Integrity Assessments are important improvements, CARB should still require that operators submit a cover design plan, or require a landfill cover section in the design plan already required under the LMR, in which they demonstrate careful material choice and design relevant to the climate and waste characteristics of their landfill. CARB should also require that intermediate cover within one (1) month.

Finally, federal solid waste regulations mandate that final cover systems are designed to minimize liquid infiltration and prevent soil erosion and must include at least 18 inches of earthen material as an infiltration or barrier layer, topped by at least six inches of another earthen layer that facilitates vegetative growth. CARB should include in the cover requirement section of the LMR revision specific requirements for final cover that build off of the solid waste requirements. CARB should require that final cover be installed on an ongoing basis once a landfill cell reaches its final grade or after a predetermined number of years in order to avoid long term use of intermediate covers. CARB should require that the cover design plan (or the cover section of the design plan) include a specified timeline for waste placement in each cell along with a detailed schedule for installing final cover once waste placement is complete. (OP_EIP-15)

Comment: Although CARB included some meaningful amendments to address issues with landfill cover, the proposed amendments in the LMR fall short of what is needed. We recommend that CARB set minimum standards for cover material. (OP_EIP-23)

Comment: Establish minimum standards for Alternative Daily Cover (ADC): We urge CARB to ban auto shredder fluff as ADC and establish minimum standards for allowable ADC materials. ADC has not been proven to reduce emissions and can increase the risk of fires and SET events due to its low density, high porosity, and flammability. If ADC is allowed, it should be limited to non-flammable, low-porosity materials. Additionally, organic material should not be used, as it contributes to methane generation and should instead be diverted to meet SB 1383 goals. (OP_CAW-76)

Comment:

- Ban the use of auto shredder fluff as alternative daily cover (ADC) and establish minimum standards for allowable ADC materials, limiting use to non-flammable, low-permeability materials.
- Prohibit the use of organic materials as ADC to support SB 1383 organics diversion goals. (OP_CAW-79)

Agency Response to Combined Comments:

No changes were made in response to these comments. These comments are out of scope of this rulemaking as the current Regulation does not include cover specifications and staff did not propose to add cover specifications. Similarly, the current Regulation already requires SEM to be conducted where there are visual indicators of elevated concentrations of landfill gas, and this requirement was not modified in the Proposed Amendments. For informational purposes, CARB provides the following.

Several of the proposed methods to address surface cover deficiencies in section 95471(k)(5) were based on research conducted by Hanson et al. (2020),[38] including the replacement of ADC with soil for daily cover, as well as the use of fine-textured soil for intermediate cover, and increased cover thickness. Considering that landfill cover types and material specifications are already established under other State regulations, regular monitoring, assessments, and targeted improvements to deficient areas of cover provide an effective and practical approach for methane control.

[38] Hanson, J.L., Yesiller, N., & Manheim, D.C. (2020, March 25). *Estimation and Comparison of Methane, Nitrous Oxide, and Trace Volatile Organic Compound Emissions and Gas Collection System Efficiencies in California Landfills: Final Report*. California Polytechnic State University. *https://ww2.arb.ca.gov/sites/default/files/2020-12/CalPoly_LFG_Study_03-30-20.pdf*.

5. Collection System Assessments

G.5-1 Provide quantitative definition of "unusual changes" in wellhead parameters

Comment:

{CARB staff note: Commenter quoted 45-Day Changes text of section 95471(j).}

CARB should provide quantitative definitions of "unusual changes" (e.g., >20% month-to-month deviation) to ensure consistent implementation across sites and avoid subjective enforcement. (OP_YoloCo-38)

Agency Response:

No changes were made in response to this comment. While specific thresholds are set forth for monthly wellhead trend analysis in section 95469(e)(7), the proposed requirements for more in-depth investigation as part of a collection system assessment provide operators with flexibility to interpret monitoring data with full context and respond appropriately.

H. Recordkeeping and Reporting

1. Quarterly Raw Monitoring Data Reporting

H.1-1 Extend due dates for quarterly monitoring data reporting

Comment: CARB proposes to implement several new reporting obligations that will not serve to reduce emissions from MSW landfills, including:

…

- Quarterly Monitoring Data Reports, which must include records of all SEM data, component leak monitoring data, and wellhead monitoring data. See Section 95470(b)(4). All of the information will be submitted in the Annual GCCS Report, making this obligation unnecessary and duplicative. Quarterly reporting would not provide operators with enough time to prepare reports, especially where follow up monitoring and corrective action may be required to actively reduce emissions. CARB should revise this requirement to semi-annually or allow for reporting only in the Annual GCCS Report. (OP_WM-75)

Comment: We are also concerned about subdivisions (b) and (c) of section 95470, which require submission of quarterly reports within 15 days of the quarter's end. This does not allow enough time to validate, perform quality assurance/control, or make any corrections. This could result in errors and inefficiencies in the process by triggering the need for submission of corrections or amendments. (OP_Recology-28)

Comment: We also recommend that any deadline for a quarterly report be extended to at least 45 days following the close of the quarter. (OP_Recology-31)

Comment: §95470(b)(4) Quarterly Monitoring Data Report: Submission of all surface, component, and wellhead data in CSV within 15 days of each quarter means significant workload; requires District review under MOUs. (OP_SMAQMD-28)

Comment: Require quarterly reporting of cover integrity monitoring results to align with existing reporting for SEM, component leak, and wellhead monitoring data. (OP_CAW-78)

Comment:

{CARB staff note: Commenter quoted 45-Day Changes text of section 95470(b)(4).}

Fifteen days from the end of the quarter is a very tight schedule for reviewing the data and preparing the quarterly reporting. We suggest that it should be 30 days from the end of the quarter. (OP_YoloCo-31)

Comment: The fifteen calendar day deadline after the quarter end for submission of the Quarterly Report leaves very little time for data validation and correction. Recommend revising to forty-five days from the end of each quarter. (OP_WPWMA-14)

Comment:

Section 95470: Recordkeeping and Reporting Requirements

The Sanitation Districts support CARB's efforts in promoting and expanding digital reporting. A standardized digital reporting process would help improve reporting clarity and efficiency, facilitating accelerated data review and resolution of problems. However, the Sanitation Districts recommend that CARB reduce the reporting frequency from quarterly to annual to be in line with other annual reporting requirements. (OP_LACSD-16)

Comment:

Topic: Reporting 95470(b)

Potential Issues: {CARB staff note: Commenter quoted 45-Day Changes text of section 95470(b)(4).}

Concerns:

- Tight deadline for Quarterly Reports – fifteen calendar days after quarter end leaves very little time for data validation, QA/QC, and data correction.

Potential Alternative:

- Revise deadline for quarterly reports to be 45 days of the end of each quarter (similar to SCAQMD's quarterly Rule 1150.1 reports). (OP_SWMD-18)

Comment:

Topic: SEM 95471(c)

Potential Issues:

6. SEM report due by the 15th of the month following the quarter

Concerns:

- SEM report preparation and submittal by the 15th of the month following the quarter would be very difficult to achieve.

Potential Alternative:

- SEM report due date should be revised to be each quarter by the 45th day after the end of each quarter. (OP_SWMD-22)

Agency Response to Combined Comments:

CARB made changes in response to these comments. CARB extended the deadline for submitting Quarterly Monitoring Data Reports in the 15-Day Changes in response to the concerns raised by commenters. Allowing 30 calendar days after the end of each quarter to submit monitoring data reports provides sufficient time for quality assurance and quality control checks by the owner or operator to minimize submission of erroneous and incomplete data.

CARB did not adopt commenters' suggestions to reduce reporting frequency (such as semiannual or annual reporting), as timely submission of monitoring data is needed for effective regulatory oversight.

2. Annual Gas Collection and Control System Reports

H.2-1 Not all sites have capability to create geographic information system (GIS) files

Comment:

§ 95470(b) Reporting Requirements

The additional mapping requirements should consider that not all sites have the ability to produce shapefiles (.shp or .kml). (OP_WPWMA-13)

Comment:

Topic: Reporting 95470(b)

Potential Issues:

Annual Report - Most recent topographic map of the site in an electronic format compatible with viewing in a geographic information system (e.g., file formats of .shp or .kml) showing the following, with separate files as needed to show any changes during the calendar year:

- The perimeter of the permitted disposal area, the area of the landfill under which decomposable solid waste has been placed, and areas with daily, intermediate, and final cover, including the cover material type over the landfill surface.
- Area of the working face with waste in place less than 180 days, the date when filling began and the date surface emissions monitoring is conducted.

Concerns:

- Not all sites have prior experience producing shapefiles (.shp) or KMLs; conversion errors or missing attribute tables can delay submission. (OP_SWMD-17)

Agency Response to Combined Comments:

No changes were made in response to these comments. Electronic files compatible with geographic information system (GIS) software will significantly improve CARB's ability to make compliance determinations by enabling digital overlaying of map files with monitoring and other data. The Proposed Amendments allow submission in any GIS-compatible format, providing significant flexibility in what type of software platforms can be utilized for this requirement.

H.2-2 Clarify recordkeeping requirements and require reporting for cover integrity monitoring

Comment: Clarify recordkeeping requirements: CARB's current recordkeeping language under § 95470(a)(1)(CC) requires operators to maintain descriptions of monitoring procedures and records of completed repairs or maintenance. We recommend clarifying that operators must also document any observed cover integrity issues, including the date, location, observations of odors or deviations, and nature/severity of the issue, in addition to any corrective actions/repairs. This ensures that compliance is verifiable and that corrective actions are properly documented. (OP_CAW-74)

Comment: Clarify §95470(a)(1)(CC) to require documentation of all observed cover deficiencies, including the date, location, and corrective actions taken. (OP_CAW-86)

Comment: Require reporting of cover monitoring plans: Cover monitoring plans mandated in §95464(b)(6) should be submitted to CARB for review rather than maintained solely for recordkeeping purposes. In addition, the results of cover inspections should be reported quarterly– including any identified issues, observations, and actions taken to repair cover issues. Implementing quarterly reporting for cover monitoring would align with existing quarterly reporting requirements in § 95470(b)(4), all of which are fundamental to assessing the efficiency and effectiveness of landfill gas collection and control systems. This alignment will promote a more comprehensive understanding of landfill performance, ensuring that key elements of GCCS operation are tracked and evaluated together by regulators. (OP_CAW-75)

Agency Response to Combined Comments:

CARB made changes in response to these comments. In the 15-Day Changes, dates that monitoring occurred were added to the recordkeeping for cover integrity monitoring. No other changes were made in response to these comments. Section 95470(a)(1)(CC) as proposed in the 45-Day Changes already requires records demonstrating compliance with the cover integrity monitoring requirements, including a description of the monitoring procedures and records of repairs or maintenance. Records must be provided by the owner or operator upon request as specified in section 95470(a)(3). These requirements are sufficient to evaluate compliance with the cover integrity monitoring requirements.

H.2-3 Extend due date for annual reports

Comment: The annual report required under Section 95470(b)(3) will be much more extensive under the revised rule because of all of the additional monitoring, recordkeeping, testing, and documentation required. As such, landfills will need more time to compile, review, assess, and report on the information required in the annual report. We request an extension of the

deadline from March 15 to April 30 for report submittal. Since CARB will also be getting quarterly reports under the rule (Section 95470(b)(4)), this deadline extension is reasonable. (OP_L and D-6)

Comment:

Annual Reporting

The revised rule significantly expands the scope of the annual report. Kiefer will require additional staffing and requests an extension of the submission deadline from March 15 to April 30. (OP_SacCo-22)

Agency Response to Combined Comments:

No changes were made in response to these comments. Although the annual report includes additional information under the Proposed Amendments, standardizing and digitizing the reporting is also expected to simplify compliance and assist landfill operators in ensuring accurate and complete information is submitted, resulting in efficiency gains for owners or operators compared to the lengthy PDF reports CARB typically receives under the current Regulation. The existing deadline provides CARB with timely information needed for oversight.

3. Surface Emissions Monitoring Measurement Frequency (data points collected per second)

H.3-1 Reduce the number of readings per second required

Comment: CARB proposes to implement several new reporting obligations that will not serve to reduce emissions from MSW landfills, including:

- All SEM and component leak monitoring data, including concentration reading, location coordinates, and time and date of each measurement at each one hertz reading. See Sections 95470(a)(1)(D), 95470(a)(1)(F), 95470(b)(6)(D), 95471(c)(2)(A), 95471(c)(3)(A). Like the requirement imposed on technologies used for purposes of monitoring unsafe-to-walk surface areas, this obligation is inappropriate and technically infeasible. One second intervals would flood both operators and CARB with immense amounts of data with no additional benefit in terms of emissions reductions. Accordingly, WM requests that CARB revise the requirement to reduce the frequency to five seconds. (OP_WM-73)

Comment:

- Section: 95470(a)(1)(D) – SEM monitoring data & (a)1)(F)–Component leak monitoring data & (b)(6)(D)
- Current: Record time/date of measurements (i.e. each one hertz reading)
- Proposed: Strike reference of one hertz
- Rationale: Monitoring systems measure in five second intervals. Reducing intervals to one second could overwhelm system. (OP_WM-15)

Comment:

{CARB staff note: Commenter quoted 45-Day Changes text of section 95471(c)(2).}

In Section A the new requirement for 1 hz measurement frequency seems excessive. We have been doing 4 seconds (1/4 hz) since the beginning of the surface emissions monitoring program, and this process generates about 150 readings per 50,000 sf grid or one recorded reading every 300 to 350 sf. We recommend removing the frequency of data collection requirement. (OP_YoloCo-36)

Agency Response to Combined Comments:

No changes were made in response to these comments. As described in the ISOR, readings with at least one hertz frequency maximize the surface coverage of measurements within the typical capability of instrumentation already in use for surface emissions monitoring. This change effectively accomplishes tighter monitoring spacing without the need for additional labor time. This data recording and reporting frequency will also help to create a clear representation of the walking pathway so that CARB can confirm a compliant walking pattern (e.g., including monitoring all cover penetrations).

H.3-2 Support number of readings of per seconds required

Comment: Enhanced recordkeeping and reporting - § 95470(a)(1)(D): Requiring operators to record all SEM concentration readings, including coordinates, date/time, and a minimum collection frequency of one hertz, is a significant improvement in accountability and data quality. (OP_CAW-22)

Agency Response:

No changes were made in response to this comment. CARB appreciates the comment and thanks the commenter.

4. Scheduled Surface Emissions Monitoring Notification

H.4-1 Remove or change timing of scheduled SEM notifications

Comment: CARB proposes to implement several new reporting obligations that will not serve to reduce emissions from MSW landfills, including:

…

- SEM Notifications 15 days prior to monitoring event. See Section 95470(b)(5). This obligation may conflict with subcontractor availability and will provide no emissions reductions. It should therefore be removed. (OP_WM-76)

Comment:

{CARB staff note: Commenter quoted 45-Day Changes text of section 95470(b)(5).}

Section (5) is entirely impractical. Surface emissions monitoring is conducted when wind and precipitation requirements are met. A 15-day notice will almost always have no relation to the conditions needed for monitoring and will not result in any improvement to the monitoring event or the landfill's compliance. (OP_YoloCo-32)

Comment:

Section 95470 (b)(5)

Requiring at least 15 calendar days advance notice of scheduled surface monitoring is impractical. RCDWR's surface monitoring schedule is frequently affected by both wind conditions and staff availability. Given that wind conditions cannot be reliably forecast by the National Weather Service 15 calendar days in advance, RCDWR recommends reducing the notification requirement to 5 calendar days to ensure more accurate scheduling and effective monitoring. (OP_RIVCO-11)

Comment:

Topic: SEM 95471(c)

Potential Issues: {CARB staff note: Commenter quoted 45-Day Changes text of section 95470(b)(5).}

Concerns:

- What happens if the date of the SEM has to move due to site conditions or weather requirements. (OP_SWMD-24)

Comment: For example, under the proposed regulations owners/operators of every facility must notify the Executive Office of the scheduled date of all quarterly surface emission monitoring events at least 15 calendar days prior to the event. This means that ARB will receive four notifications each year from each of the 153 controlled facilities for a total of over six hundred notifications a year. For what purpose? It seems far-fetched to think that ARB has the program staff or capacity to travel to even a small fraction of those facilities to observe quarterly monitoring. As such, this merely creates another regulatory burden on owners/operators with practically no benefit to the state other than to create opportunities for ARB to determine an owner/operator was noncompliant with the regulations by failing to provide adequate notice of the monitoring event. (OP_RCRC-19)

Agency Response to Combined Comments:

No changes were made in response to these comments. Advance notification is necessary to enable regulators to observe surface emissions monitoring events to confirm they are performed in accordance with the requirements of the Proposed Amendments. As explained in the ISOR, staff selected a timeline of 15 calendar days in advance to provide sufficient time for travel and other logistical arrangements.

This notification does not lock in the monitoring date – the owner or operator can change to a different date as needed to accommodate weather, staffing, or other issues that arise.

H.4-2 Support advance notification of scheduled SEM

Comment:

- Advance notification to CARB - § 95470(b)(5): We strongly support requiring operators to notify CARB at least 15 days prior to conducting SEM. We are confident this change will facilitate more effective agency oversight and will enable CARB to conduct timely audits and compliance checks, as needed. (OP_CAW-24)

Agency Response:

No changes were made in response to this comment. CARB appreciates the comment.

5. Volume of Monitoring, Recordkeeping, and Reporting Data

H.5-1 Reduce volume of additional data collection, reporting and recordkeeping

Comment: CARB proposes to implement several new reporting obligations that will not serve to reduce emissions from MSW landfills, including:

…

- In the Annual GCCS Report, CARB would require the most recent topographic map of the site in a specific format, including the areas with daily intermediate, and final cover, as well as unsafe-to-walk surface areas. See Section 95470(b)(3)(E). Locations with daily cover and unsafe-to-walk surface areas change frequently; CARB should therefore specify that the map does not need to be updated every time the cover type changes in an area. (OP_WM-74)

Comment: The Regulation should not require costly additional data collection and reporting unless such data is necessary and useful to diagnosing conditions at the landfill. (OP_WM-22)

Comment: The updated rule has greatly increased monitoring, recordkeeping and reporting requirements. Our group appreciates the need for comprehensive data capture, analysis and reporting. However, it is important to achieve a balance between extensive data capture and corrective measures while maintaining the primary focus of gathering information that is causal and meaningful. Given that the 45-Day package is the first time we have seen specific regulatory language, we look forward to continued dialogue with staff in order to refine these requirements and achieve this balance. (OP_Ind/Gov Coalition-3)

Comment: In some instances, the proposed rule adds duplicative or excessive paperwork, which will burden landfill operators and possibly overwhelm CARB's ability to review the information. Data collection and reporting must be directly tied to compliance demonstrations and/or support reduction in landfill emissions. The regulation should not require data collection for purposes that do not result in emissions reductions. (OP_Ind/Gov Coalition-5)

Comment:

Regulations Contain Excessive Reporting and Notification Requirements

RCRC is concerned that the LMR revisions significantly increase reporting and notification requirements. We are particularly concerned that this increase in frequency and volume could have negative repercussions, including oversaturation causing desensitization and complacency among regulators. (OP_RCRC-18)

Comment: RCRC strongly encourages ARB to carefully consider which monitoring and reporting obligations are of sufficient public interest to retain in the regulations and discard the rest – particularly the notification of scheduled surface emission monitoring. (OP_RCRC-20)

Comment: The updated rule has greatly increased monitoring and reporting criteria. While we appreciate the need for comprehensive data capture, analysis and reporting, it is important to achieve a balance between extensive data capture and corrective measures while maintaining the primary focus of gathering information that is causal and meaningful. (OP_Recology-27)

Comment: We ask that CARB reassess these requirements to limit monitoring and reporting to what is necessary and meaningful. (OP_Recology-30)

Agency Response to Combined Comments:

CARB made changes in response to these comments. In the 15-Day Changes, the number of topographic maps that must be supplied was limited to four per year. No other changes were made in response to these comments. The Proposed Amendments strengthen and standardize monitoring and reporting to ensure operators are aware of changing conditions and potential problems, allowing for timely intervention to reduce emissions, GCCS downtime, and other operational complications. Proposed reporting requirements improve CARB's ability to evaluate compliance, assess emissions, and inform future policy decisions. The purpose and rationale of each change was provided in the ISOR.

H.5-2 Preserve data collection and reporting requirements originally proposed

Comment: The Proposed Amendments additionally improve data collection and reporting requirements, which we urge CARB to preserve in the final regulation. (OP_CAW-1)

Agency Response:

No changes were made in response to this comment. CARB appreciates the comment and thanks the commenter.

6. Other

H.6-1 Limit certification requirements to reports only

Comment: CARB proposes to implement several new reporting obligations that will not serve to reduce emissions from MSW landfills, including:

…

- CARB would require all submissions to contain certification by a responsible official of truth, accuracy, and completeness. See Section 95470(b)(9). This should only be required for submission of reports. (OP_WM-77)

Comment:

- Section: 95470(b)(9) – Certification by responsible official
- Current: Required for any report or information submitted in LMR.
- Proposed: Require for reports only
- Rationale: LMR contains significant notification requirements. Certifications should only be required for reporting. (OP_WM-18)

Agency Response to Combined Comments:

No changes were made in response to these comments. This comment is out of scope because it does not refer to any changes in the Proposed Amendments. Certification is required to warrant accuracy and completeness of all submitted information.

H.6-2 List which instrument calibration records must be kept

Comment:

- Section: 95470(a)(1)(EE) – Calibration records
- Current: Record calibration of any instrument that requires calibration under section.
- Proposed: Include list of required instruments.
- Rationale: Recommend including list of required instruments for clarity purposes. (OP_WM-16)

Agency Response:

No changes were made in response to this comment. The Proposed Amendments require operators to maintain calibration records for all instruments that are required by the Proposed Amendments to be calibrated. A specific list would not improve clarity.

H.6-3 Clarify formatting and methods for report and request submissions

Comment:

- §95470(b)(8) Electronic submission via CARB LMR Reporting webpage:
    - All reports, notifications, and requests must be submitted electronically; guidance needed on: District access while reviewing submissions.
        - Whether sources must email the District separately.
        - Timing of reporting for approvals (ACOs, SEM, well replacements).
    - Affected reports include rationale for failures, alternative compliance, alternative SEM, third re-monitoring, alternative well replacements, root cause analyses, remote plume information, SEM notifications, quarterly data, and annual reports. (OP_SMAQMD-29)

Comment:

{CARB staff note: Commenter quoted 45-Day Changes text of section 95470(b)(8).}

The current web page for reporting is an email address to send notifications and reports to. Will CARB be developing a portal to help with required online report submissions similar to the State Water Resource Control Boards (SWRCB) GEOTRACKER? Otherwise, our fear is the required notifications reporting will be lost in an email box and ARB staff will not have sufficient time to review/respond/approve as needed. (OP_YoloCo-33)

Comment: The Sanitation Districts also recommend that the proposed record-keeping and reporting requirements be aligned with existing SCAQMD 1150.1 electronic submissions to avoid duplication. (OP_LACSD-17)

Comment: Clarifying acceptable data formats and QA/QC requirements would be beneficial in reducing administrative burden. (OP_LACSD-18)

Agency Response to Combined Comments:

No changes were made in response to these comments. The Proposed Amendments require all reports, notifications, and requests to be submitted electronically through CARB's Landfill Methane Regulation reporting webpage, and the 15-Day Changes further clarified that standardized forms must be used if provided on that webpage.

H.6-4 Request training and transition period for digital reporting

Comment:

Expanded Digital Reporting

OCWR supports expanding digital reporting, as a standardized process would help improve reporting clarity and efficiency and facilitate accelerated data review and problem responses. However, the CARB's current proposed annual reporting template is very extensive and complex to navigate. Therefore, OCWR suggests training and a phased transition period to digital reporting. (OP_OCWR-12)

Agency Response:

No changes were made in response to this comment. In the 15-Day Changes, staff proposed that the reporting must use standardized forms for items where a form is provided. The Proposed Amendments specify the process for submitting reports. Further guidance is outside the scope of this rulemaking.

H.6-5 Add standardized method to calculate annual precipitation plus liquid

Comment: A standardized method with formula to calculate inches per year should be added to adjust the “Average Precipitation Plus Liquids”, specifically for adjustments for leachate or other liquids based on inputs in gallons per year and surface area reduction. (OP_WPWMA-15)

Comment:

Topic: Table 1 Average Precipitation Plus Liquids and k Values

Potential Issues: Determination of recirculation to precipitation equivalency.

Concerns:

- Calculation for average precipitation will need to be adjusted for leachate or other liquids addition but there were no details provided on how to standardize the calculation (in inches per year) for any liquids addition.

Potential Alternative:

Add a standardized formula/method to adjust the “Average Precipitation Plus Liquids” specifically for the adjustments for leachate or other liquids addition based on inputs for gallons/year and surface area or recirculation. (OP_SWMD-25)

Agency Response to Combined Comments:

CARB made changes in response to these comments. In the 15-Day Changes, additional detail was added in Appendix I to clarify how to calculate liquids addition.

I. Alternative Compliance Options

1. Submission of Alternative Compliance Option Records

I.1-1 Preserve previously approved ACOs

Comment: Section 95468 effectively repeals all existing alternative compliance measures approved by either ARB or local air districts unless and until those measures are re-approved by ARB. The regulations require owners/operators to submit all information regarding previously approved alternative compliance options by April 1, 2027, with any alternatives not resubmitted repealed effective January 1, 2028. Local owners/operators may not be able to resubmit all materials contained in the initial application, as it is not clear there was any expectation or requirement that they retain those materials once the measure was approved. If the previously approved alternative compliance option is revoked, the Executive Director should be required to provide written reasons for the revocation similar to the current requirement to "provide written reasons for the denial" of a new requested alternative that is in Section 95468 (c)(1).

Aside from undermining the authority of local air districts that have already approved alternative compliance measures, these provisions effectively give ARB a second bite at the apple to create a one-size-fits-all regulatory approach that experience has often proven is inappropriate in a state with as much regional, climactic, and operational diversity as California.

At a minimum, the regulations should be modified to provide owners/operators with adequate time to come into compliance with changes to previously approved alternative compliance measures rather than requiring immediate compliance upon revocation. The regulations should also allow adequate time and establish a process to appeal a revocation. (OP_RCRC-15)

Comment:

Topic: Alternative Compliance Plans 95468

Potential Issues:

1. Expire April 1, 2027 – Need to resubmit to continue and get new approval
2. CARB can revoke
3. Intermittent operation no longer an ACO but a different condition/regulation within rule
4. Allowed ACO for SEM per Rule:

    a) Wind/Rain requirements – need to show LF consistently experiences issues related to weather

    b) Alternative timelines for repairs if site can show issue with procurement or delivery issues or if weather impedes repairs.

5. No longer allowed:

    a) Alternative walking paths

    b) Exclusion areas due to danger in traversing

c) Paved roads.

Concerns:

- If an ACO has already been approved, why should it need to be re-submitted and subject to another review before being re-approved?

Potential Alternative:

- Grandfather in ACOs that have already been approved by Executive Officer or CARB. (OP_SWMD-10)

Comment:

Section 95468 – Alternative Compliance Options

In the proposed rule, CARB plans to eliminate several alternative compliance options (ACOs), tighten requirements for others, and require landfills to resubmit previously approved ACOs, which may be revoked. The proposed rules do not set approval timelines, making it unreasonable to delay implementation of an ACO—even if previously approved—until new approval is granted.

Recommendation: We strongly suggest that ACOs that have already been approved by CARB or the Executive Officer be grandfathered in, meaning operators would not be required to resubmit. (OP_Recology-8)

Comment: Under Section 95468, CARB…now requires resubmission of previously approved ACOs—allowing retroactive denial. (OP_SacCo-8)

Agency Response to Combined Comments:

Changes were made in response to these comments. In the 15-Day Changes, a 180-day period was provided after a determination is issued before the revocation takes effect. Additionally, a clarification was added to section 95467(a) that the process therein only applies to a system without an approved alternative compliance option (ACO) for semi-continuous operation. No other changes were made in response to these comments.

The Proposed Amendments do not repeal all existing ACOs or require all previously approved ACOs to be re-approved in order to remain in effect. An approved ACO remains in effect unless it is actively revoked by the Executive Officer pursuant to section 95468(d), or it is invalidated (as of January 1, 2028) because the operator fails to submit documentation pursuant to section 95468(e).

The Proposed Amendments maintain the 120-day Executive Officer review timeline of the current Regulation, however, the 15-Day Changes specify that the review begins upon submittal of any additional information requested.

Removal of examples of potential ACOs does not eliminate the ability for such an ACO to be requested and approved. See the agency response in section IV.I.2-1 for more information.

2. Examples of Alternative Compliance Option Requests

I.2-1 Retain existing examples of alternative compliance options

Comment: Process for Review and Repeal of Existing Alternative Compliance Measures is Troubling

RCRC is concerned by ARB's attempt to substantially shorten the list of examples of alternative compliance measures that may be issued by the Executive Officer. While the existing LMR contains six examples, the proposed regulations eliminate four of those and leave only two in place, including allowing owners/operators to require additional time for repairs or requesting alternative wind speed or precipitation requirements.

While we understand that the list in Section 95468 remains illustrative and is not limited to those enumerated examples, it is unclear why ARB is seeking to eliminate those alternative compliance options if they truly remain available to owners/operators. The ISOR seems to indicate that the changes are cleanup rather than substantive changes and that the "removed examples" are no longer necessary due to other changes in the proposed amendments. These statements are inconsistent and appear to signal that ARB will be significantly limiting the types of alternative compliance measures available to owners/operators.

Some of the alternatives proposed for deletion are still necessary despite ARB believing they are no longer necessary in light of other regulatory changes. Alternative compliance measures are needed to provide flexibility and respond to specific conditions at a given site, so it is disturbing that ARB is trying to take some of those alternatives off the table. For example, the existing alternative (proposed for deletion) for "(1) Semi-continuous operation of the gas collection and control system due to insufficient landfill gas flow rates" is still needed. The only other mention of insufficient gas flow is in Section 95464 (b)(2)(B)2 for routing collected gas to an open flare. Insufficient gas flow can occur with control systems that are not open flares. Attempting to collect gas when there is insufficient gas flow can result in subsurface fires. The proposed allowance for semi-continuous operation is limited to closed landfills and so will be unavailable for active landfills with low gas volumes (exactly where the allowance is needed). The existing alternative (proposed for deletion) allowing "(4) Alternative walking patterns to address potential safety and other issues, such as: steep or slippery slopes, monitoring instrument obstructions, and physical obstructions" may be needed for field verification of remote monitoring measurements. Similarly, the existing alternative (proposed for deletion) allowing flexibility to discontinue surface inspection of construction areas and other dangerous areas may be needed on a case-by-case basis.

ARB should maintain the existing list of alternative compliance options to ensure regulatory responses can be tailored to site specific conditions when the proposed one-size-fits-all solution is inadequate. ARB should also specifically allow for the issuance of alternative compliance measures to address safety-related concerns. (OP_RCRC-14)

Comment: Section 95468 (a): Subsection (4) should not be deleted. Per earlier comments, it may be practical, that in lieu of remote sensing in unsafe to walk areas, alternative walking patterns may be suitable. (OP_SWANA-29)

Comment: Kiefer Landfill frequently experiences weather conditions that necessitate ACOs to remain in compliance. Over the past year, the County has successfully applied for and received ACOs for each reporting period. Without these, the County would have violated time-

bound re-monitoring rules or failed to meet weather-related compliance windows (e.g., within 72 hours of wind or rain). Under Section 95468, CARB has removed several ACO options, made others more stringent… (OP_SacCo-7)

Agency Response to Combined Comments:

No changes were made in response to these comments. The Proposed Amendments streamline the list of examples because the deleted examples are not expected to be needed due to other revisions. ACO requests "may include, but are not limited to" the examples listed in section 95468(a)(1)–(2), as clearly stated in the regulation (both current and proposed).

3. Other

I.3-1 Support 120-day review timeline

Comment: The County is generally in favor of the 120-day review timeline for alternatives, and other items that are not part of the 'standard' compliance (semi-continuous operation, etc.). (OP_YoloCo-5)

Comment:

95468. Alternative Compliance Options.

We like this section, and the requirement for the Executive Officer to respond to a request within 120 days. (OP_YoloCo-43)

Agency Response to Combined Comments:

No changes were made in response to these comments. Note that in the 15-Day Changes, the timeline for GCCS semi-continuous operation and permanent shutdown requests was changed to 180 days and the 120-day review period for an ACO request was revised to begin upon submittal of any additional information requested.

I.3-2 Impractical to require advance ACO approval in writing

Comment: The automatic approval timeline has also been eliminated. Under the proposed rule, ACOs must be approved in advance, regardless of agency response time, which is unworkable. (OP_SacCo-9)

Comment:

Section 95468: Alternative Compliance Options

The Sanitation Districts commend CARB on allowing alternative compliance options (ACOs) to accommodate site- and case-specific situations. However, the proposed amendment under this subsection states that ACOs must be approved, in writing, by CARB or its delegated agencies before they become effective. The proposed amendments further state that "the Executive Officer will review the requested alternatives and either approve or disapprove the alternatives within 120 days". In many practical cases, remedial actions, including alternatives, must be implemented as soon as possible to ensure compliance. Therefore, timely regulatory approval from ACOs is essential. The Sanitation Districts recommend that a written notification

of the ACO's approval or disapproval from the Executive Officer be received within 30 days. (OP_LACSD-5)

Agency Response to Combined Comments:

CARB made changes in response to these comments. The language referred to in these comments regarding when a pending request becomes effective was deleted in the 15-Day Changes and described in the 15-Day Notice "Summary of Proposed Modifications" item 58.

Responding to an ACO request within 30 days as suggested would be impractical, as the Executive Officer must review the request, consider the criteria listed in section 95468(b), and ensure that any alternative provides equivalent methane control and enforceability as stated in (c)(2). Further, not all requests provide sufficient information for this determination, and therefore staff proposed in the 15-Day Changes to revise the 120-day review period to begin upon submittal of any additional information requested.

I.3-3 Revert to existing language for Section 95468 and establish ACO review committee

Comment: Under Section 95468, CARB has proposed to remove multiple options for alternative compliance options (ACOs), made others more stringent, and added a requirement that mandates landfills resubmit previously approved ACOs, allowing CARB or the districts to take them away after the fact despite past regulatory approval. CARB has also proposed taking away the timeline when ACO's would be automatically approved if CARB or the districts did not respond in a certain amount of time. Under the proposed rule, ACOs could only be implemented if approved in advance, regardless of how long it takes an agency to review and approve them.

The proposed changes are very unreasonable in light of the reality of current regulatory situation with ACOs under the LMR. This will almost guarantee that no other alternatives will ever be granted, and existing approved ones will be rescinded. In fact, which appears to be what CARB is trying to accomplish here. To begin with, CARB and the districts can take months and even years to review and act on ACO requests. Without a deadline by which they must act, ACO requests will be ignored, leaving landfills in a state of limbo with respect to their need for an AOC to achieve compliance and the agencies' unwillingness or inability to respond in a timely manner. Further, in light of the fact that CARB and the districts have rejected almost all recent ACO requests, even those with strong justification, this suggests that the provision to allow reconsideration of past ACO approvals will lead to those being rescinded.

Since the ACO process is difficult enough as it is, we request that CARB not change these ACO provisions, and instead establish a committee within CARB, and possibly including key air districts, who will be responsible for timely review and approval/disapproval of ACO requests. (OP_L and D-35)

Agency Response:

CARB made changes in response to this comment. The language regarding written approval before effectiveness of pending requests was deleted in the 15-Day Changes and described in the 15-Day Notice "Summary of Proposed Modifications" item 58. No other changes were made in response to this comment.

The Proposed Amendments maintain the 120-day timeline for the Executive Officer to review and either approve or disapprove an ACO, however, staff proposed in the 15-Day Changes to revise the period to begin upon submittal of any additional information requested.

The rationale for requiring submission of documentation for previously approved ACOs is provided in the ISOR. The Proposed Amendments do not repeal all existing ACOs or require all previously approved ACOs to be re-approved in order to remain in effect. An approved ACO remains in effect unless it is actively revoked by the Executive Officer pursuant to section 95468(d), or it is invalidated (as of January 1, 2028) because the operator fails to submit documentation pursuant to section 95468(e).

The request to establish a committee for ACO review is outside the scope of the Proposed Amendments because no changes were proposed in how ACOs are evaluated.

J. Uncontrolled Landfills

1. Heat Input Capacity Calculation for Small, Uncontrolled Landfills

J.1-1 Maintain 450,000-ton waste-in-place threshold for calculating heat input capacity

Comment: Eliminating applicability for active landfills with 450,000 tons in place will have a significant impact on smaller landfills and municipalities by imposing additional monitoring and reporting that is not warranted. The original LMR language should stay in place. (OP_SWANA-5)

Comment:

Eliminating Applicability for Active Landfills with 450,000 tons in Place

The LMR as originally written provided control and regulation of greater than 94% of landfill gas generated in the State of California. Going after the remaining 6% (likely smaller landfills) was not practical nor cost effective. The use of 450,000 tons of waste in place was an effective threshold for characterizing when landfills should determine if a landfill gas collection system is needed. Effected smaller landfills are generally operated by small municipalities where, given their financial constraints, are helped by indicators that may be easily measured, such as “waste-in-place”. If instead, the starting point is calculating landfill gas heat input capacity for any active landfill below the 450,000 tons of waste in place level, that may result in excessive cost to small municipalities with no evidence that these sites are contributing problematic levels of methane to the environment. In fact, a “tons in place” threshold is used because installing gas collection systems on very small landfills is not cost effective and is often problematic to operate because of the low methane quality of the gas, as well as the possibility of pulling in too much oxygen due to the shallow nature of these sites.

We recommend that Section 95463 not be modified. (OP_SWANA-14)

Comment:

Proposed Changes to Exemptions and Requirements for Landfills With Less Than 450,000 Tons Waste-in-Place Should Be Revised

Section 95462 (b) changes the scope of the exemption for landfills that only “receive” construction and demolition wastes, inert wastes, or non-decomposable wastes by limiting the exemption to those facilities that “contain” only these waste types. Wastes contained within sites that may have once received other types of waste likely do not contain enough organic materials to generate methane emissions. As a result, the proposed regulatory expansion is unwarranted and will have little, if any, environmental benefit.

Section 95463 subjects landfills with less than 450,000 tons waste-in-place and that install a gas collection and control system to the full scope of the proposed regulations. These smaller landfills may not have sufficient landfill gas to maintain continuous gas collection and control and can only operate intermittently. Unfortunately, intermittent operation of a gas collection and control system is not adequately considered in the proposed regulations. Under existing law, these active MSW landfills with less than 450,000 tons waste-in-place are only required to submit a waste-in-place report and maintain the system. Imposing the full scope of the regulatory requirements on smaller landfills will disincentivize owners/operators from installing a landfill gas collection and control system.

The Economic Analysis in Appendix B does not reflect the impact of the proposed regulations on these smaller landfills. The cost per ton of implementing the proposed regulations on these smaller landfills is significantly greater than larger sites and would make voluntary installation and operation of a gas collection and control system unaffordable.

Maintaining the current ability for active landfills with less than 450,000 tons waste-in-place to continue to submit the annual waste-in-place report would better incentivize the voluntary installation of gas collection and control systems before exceeding the 450,000 tons waste-in-place threshold.

For these reasons, ARB should instead continue to allow active MSW landfills with less than 450,000 tons waste-in-place to submit the annual waste-in-place report. (OP_RCRC-2)

Agency Response to Combined Comments:

No changes were made in response to these comments. The Proposed Amendments are not expected to result in any additional landfills needing to install a GCCS; the proposed changes to section 95463 are intended to simplify the requirements for uncontrolled landfills and streamline reporting.

The exemption for closed or inactive landfills with less than 450,000 tons of waste-in-place remains in effect as clearly stated in section 95462(c). For active, uncontrolled landfills with less than 450,000 tons of waste-in-place, the Proposed Amendments require calculation of heat input capacity, which as explained further on p. 18 of the ISOR, staff expects will be a negligible additional effort over the existing waste-in-place reporting that does not result in additional costs. Note that a landfill is defined as uncontrolled if it does not route collected gas to a gas control system that destroys methane (refer to the proposed definitions of “Controlled MSW Landfill” and “Uncontrolled MSW Landfill” and the agency response in section IV.F.7-8 for more information).

Staff notes that any landfill which operates a GCCS is subject to the current regulation unless it meets an exemption in section 95461 and 95462.

For more information regarding the criteria for uncontrolled landfills to fulfill the requirements of the regulation, refer to the agency response in section IV.J.1-3.

The rationale for changing “contain” to “receive” is provided on p. 17 of the ISOR and OP_RCRC-2 does not address that provided rationale in requesting reversion of the language.

J.1-2 Allow site-specific waste characterization for heat input capacity calculations

Comment:

The Calculation of Heat Input Capacity for Uncontrolled MSW Landfills Should Allow Site Specific Values

Under the proposed regulations, uncontrolled MSW landfills shall submit an Annual Uncontrolled Landfill Report to the Executive Officer, which includes a calculation of the landfill gas heat input capacity based upon the formula in Appendix I. That formula in Tables 2A and 2B is based upon Facility and Disposal-Based Characterization of Solid Waste in California conducted by CalRecycle and its predecessor the California Integrated Waste Management Board. These values are based upon average compositions of various landfills. As jurisdictions implement the organics diversion programs associated with CalRecycle’s SB 1383’s regulations, the organics compositions will decrease and result in less methane-generating materials being disposed in landfills. Some of these jurisdictions are conducting site specific waste characterization studies at the landfill that would be more valid than the standard values used in Appendix I.

For this reason, the proposed regulations should provide an option to use site specific waste characterization when calculating the landfill gas heat input capacity. (OP_RCRC-3)

Agency Response:

No changes were made in response to this comment. The calculation of heat input capacity relies on site-specific records of the total amount of solid waste (in tons) deposited each year the landfill was in operation. Because the majority of landfills lack historical waste characterization data, Appendix I specifies the statewide average composition (and related carbon content and degradability parameters). Site-specific waste-characteristic measurements collected only in recent years would not meaningfully alter heat input capacity estimates. Therefore, using statewide waste composition data provides the most representative and cost-effective basis for estimating heat input capacity for all landfills in California.

J.1-3 Clarify responsibilities closed, uncontrolled landfills

Comment:

Topic: Grandfathered Existing Conditions specifically GAC or other treatment systems (aka not active controlled operations)

Potential Issues:

- “Uncontrolled MSW Landfill” means a MSW landfill that is not a controlled MSW landfill. MSW landfills that use a passive venting or carbon adsorption system are uncontrolled MSW landfills.
- Uncontrolled MSW Landfills: By March 15, 2027, each owner or operator of an uncontrolled MSW landfill (as defined in section 95475) shall calculate the landfill gas heat input capacity pursuant to section 95471(b) and shall submit an Annual Uncontrolled Landfill Report to the Executive Officer.
- Submit an Annual Uncontrolled Landfill Report by March 15 each year to the Executive Officer until either of the following conditions is met:
- The calculated landfill gas heat input capacity is greater than or equal to 3.0 MMBtu/hr recovered, or
- If the MSW landfill is active, the owner or operator submits a Closure Notification pursuant to section 95470(b)(1). Submitting the Closure Notification fulfills the requirements of this subarticle. If the MSW landfill is closed or inactive, submittal of the Closure Notification is not required to fulfill the requirements of the subarticle.

Concerns:

- How are grandfathered sites going to be treated under the proposed review? Specifically related to already approved and installed GAC systems?
- Will closed sites need to resume completing annual Heat Input Capacity (HIC) report – using lower 970 heating value for calculation – Report due March 15th?
- Will closed sites that are completing annual SEM need to restart the 4 consecutive quarters without exceedances requirement?

Potential Alternative:

- No requirement for Annual Reporting and calculating HIC annually.
- No requirement for restarting quarterly SEM if site has already been without SEM exceedances for 4 consecutive years. (OP_SWMD-2)

Agency Response:

No changes were made in response to this comment. The Proposed Amendments do not alter the current Regulation’s criteria for uncontrolled landfills to fulfill the requirements of the regulation pursuant to 95463(b). Landfills with passive venting or GAC systems are “uncontrolled MSW landfills” as defined in 95475.

Uncontrolled landfills that have fulfilled the current Regulation’s requirements pursuant to section 95463 (including submittal of all required reports) prior to the effective date of the Proposed Amendments are not required to submit the Uncontrolled Landfill Report in 2027 to re-demonstrate that they are not subject to the Proposed Amendments. This includes uncontrolled sites that:

- are closed and have less than 450,000 tons;
- are closed and have heat input capacity less than 3.0 million British thermal units per hour (MMBtu/hr); and
- are closed and have demonstrated there is no measured surface concentration of methane of 200 ppmv or greater through four consecutive quarterly monitoring periods.

Owners or operators of uncontrolled sites who have any uncertainty about their regulatory status are encouraged to meet with staff.

2. Remotely-Detected Methane Emission Plumes at Uncontrolled Landfills

J.2-1 Remote plume notifications at uncontrolled landfills

Comment: Based on our experiences with remote satellite monitoring we provided several suggestions for revising the rule:

Applicability for GCCS installation or decreased operation or system removal

A detection above the SEM threshold conducted in response to a remote detection should not trigger GCCS installation (OP_WM-47)

Comment: Uncontrolled landfills that are otherwise exempt from SEM requirements should not be required to conduct SEM over the entire surface of the landfill in response to a remotely detected plume. CARB should retain its voluntary validation and notification program for uncontrolled MSW landfills that receive a satellite detection as has been done in the past. (OP_WM-49)

Comment: We have serious issue with the requirement that landfill not even subject to the full LMR requirements yet (or ever) must conduct any monitoring in response to a remotely detected plume. We request that provision be removed from the rule, and, instead, CARB should make that requirement voluntary for those uncontrolled MSW landfills, as has been done in the past. It seems unfair for a landfill that meets exemption requirements for a rule be required to comply with SEM provisions in that rule. (OP_L and D-38)

Agency Response to Combined Comments:

No changes were made in response to these comments. As discussed in the ISOR, a remote plume detection suggests a potential emission source at the landfill. This requirement only applies to uncontrolled landfills that have a heat input capacity of 3.0 MMBtu/hr or greater and are therefore already required to perform quarterly SEM to demonstrate there are no concentrations of 200 ppmv or greater (section 95463(b)). Performing instantaneous surface emissions monitoring in response to the plume detection is important to establish whether there is an exceedance over the regulatory limit that would require installation of a GCCS.

J.2-2 Do not require GCCS installation based on remote plume detection alone

Comment: Remote monitoring detections are not an appropriate basis for the mandatory application of regulatory requirements, especially the capital and labor-intensive installation of a GCCS. As set forth herein, significant issues remain with respect to the detection capabilities of emerging measurement technologies relative to the unique characteristics of MSW landfills and LFG, and the quantification methodologies that convert such detections to assumed emission rates, are likewise undeveloped, and in many cases, proprietary. These technologies should not be the basis on which GCCS requirements are triggered. (OP_WM-68)

Agency Response:

No changes were made in response to this comment. Remote monitoring detections alone do not trigger the requirement for GCCS installation under the Proposed Amendments. Section 95469(b)(3) requires the owner or operator to perform instantaneous SEM according to the across the entire landfill surface.

J.2-3 Reduce time to respond to remote plume notification at uncontrolled landfills

Comment: Delayed timelines for uncontrolled landfills - § 95469(b)(3): Under the draft amendments, uncontrolled landfills are given 30 days to complete follow-up SEM after notification of a plume from CARB and 35 days to report to CARB on their findings and mitigation actions. In CARB's Initial Statement of Reasons (hereinafter referred to as "ISOR"), staff explained that this longer timeline is intended to provide additional coordination time to complete monitoring over the landfill surface. However, this delay is inconsistent with the urgency and scale of emissions to be captured under the SERP. Super emitter events represent major, active methane releases that can persist and intensify if not addressed quickly.

We recommend shortening this timeline to 14 days for follow-up SEM and 21 days for reporting. This adjustment would ensure that response actions occur promptly while still allowing adequate time for planning and logistics. (OP_CAW-13)

Comment: Shorten follow-up and reporting timelines for uncontrolled landfills under the Super Emitter Response Program (SERP) to 14 days for SEM completion and 21 days for reporting. (OP_CAW-17)

Agency Response to Combined Comments:

No changes were made in response to these comments. For uncontrolled landfills, the purpose is to ensure monitoring occurs to establish whether there is any surface methane concentration of 200 ppmv or greater that would then trigger GCCS installation, rather than rapid mitigation of the source. A timeline of 30 days recognizes the additional time needed to coordinate and complete surface emissions monitoring over the entire landfill, rather than the more targeted area that must be monitored in response to a plume notification at a controlled landfill.

3. SEM Demonstration for Landfills over Heat Input Capacity (HIC) Threshold

J.3-1 Do not require GCCS installation in response to a single 200 ppmv exceedance at a landfill over the heat input capacity threshold

Comment: One detection of methane above the 200 ppmv threshold should not trigger regulatory obligations.

The Draft Regulation would require compliance with Sections 95464 through 95476 of the Rule where a landfill has a landfill gas heat input capacity greater than or equal to 3.0 MMBtu/hr recovered and where there is a measured concentration of 200 ppmv methane or greater

using the instantaneous SEM procedures under Section 95471(c)(1) and (c)(2), including monitoring performed in response to a remotely detected emission under Section 95469(b)(3). See Section 95463(b)(2). Importantly, Section 95464 contains the GCCS requirements.

This "one-hit trigger" of an instantaneous SEM detection of 200 ppmv to require GCCS installation is inappropriate and must be revised to allow for operators to first conduct corrective action where the methane was detected. Surface detections of methane can occur for a wide variety of reasons, especially at the extremely low detection threshold of 200 ppmv. There is no opportunity or incentive for sites—specifically closed sites—to remediate an exceedance and demonstrate effectiveness of such corrective measures with re-monitoring. Such inflexibility for closed sites particularly limits short-term reduction opportunities. Moreover, particularly for closed sites, the Draft Regulation may actually increase emissions by disturbing certified final cover to require installation of a new GCCS. Such a requirement could also be in direct conflict with federal and/or solid waste requirements.

…

In this respect, only if, after two attempts to conduct corrective action in accordance with Section 95469(a)(1)(B), the leak continues to exist, should operators be required to install GCCS and comply with Section 95464 through 95476 of the Rule. (OP_WM-67)

Agency Response:

No changes were made in response to this comment. This comment is out of scope of the rulemaking because no changes were made regarding the GCCS installation criteria discussed in this comment. Uncontrolled landfills with heat input capacity of 3.0 MMBtu/hr or greater are already required under the current Regulation to install a GCCS if they are unable to demonstrate there are no concentrations of 200 ppmv or greater (section 95463(b)). These factors indicate that the landfill generates sufficient landfill gas to sustain operation of a GCCS. Exceeding the 200 ppmv threshold confirms that the landfill cannot adequately control methane emissions without installing a GCCS.

K. Regulatory Partners

1. Pre-rulemaking Engagement with Regulatory Partners

K.1-1 Ensure early and meaningful engagement with air districts during rule development

Comment: As the local agencies responsible for direct enforcement of LMR provisions, air districts should be actively engaged as co-regulators in rule development. While CARB staff informed districts that changes to the regulation were planned, there was no opportunity provided for meaningful collaboration or feedback during the drafting of the proposed LMR amendments. Instead, districts were asked to provide comments during the public comment period. Early and ongoing engagement would help ensure that the regulation is both effective statewide and feasible to implement locally. (OP_SDAPCD-1)

Comment: While we value CARB's work on these regulations and share the goals of reducing pollution from landfills, we note that Sac Metro Air District was notified of the proposed rules only after public notification, leaving very limited opportunity for collaborative discussion. As co-implementers of the regulation, we are disappointed that we were not included in any

working groups prior to publication and that the proposal was not brought to CAPCOA or other forums where our experience with these sources could have meaningfully informed the proposed changes. (OP_SMAQMD-1)

Comment: We have concerns of the process as California Air Resources Board (CARB) reached out to South Coast AQMD and other air districts that the proposed LMR was open for comments on Friday, October 31, 2025, after a single Public Workshop on December 18, 2024. We encourage CARB to greatly improve collaboration in this effort and future rule development processes to allow air districts the opportunity to share their first-hand experiences to improve rule clarity and effectiveness. Due to the breadth of proposed changes to the LMR and the limited duration for review (four business days between being notified and when comments are due), staff's comments are brief and incomplete. (OP_South Coast AQMD-1)

Agency Response to Combined Comments:

No changes were made to the Proposed Amendments as a direct result of the specific text of these comments. In response to these comments and in preparation for the 15-Day Changes, CARB worked closely with air districts following the November Board meeting and into the spring, including meetings between senior leadership, technical staff across districts, presenting at standing California Air Pollution Control Officers Association (CAPCOA) board and committee meetings, soliciting informal feedback, and following up with individual air districts.

CARB values our regulatory partners at local air districts, many of whom jointly implement and enforce the LMR and have made key contributions to the development of the Proposed Amendments based on their on-the-ground experience implementing and enforcing the Regulation. In addition to engagement with air districts after the November Board meeting, CARB staff engaged with air districts early in the pre-rulemaking process, including a March 2023 meeting ahead of the first public workshop (May 2023), where CARB staff presented on concepts for potential changes to the LMR and sought feedback from district staff. Some districts remained engaged in the process and provided input as CARB refined concepts and presented updates in two subsequent public workshops and a community meeting from 2023–2025. Further, CARB staff confirmed that at least one contact from each air district was included on the emailing lists for the first public workshop in 2023 and the public release of the 45-Day Changes on September 23, 2025, and provided the link to sign up for the emailing list in every public workshop and community meeting. CARB staff will continue coordinating with air district staff and are committed to working closely with our air district partners throughout implementation.

2. Air District Implementation Resources

K.2-1 Reassess cost estimates; provide funding and staffing support for expanded district responsibilities

Comment: The cost analysis for air district resource impacts is lacking and greatly underestimates actual implementation efforts, which include permitting and enforcement activities. Lack of resource considerations for the air districts will significantly hinder the implementation and enforcement of the proposed LMR. (OP_South Coast AQMD-7)

Comment: SDAPCD is also concerned that the local resources that are required to implement and enforce the proposed rule are underestimated in the rule analysis. The proposed changes significantly expand the level of review and approval required by permitting staff of local districts, including:

- Design Plan Requirements: In addition to submitting and maintaining design plans and modifications, landfills now must submit design plans for control systems (flares, engines, etc.)
- Surface Methane Monitoring: Expanded coverage and frequency would require additional data verification.
- Additional Approval & Review: Alternative Compliance Options, Component Monitoring Plans, and requests for alternative remedies, etc., all that require review, approval, and verification of compliance.

Further, based on SDAPCD's analysis, it would require additional full-time employee (FTE) positions to fully enforce the revised rule, including adequate review design plans, and evaluation of compliance reports expanded monitoring data.

Given that SDAPCD is the primary implementing and enforcement agency for enforcement of landfill air pollution requirements in San Diego County, successful execution of the amended regulation will depend on adequate resources and corresponding financial support. We respectfully request that CARB provide additional funding through the existing Memorandum of Understanding (MOU) between CARB and the air districts to cover the increased workload, staffing, and technical training required by these amendments. Such funding would reinforce CARB's partnership with local agencies and ensure the regulation's success while maintaining the integrity of enforcement programs across the state. (OP_SDAPCD-3)

Comment:

Resources for Implementation

While we welcome the improvements to the regulation, Air District staff share the concerns expressed by other air districts regarding the resources required for implementation. As co-implementers of this rule, air districts and CARB need to work together to ensure there is an accurate understanding of implementation costs and that those costs are equitably addressed. (OP_BAAD-5)

Comment: In the spirit of interagency collaboration, it is important to share our concerns regarding the limited engagement opportunities in developing the proposed amendments, and how they will substantially expand both the scope and intensity of local enforcement responsibilities without funding to support the expanded tasks associated with the proposed amendments. If the LMR continues to be implemented locally through CARB/air district MOUs, the proposal would impose significant unfunded staffing and administrative requirements on air districts that oversee a large number of regulated landfills across diverse geographic conditions.

The District's initial review of the proposed amendments identifies several key areas that will increase regulatory workload and inspection time well beyond the current LMR framework. For illustrative purposes, the following identifies a few examples of resource impacts to air districts potentially responsible for enforcement of LMR under MOUs:

Expanded Wellhead Monitoring and Data Analysis (§95469(e)): The new requirements add continuous or weekly checks for pressure, temperature, oxygen, methane, CO_2, carbon monoxide, and liquid levels. Each of these parameters carries its own follow-up and corrective-action timeline.

Enforcement Impact: Review of multi-parameter datasets, trend analyses (temperature ±20 °F and O_2 ±2%), and verification of corrective actions will significantly increase the time required per inspection. The District estimates at least a two- to threefold increase in data review and reporting verification per site.

Satellite and Remote Plume Response (§95469(b)): The new section requires landfill operators to inspect and report on CARB-identified methane plumes within five days. While the District supports the integration of remote-sensing tools, these notifications will also trigger District oversight to verify operator responses, documentation, and follow-up actions.

Enforcement Impact: Each notification will generate multiple staff hours for tracking, correspondence, and verification.

Enhanced Surface Monitoring and Working-Face Inclusion (§95465–95471): By removing the working-face exclusion and establishing escalation to monthly SEM for recurring exceedances, the regulation increases both the monitored surface area and the frequency of required inspections.

Enforcement Impact: Staff will need to review more detailed surface monitoring data, validate escalation logic, and confirm ALD (Advanced Leak Detection) equivalency approvals—all requiring specialized training and more field time.

Expanded Reporting and Recordkeeping (§95470): The proposed electronic reporting and new data fields (e.g., coordinate precision, one-hertz data, ALD/satellite records) will require additional time to validate and archive. Without standardized reporting software, District staff will need to manually review large data sets.

Semi-Continuous Operation and Permanent Shutdown Provisions (§95467): The new multi-year demonstration and simulated-shutdown requirements will require long-term tracking and periodic verification, further adding to administrative workload.

The Initial Statement of Reasons (ISOR) estimates statewide air district costs of approximately $139,198 per year and only $417,594 over three years, with no identified funding source to offset those costs. This estimate significantly understates the projected resource needs for air districts like ours. Based on the proposed requirements, as described above, the District anticipates a substantial increase in enforcement labor hours that cannot be absorbed within existing inspection and engineering resources.

To ensure effective, ongoing collaboration between CARB and air districts through a successful and equitable implementation process, the District respectfully requests that CARB work with air districts to reassess cost estimates in the ISOR to reflect realistic staff-hour demands and travel requirements; and commit to sufficient, ongoing implementation funding for local air districts. Additionally, the District would like to continue building on our strong working relationship with CARB by recommending that an implementation workgroup be established to develop the guidance and training resources necessary for successful implementation of the LMR. In summary, the District urges CARB to work collaboratively with

air districts as necessary to ensure that the regulation can be implemented effectively and equitably across California. (OP_SJVAPCD-1)

Comment: Given the compressed timeline, our review and submission of comments were conducted on an accelerated basis. Our review identifies several areas of concern that could significantly impact operational requirements, monitoring, reporting, and enforcement, most notably a substantial increase in oversight for districts with MOUs, which translates to significant resource and cost implications. Considering these factors, primarily the issue of resources, we are taking a neutral position on this regulation. We hope that in the future, CARB will engage CAPCOA and local air district resources earlier in the rulemaking process to allow for more thorough review and meaningful input. (OP_SMAQMD-2)

Comment: Key concerns include:

- Substantial increases in monitoring, reporting, and operational requirements, including semiannual liquid level monitoring, continuous pressure monitoring, enhanced well temperature monitoring, recurring exceedance tracking, alternative compliance plans, and unsafe-to-walk surface monitoring. These create significant administrative burdens for both regulated sources and District staff. The resource risk is substantial and cannot be borne by the permit holder; even in a district with a small number of sources, enforcement workload would significantly increase, and these costs cannot reasonably be passed to a few sources. (OP_SMAQMD-3)

Comment: Key concerns include:

…

- Funding and Administrative Feasibility: The proposed LMR would substantially increase monitoring, reporting, and enforcement workload for districts. Many landfills are publicly owned, and existing district fee schedules generally do not allow recovery of these costs without rule changes. Given the current economic conditions, it is unlikely that district boards would approve a large fee increase, particularly because it would affect only a small number of sources. Nevertheless, MOUs place the responsibility for implementing and enforcing this regulation squarely on districts. The ISOR estimate of roughly $400,000 statewide (Economic Impacts Assessment, ISOR pp. 140-145) significantly underestimates the true administrative, monitoring, and enforcement burden and does not reflect the actual staff effort required. Without a practical funding mechanism, consistent statewide implementation is at serious risk. (OP_SMAQMD-8)

Agency Response to Combined Comments:

CARB updated the economic analysis in response to these comments. CARB staff appreciate the engagement and input from air districts on the costs and resource impacts of the Proposed Amendments as well as cost information on the overall implementation of the landfill regulations. As a result of air district engagement, in the 15-Day Notice, staff updated the cost analysis for air districts that implement and enforce the LMR through memoranda of understanding. For the updated cost analysis, staff primarily relied on the estimates (e.g., in hours per task) of resource impacts to implement new provisions of the LMR amendments submitted by air districts, with adjustments where CARB had available data to estimate the number of landfills expected to invoke a particular provision or the number of events expected to occur.

This resulted in an increase to the estimated costs that may be incurred by air districts for implementing the changes in the Proposed Amendments.

While staff's updated cost analysis only focuses on the potential cost impacts of these Proposed Amendments, CARB recognizes that ongoing costs for conducting regulatory oversight over landfills for both the existing Landfill Methane Regulation requirements as well as other local rules can be significant, particularly when issues of noncompliance arise or permitting changes are needed. Given these existing resource demands on air districts, and the ongoing challenges that public agencies face in securing resources for implementation, CARB staff worked to identify and take responsibility for a number of new regulatory provisions in an attempt to minimize additional impacts on our local air district partners (e.g., CARB will take responsibility for evaluating and approving alternative SEM procedures since they will apply statewide when approved). CARB staff are also working to streamline existing implementation through improvements to reporting procedures and other administrative functions in an effort to further leverage existing staffing and improve the efficiency of regulatory implementation. CARB staff look forward to continuing to work closely with air districts to ensure successful implementation of both the existing Regulation and the Proposed Amendments.

K.2-2 Develop implementation workgroup; provide detailed guidance and training for monitoring, reporting, and enforcement

Comment: The SMAQMD strongly recommends CARB provide additional clarification, guidance, and implementation details on the following:

- Monitoring and reporting responsibilities for the new semiannual, continuous, and enhanced monitoring requirements.
- Definitions and applicability of gas collection system components, interior/exterior wells, and exemptions for treated fuel engines.
- Procedures and timelines for follow-up on alternative monitoring, unsafe-to-walk areas, remotely detected plumes, recurring exceedances, and SEM exceedances across multiple cracks.
- District access to electronic submissions and how to coordinate review responsibilities under MOUs.
- Funding and administrative feasibility: The proposed LMR will require significantly more staff time and administrative oversight than existing landfill programs. Because current permit fees cannot support these additional obligations, CARB should consider funding mechanisms or implementation. Sac Metro Air District's review indicates that the fiscal impact described in the ISOR substantially underestimates the actual workload and financial burden on districts. Without adequate funding or flexibility, implementation consistency and enforcement effectiveness will be difficult to achieve.

Sac Metro Air District appreciates CARB's continued efforts to reduce emissions from landfills and supports the intent of the proposed regulation. We hope CARB will consider the changes and clarifications outlined in this letter, particularly those related to implementation resources and funding, to ensure that the regulation can be effectively and consistently carried out across all districts. (OP_SMAQMD-35)

Comment: Key concerns include:

…

- New reporting pathways via the CARB LMR Reporting webpage, requiring guidance on how the District will access, review, and track submissions, including approvals, alternative compliance, and notifications. (OP_SMAQMD-7)

Comment: Key concerns include:

…

- Enforcement and compliance challenges, including follow-up for alternative monitoring procedures, remotely detected plumes, recurring surface exceedances, and reporting of SEM exceedances across multiple cracks or disturbed areas. (OP_SMAQMD-5)

Agency Response to Combined Comments:

No changes were made in response to these comments. CARB is committed to continuing to work closely with districts to ensure successful implementation, including on the items identified in these comments. Note that in the 15-Day Notice, staff updated the cost analysis for air districts to reflect higher implementation costs as further described in the agency response in section IV.K.2-1.

K.2-3 Higher operating value approval authority

Comment: The Initial Statement of Reasons (ISOR) staff report incorrectly assumes air districts have delegated authority for provisions in federal regulations related to wellhead higher operating values. Currently, U.S. EPA staff reviews and approves such requests. The proposed LMR shifts that responsibility to the air districts, adding workload without consideration of the available resources at or costs to the air districts. (OP_South Coast AQMD-8)

Agency Response:

No changes were made in response to this comment. CARB recognizes that air districts do not have delegated authority to approve higher operating values (HOV) for individual wellhead temperatures under federal rules, and the Proposed Amendments do not require districts to evaluate such requests. The Proposed Amendments are designed to avoid the need to issue higher operating values for temperature by setting the corrective standard to 145 °F, while the requirements for wells that exceed the 131°F threshold help to prevent temperatures exceeding the 145°F standard and ensure such exceedance is promptly detected. Therefore, staff does not expect that air districts will need to review HOV requests under the Proposed Amendments.

In 15-Day Changes, CARB added a requirement for operators to notify CARB of any request for HOV for temperature from another regulatory agency by submitting the request and any supporting documentation, and any approval or denial issued by that agency, so that CARB and districts will be informed of conditions at a landfill when evaluating compliance data or planning compliance inspections, and understand what conditions and monitoring provisions have been approved under other regulatory structures.

3. Air District Memoranda of Understanding and Compliance Timing

K.3-1 Delay amendments effective date until air district MOUs are updated

Comment: Many Air Districts have memorandums of understanding with CARB to enforce CARB's existing LMR. {Footnote: WM understands these MOUs would need to be updated for Air Districts to enforce the revised LMR.} (OP_WM-26)

Comment:

Effective Date of the Regulations

The proposed amendments to the LMR are extensive and will require additional equipment deployment, enhanced field work and corrective action as well as additional regulatory notifications, reporting and oversight. The functionality of the original LMR was largely due to the successful delegation of authority to implement its provisions to the local air quality management districts (AQMDs). This was a critical step required in the Board Resolution when the LMR was adopted in 2009.

The effort to finalize this delegation of authority through memorandums of understanding (MOUs) took time, with some AQMDs like the SCAQMD amending their Landfill Rule 1150.1 to fully incorporate the LMR requirements. Using the SCAQMD as an example, CARB adopted the LMR in 2009, which became effective in June 2010, the SCAQMD Board adopted the revised Rule 1150.1 in April 2011, and the MOU between the two agencies was signed in May 2012; an effort that overall took almost three years. Of the 22 AQMDs that established MOUs with CARB, the last one was signed in May 2015; six years after CARB adopted the LMR.

While updating the MOU's should be less of an undertaking, many of the AQMD staff members involved in the initial MOU development process may no longer be with the respective agencies. Additionally, discussions with representatives of various air districts have indicated that the resources required for proper oversight and enforcement of the revised LMR will be extensive. This will in turn require thoughtful updates to the MOU's to ensure the AQMDs are properly resourced, trained and the significantly revised scope of the new regulations is fully incorporated into the updated agreements.

It is recommended that the revised LMR not become effective until full delegation and guidance is provided to the local air districts through MOUs or other means. This will also allow time for the regulated landfills to effect the necessary changes to implement the amended regulation in a manner that is consistent with expectations of the amended MOU's. (OP_Ind/Gov Coalition-31)

Comment:

Effective Date of the Regulations

The proposed amendments to the LMR are extensive and will require additional equipment deployment, enhanced field work and corrective action as well as additional regulatory notifications and reporting. The functionality of the original LMR was largely due to the successful delegation of authority to implement its provisions to the local air quality management districts (AQMDs). This was a critical step required by the following Board Resolution when the LMR was adopted in 2009.

Discussions with representatives of various air districts have indicated that the resources required for proper oversight and enforcement of the revised LMR will be extensive. This will in turn require thoughtful updates to the MOUs to ensure the AQMDs are properly resourced, trained, and the scope of the new regulations is fully incorporated into the revised agreements.

Recommendation: The revised LMR should not take effect until full delegation and guidance is provided to the local air districts through MOUs or other means. This will also allow time for the regulated landfills to effect the necessary changes to implement the amended regulation in a manner that is consistent with the expectations of the amended MOUs. (OP_Recology-34)

Comment: The revised LMR should not become effective until full delegation and guidance is provided to the local air districts through Memorandums of Understandings (MOUs) or other means. This will also allow time for the regulated landfills to effect the necessary changes to implement the amended regulation. (OP_SWANA-2)

Comment:

Delegating Authority to the Local Air Districts

The proposed amendments to the LMR are very extensive in terms of enhanced efforts in monitoring which will require new and expensive equipment deployment, enhanced field work and remediation efforts, additions to regulatory notifications and reports, as well as recordkeeping. The effectiveness of the original LMR was largely due to the successful delegation of authority to implement the LMR by the local air districts. This was a critical step and required by the following CARB Resolution when the LMR was adopted in 2009:

> "*BE IT FURTHER RESOLVED that the Board directs ARB staff to work with local air districts to: (1) develop a guidance document to assist MSW landfill owners and operators in complying with the requirements of the proposed regulation, (2) develop and consider agreements with local air districts to implement and enforce the proposed regulation, (3) establish an implementation workgroup that meets periodically to discuss implementation issues and promote statewide consistency regarding the implementation and enforcement of the proposed regulation, and (4) modify the regulation to clarify, as discussed in the ISOR/Staff Report, that the regulation is a regulatory floor."*

The effort to finalize delegation through the memoranda of understanding (MOUs) took time, with some air districts, like the South Coast Air Quality Management District (SCAQMD), amending their Landfill Rule 1150.1 to fully incorporate the LMR requirements. Using the SCAQMD as an example, CARB adopted the LMR in 2009, which became effective in June 2010, the SCAQMD Board adopted the revised Rule 1150.1 in April 2011, and the MOU between the two agencies signed in May 2012; an effort that took almost three years. Of the 22 air districts that established MOUs with CARB, the last one was signed in May 2015; six years after CARB adopted the LMR.

This critical issue of delegation has not been addressed by CARB staff.

We recommend that the revised LMR not become effective until full delegation and guidance is provided to the local air districts through MOUs or other means. This will also allow time for the regulated landfills to effect the necessary changes to implement the amended regulation. (OP_SWANA-12)

Comment: CARB has yet to engage local air districts regarding existing LMR MOUs which will cease to apply once the proposed LMR is adopted. This creates a gap in implementation and enforcement of the proposed LMR until new MOUs are signed. South Coast AQMD previously demonstrated equivalency with existing District rules and the previous LMR, however the proposed LMR will result in additional resource impacts that have not been fully considered or analyzed by CARB. (OP_South Coast AQMD-2)

Comment: South Coast AQMD staff appreciates increased collaboration from CARB moving forward in addition receiving communications regarding CARB's intentions for the existing LMR MOUs. (OP_South Coast AQMD-9)

Comment: The deadline for implementation of any new or modified requirements should not be linked to the rule promulgation date. Rather, it should be linked to the date CARB approves new or updated Memoranda of Understanding (MOUs) with each specific district. As the districts will generally be responsible for rule implementation and enforcement, there must be updated MOUs issued before landfills are required to comply because of the major changes to this rule. (OP_L and D-4)

Comment:

Providing a Reasonable Timeline for Implementation

Similar to the current LMR implementation and enforcement, it is expected that the implementation and enforcement of the proposed LMR amendments would be delegated to the local air districts. To avoid potential confusion and provide sufficient time for affected stakeholders to make necessary adjustments to comply with the amended rules, the Sanitation Districts recommend that the amended LMR not take effect until the process of granting and authorizing full delegation to the local air districts is completed. (OP_LACSD-2)

Comment: SWMD believes that effective implementation of the proposed rule will require coordination with local Air Quality Management Districts (AQMDs) and the development of corresponding local regulations. The proposed amendments introduce new infrastructure needs, field activities, regulatory notifications, reporting requirements, and oversight responsibilities. For example, provisions related to the resubmission of previously approved Alternative Compliance Plans, the use of unapproved alternative monitoring methodologies, and new wellhead operation and monitoring thresholds must be aligned with local AQMD regulations to ensure safe and compliant operations.

The successful implementation of the original LMR in 2009 was largely due to CARB's delegation of implementation authority to local AQMDs, as required by the Board Resolution at the time. SWMD recommends that this same coordination process be incorporated into the rollout of the proposed amendments to ensure consistent, practical, and enforceable application statewide. (OP_SWMD-1)

Comment: And finally, allow the AQMDs to provide clear oversight of a substantial change in the rule. (T_RS-2)

Agency Response to Combined Comments:

No changes were made in response to these comments. Memoranda of understanding (MOUs) to implement the enforce the LMR are structured as broad agreements that allow the air districts to act as the Executive Officer. Existing MOUs remain effective

after the effective date of the Regulation, unless and until they are replaced by an updated MOU, or a party elects to terminate the existing MOU. CARB will coordinate with districts to update MOUs.

There will not be a gap in implementation and enforcement that would necessitate a delay in effectiveness of the Proposed Amendments, as CARB retains implementation and enforcement authority alongside air districts, and districts can continue to implement and enforce the LMR under existing MOUs. Even in districts that have not entered into an MOU under the current Regulation, CARB often coordinates with the local air district to conduct LMR inspections or respond to compliance concerns.

The effective date of the Proposed Amendments does not need to be delayed to allow for air district rule updates. Air districts with MOUs can, and generally do, simply implement and enforce the LMR directly. Alternatively, air districts can update their rules to be at least as stringent as the Proposed Amendments, but are not required to, and only one district has done so for the current Regulation (South Coast Air Quality Management District (AQMD)).

K.3-2 Extend compliance timelines to account for resource and training needs

Comment: The proposed implementation and compliance timelines also appear overly ambitious given the scope of new requirements, the need for training, and the establishment of new review and approval procedures. Implementation of the proposed changes including expanded plan approvals, compliance determinations, monitoring of both the landfill surface and the Gas Collection and Control System (GCCS), recordkeeping, reporting, and technology verification will require additional district resources, significant preparation and coordination, and training of staff. Based on CARB's estimates, there are a total of 188 landfills in the state and 153 of them operate GCCS and 140 of the 188 are government-owned landfills. The increased resources and challenging timelines, especially for government-owned landfills will add compliance challenges for the districts. A phased implementation schedule or extended compliance timeline would better support consistent enforcement and reduce disruption to ongoing district operations. (OP_SDAPCD-2)

Agency Response:

CARB made changes in response to this comment. In the 15-Day Changes, CARB phased-in implementation timelines for several provisions, including developing component leak monitoring plans and cover integrity monitoring plans, submitting documentation of current alternative compliance options, reporting records of monthly wellhead parameter trends and changes in daily gas collection, and monitoring engine and gas turbine exhaust temperature. CARB plans to work closely with districts to ensure successful implementation both for regulated entities and air districts, to help ensure a smooth transition into the new requirements as they become effective.

L. Costs

1. General Comments Regarding Costs and Workload to Regulated Entities

L.1-1 Excessive compliance burden compared to environmental benefit

Comment: While we support the goal of reducing methane emissions, we have concerns that many of the proposed requirements are not practical, not cost-effective and in some cases, may not lead to meaningful improvements to environmental outcomes. (OP_Ind/Gov Coalition-4)

Comment:

CARB Appendix B – Economic Analysis

CARB's economic analysis downplays the true cost of the proposed changes to the LMR, particularly for smaller or rural landfills that lack resources or flexibility. Industry and local government support responsible regulation and methane reduction. The proposed rule in some cases imposes unrealistic requirements, adds significant cost, and may not achieve the intended environmental benefits. We urge CARB to revise the rule to reflect real-world landfill conditions, focus on proven approaches, and adopt more achievable timelines. (OP_Ind/Gov Coalition-34)

Comment: While the County believes the proposed regulations will help provide needed accountability for landfill owners across the state, staff are equally concerned that the extra work involved to comply with some sections of the updated LMR will far exceed the limited and even questionable environmental benefit. (OP_YoloCo-1)

Comment: The current proposed regulation updates would substantially increase the cost burden for landfills to comply with the LMR. The County believes this may have the unintended consequence of more illegal dumping in undeveloped and rural areas of the state. (OP_YoloCo-2)

Comment: If approved, the proposed amendments will significantly impact landfills across the state, imposing increased unnecessary operational and financial burden on local government agencies to comply with an increasingly stringent regulatory environment with little added environmental benefit. (OP_WPWMA-1)

Comment: The Salinas Valley Solid Waste Authority (SVSWA) strongly objects to the proposed amendments to the Regulation on Methane Emissions from Municipal Solid Waste Landfills (Title 17, CCR §95462-95475) as released in Appendix A-1 of the Initial Statement of Reasons dated September 23, 2025.

While SVSWA supports the goal of reducing methane emissions, these amendments go far beyond what is technically necessary or operationally reasonable. The proposed regulation represents a fundamental overreach – introducing an unworkable set of new monitoring, reporting, and compliance requirements that will impose extreme financial and administrative burdens on public agencies without any substantial corresponding environmental benefit. (OP_SVSWA-1)

Comment:

Operational Overreach and Duplicative Monitoring

CARB's proposal to expand wellhead monitoring to include enhanced monitoring triggers, is excessive and disconnected from practical landfill operations. The new quarterly-to-monthly surface emission monitoring cycles required after a certain number of exceedances, well-by-well "enhanced" verification requirements, and expanded data logging mandates are beyond the staffing and budget capacity of most public landfill operators. There is no scientific justification that these incremental reporting steps yield a measurable improvement in methane capture efficiency. (OP_SVSWA-2)

Comment: The proposed amendments, as drafted, are punitive, infeasible, and misaligned with the operational realities of public landfill management. They will not advance California's methane reduction goals in a meaningful or cost-effective manner. Instead, they will redirect scarce public resources away from practical emission mitigation projects and into a maze of bureaucratic recordkeeping. (OP_SVSWA-9)

Agency Response to Combined Comments:

No changes were made specifically in response to these comments. However, the 15-Day Changes provided additional flexibility, including certain extended action timelines and compliance phase-in dates, alternatives, and exceptions for special circumstances. Additionally, the cost analysis was revised in the 15-Day Notice to reflect higher costs than originally calculated.

Emission reduction and other benefits were discussed in the ISOR chapters IV and V. With respect to concerns about illegal dumping as a potential unintended consequence, staff believes that an unlikely outcome based on the costs of the Proposed Amendments (based on the revised cost estimate, potential pass-through costs could be up to $0.09 cents per household per month).

These comments do not identify specific areas of concern, however, where the comment letters discuss specific concerns, those have been responded to throughout this FSOR.

L.1-2 Prevention and early mitigation is worth the cost

Comment: The climate benefits of CARB's Proposed Amendments are estimated to be about three times higher than the projected implementation costs over three years and impose no direct compliance costs for individuals. However, if 100% of compliance costs to landfill operators were passed on to Californians, it would amount to just $0.31 per person, per year – in exchange for substantial benefits in avoided social cost of methane ($56 million to $178 million from 2027-2029) and improved air quality. Further, analyses from other states found that adoption of landfill methane rules had little impact on tipping fees. This favorable benefit-cost analysis mirrors findings in other states. For example, the State of Colorado found a 6:1 benefit-to-cost ratio in an initial economic impact analysis of their Regulation Number 31 to control methane emissions from municipal solid waste landfills. (OP_RMI/EDF-3)

Comment: Thank you to CARB staff for the thoughtful and rigorous work that went into the proposed amendments. CARB's own analysis shows that the benefits of strengthening landfill methane regulations are more than triple the estimated costs. With the proposed -- while the

proposed amendments impose no direct compliance costs for individuals, if they were passed on to Californians, it would amount to just $0.31 per person per year. For that modest investment, the State secures cleaner and safer air for frontline communities. Remote sensing, air and satellite surveys have repeatedly detected super emitting plumes at California landfills, many of which are large, undetected, and untreated. (T_RMI-1)

Comment: And when we talk about the cost, you know, we're looking at this like is it a cost to the operators, it is a cost to the public? This is a cost to our community that we need to decide. Are we going to put the cost up front and figure out getting what we need to make sure that our environment is safe or are we going to put the cost on the back end. And for the operators, the cost what's happening at Chiquita is extremely significant. And I think if they were to go back in time and decide to do more monitoring, and catch this earlier, and handle it, they would have.

And so, I know for other operators who don't have an elevated landfill temperature event right now, they might be saying this is too much cost. But the truth is, even for the operators, spending more money up front to make sure this doesn't happen again is extremely important. And then, of course, for our community, I think all of us who are just wanting to put our trash in the trash bin wouldn't mind a few more cents to make sure that we can buy a house without having the concern of being poisoned in our own homes. (T_Orchid-2)

Comment: These grocery bags here cost about $0.30 and we all use these bags for our groceries and we're willing to pay for them out of convenience, even though they'll likely end up in the very landfills that are harming us. We should be willing to pay the same price for higher standards that protect communities. $0.31, that's all it will cost us. The cost of prevention is far less expensive than the cost of inaction. And it doesn't end with regulation. Implementation is imperative. (T_VVCA-3)

Comment: Further, we already have technology for real time fenceline monitoring alerts and transparent public facing websites, or scorecards. I was a cost accountant for 34 years and got deeply into five or six different industries. Moore's Law has shown that humanity -- has shown humanity over and over again that we get lower, not higher, costs as these very technological super powers mature. Prevention is always a whole hell of a lot cheaper than cure. Everybody knows that. As a finance lifer I can tell you that preventing a hotter, drier, sicker future for the American west is dramatically afford -- more affordable than having -- for family wallets than having to suffer the harms. (T_ECA/CAC-2)

Comment: And while there are concerns about, you know, the costs of implementing regulations, as has been mentioned by a number of people from the fenceline communities, there is a cost -- a tremendous cost in not acting and it's being borne, not by the operators, but disproportionately by the fenceline communities in the form of declining property values, in the form of medical bills and in the form of emotional and psychological stress that's being put on these communities. (T_VIP2-3)

Comment: I'm here today not only for myself and my neighbors, but for every community across California living near a landfill, communities that carry the same daily burdens we do. It's been 15 years since there's been real change to the Landfill Methane Regulation. And in those 15 years, my community has seen landfill expansion, more tonnage, stronger order -- odors, more diesel traffic, and now subsurface fires. Fifteen years of waiting has meant 15 years of worsening conditions for real people and real families.

You've heard from scientist experts who shared the data, the methane emissions, the climate impacts, and the urgent need to act. I want to share what that looks like for those of us who live right next to it, front-line communities. While industry talks about financial burden of stronger methane rules, we're living the human burden every single day. We have expenses like doctor visits, prescriptions, air filters, rodent control just to make our homes livable. And we carry the constant worry about our kids and what they're breathing.

We talk about the cost, and let's be honest, our health has a price too. The communities like mine have been paying for far too long. This isn't about just methane. It's about justice, about protection, and about putting people over -- people before profits.

And with the few -- a few seconds, I just want to send a message directly to industry. Enough with the fearmongering about raising rates and the guilt tactics to make poor people feel bad for caring about their health and families. As you worry about lost profits -- add lost of life to the equation, because that's what we're worried about, real life, real burdens. And I ask you to look at the community members in the room and see us as lives not numbers. (T_GHEJ-1)

Comment: (THROUGH INTERPRETER): Hello. My name is Leticia Luna. I'm from the community of Avenal in Kings County. I arrive in that community in 2001. The community for me looked very pretty and calm. That was 15 year ago and now we cannot go out on the streets. The smell is really bad. People is leaving our community because their homes are not safe. And when they leave, they are difficult to sell. We live very close to the landfill. We are asking for you to provide us with stronger laws, that you send people to monitor what is going on. We don't want everything to be just on paper. Please go to our landfill. You can see how close it is to our homes. We have illnesses as cancer, Valley Fever among others. Please take care of our sons, our daughters, our future generations. Please send people to investigate. Don't just move your heads listening to us. Take action. Thank you. (T_Luna-1)

Comment: You've already heard heart-wrenching stories about health and community welfare. I want to focus on the second part of CARB's mission statement, considering effects on the economy. Just as they did 15 years ago when they LMR was first being considered, waste companies and landfill operators are touting increased costs. The sky did not fall then and there's Absolutely no evidence that it will happen now.

Adjusted for inflation, average statewide tipping fees have only increased a single percentage point since 2011. Riverside County warns in 2009 that the methane rule would force them to double staff, but in reality their tipping fee increased by about $0.12 per year, from 2010 to 2023, $0.12. And Remember tipping fees are driven by lots of factors like fuel labor, equipment, and contracts. The cost of inaction is exponentially higher.

The disaster at the Chiquita Canyon Landfill is a stark example. In 2024, the underground fire at Chiquita cost the operator to $224 million to manage. After throwing nearly a quarter billion dollars at the problem, it's still not solved. The community continues to suffer profound health impacts and costs continue to mount. The methane that spews from our state's landfills is supercharging climate change, one of the biggest financial burdens we collectively face.

California's Natural Resources Agency conservatively estimates that climate change will cost our State $113 billion a year by 2050, around 3,000 per person paid in the form of higher taxes, rising costs of necessities like health care and groceries. By contrast, CARB's proposal would cost about $0.31 per person per year. This isn't complicated math. A strong LMR is the

smart fiscal choice. This rulemaking represents an opportunity for CARB to put its mission statement into real tangible action, and I urge you to take it. (T_Helfend-1)

Comment: Sadly, ETLF and SET events are not rare these days and the citizens of California are not falling for that excuse any more, and neither should CARB. Elevated methane is often an indicator something may be going wrong in a landfill. The proverb, "An ounce of prevention is worth a pound of cure," comes to mind and it is what we are asking for now.

If only Chiquita Canyon Landfill had followed this proverb none of this would have happened to my town and many other landfills that are following quickly in their footsteps. The long-term site savings far outweighs the short-term initial investment. This goes the same for government. Invest in the preventative legislation and action, because paying for all the sick people that end up as a result of these broken landfills creates lots of medical bills and unemployed people. Due to long-term exposure, many of these symptoms do permanent damage and don't go away. Eventually, the government will end up footing the bill.

Currently, in my town, we are paying very high utility bills, experiencing property value loss, more medical bills and serious loss of quality of life. I am petrified to go to the doctor for fear what I may find from living near this landfill.

Thank you for considering my request for an ounce of prevention. I am only one of so many living in this hell that has stolen years from my life and all of this could have been prevented. Thank you. (T_DeSesa-1)

Comment: But the last thing I'd say is my house in Val Verde, I had to move. I have an empty house. I have two homes now. I can't afford two homes. Most people can't. Please look into this a lot more. I support this. Thank you so much. (T_Stinson-3)

Comment: My home of 27 years is for sale and so far I have not been able to sell it, even after dropping the price $75,000 below market.

I spend my vacation days speaking at meetings like this, volunteering at local councils and advisory committees, instead of spending time with my family and having fun. Please don't cater to the billion dollar landfill corporations. The reason we are currently suffering is because the government agencies failed to properly protect us with the proper regulations like you have proposed today. The real cost to landfill operators of these amendments is pennies compared to the costs when things go wrong. (T_Howse, S.-2)

Agency Response to Combined Comments:

No changes were made in response to these comments. CARB thanks the commenters for sharing their experiences, perspectives, and engagement.

L.1-3 Revise cost estimates; conduct full fiscal impact and cost-benefit analysis based on real-world conditions

Comment: CARB has severely underestimated the financial impact these amendments will have on landfills in the state as well as the corresponding impact this will have on rate payers for solid waste services. Appendix B of CARB's "Initial Statement of Reasons" (ISOR) requires significant revision to address these inadequacies. Further, CARB staff should work with actual landfill owner/operators in the state to better understand these costs, so that they reflect real-world conditions and realities. (OP_L and D-3)

Comment:

Request for Regulatory Reconsideration SVSWA urges CARB to:

…

- Conduct a complete fiscal impact and cost-benefit analysis based on actual field conditions on the ground before further rulemaking. (OP_SVSWA-8)

Comment:

Appendix B - Economic Analysis

…

The Economic Analysis significantly underpredicts the increased costs to landfills to comply with this regulation. (OP_YoloCo-41)

Agency Response to Combined Comments:

No changes were made in direct response to these comments as these comments do not identify any specific items the commenters believe are underestimated or require changes. In the 15-Day Notice, staff updated the economic analysis. CARB staff provided methods, assumptions, data sources, and calculations that were used to estimate costs in the ISOR Chapter VIII and Appendix B. These specific comments do not identify what items the commenters believe are underestimated. Additional specific comments from some of these commenters as well as others are responded to elsewhere in this FSOR.

L.1-4 New SEM requirements are too stringent and costly

Comment: CARB's proposed changes to Surface Emission Monitoring (SEM) are incompatible with Kiefer's operations:

…

- New criteria and tight timelines for alternative remedies to SEM exceedances will raise costs.
- Recurring SEM exceedance areas face escalating requirements, potentially trapping large landfills like Kiefer in a cycle of costly monitoring and compliance. (OP_SacCo-17)

Agency Response:

No changes were made in response to this comment. Costs were analyzed in chapter VIII and Appendix B of the ISOR.

L.1-5 Early detection and mitigation avoids greater downstream costs

Comment: And, you know, I know there was mention of the cost of these new regulations, but I will tell you it is costing millions and millions of dollars a week to export this leachate, to, you know, install each of these additional wells that are needed at Chiquita Canyon. It is incredibly costly not to take action, and not only for the regular -- not only for the operators, but also for the regulators. (T_Schiavo-10)

Comment: Similarly, the cost of treating advanced colon or breast cancer far outweighs the cost of screening and early detection. There is a theme here for sure and that is that detection, prevention, and mitigation are much less expensive than dealing with downstream consequences. (T_Mulligan-3)

Agency Response to Combined Comments:

No changes were made in response to these comments. CARB appreciates the comments and thanks the commenters.

L.1-6 Compliance costs might be passed to residents and businesses

Comment: C.A.R. is concerned that compliance costs could unintentionally increase housing and infrastructure costs borne by California residents already struggling to pay their rent and mortgages.

Landfills are primarily funded through local rate structures. According to the Initial Statement of Reasons and Appendix B (Economic Analysis), implementation costs on public and private landfill operators are expected to exceed $12 million in first-year compliance cost, which is likely to be passed through to residents and businesses through higher solid-waste fees. C.A.R. urges CARB to coordinate closely with Cal Recycle and local air districts to avoid duplicative inspection and reporting requirements that could further inflate costs without providing any additional benefits to the community and respectfully requests CARB consider the following amendments prior to adoption:

1. Clarify Cost Recovery and Implementation Schedules. Provide direction to local air districts to ensure rate increases and fee recovery on households remain minimal through a reasonable phase-in timeline.

2. Ensure Consistency with SB 1383 Programs. Align data reporting and inspection intervals with CalRecycle's organic waste diversion requirements to streamline local implementation and eliminate duplication.

3. Conduct a Residential Rate Impact Analysis. Quantify potential effects on solid-waste collection fee increase impact on households prior final rule adoption. (OP_CAR-1)

Comment: Landfill capacity is diminishing in California, particularly in the greater Los Angeles region. Recognizing that the State is working towards ensuring that all waste can be managed through recycling and composting infrastructure, there are significant barriers to achieving this outcome in the near term. California cannot afford to lose any more regional disposal facilities – and avoiding unintended consequences requires ensuring California's remaining landfills be affordable for solid waste ratepayers. (OP_WM-20)

Comment: The costs of implementing the Draft Regulation will be incorporated into disposal rates for individual landfills, which are in turn paid by commercial/industrial customers, waste haulers contracted to jurisdictions, and/or local municipalities, who set waste and recycling rates paid by residents and businesses that incorporate the costs of disposal. (OP_WM-31)

Comment: The proposed changes to the LMR raise several concerns that would significantly increase operational costs. As a public landfill, Kiefer cannot quickly adapt to regulatory shifts of this magnitude, and these increased costs would ultimately burden the community it serves. (OP_SacCo-1)

Comment: The practical result is an unfunded state mandate that will directly increase disposal and collection rates for residents and businesses across California. (OP_SVSWA-4)

Agency Response to Combined Comments:

No changes were made in response to these comments. Regarding potential pass-through costs, refer to the agency response in section IV.L.1-1. Regarding consistency with SB 1383 programs, the LMR is not duplicative with organic waste diversion requirements as the LMR addresses emissions from waste already in place in landfills, which will continue to need to be controlled even as organic waste disposal decreases.

2. Specific Comments Regarding Estimate of Costs to Regulated Entities in the Staff Report

L.2-1 Monitoring will impose high costs with labor rates higher than CARB's analysis

Comment: The monitoring provisions as proposed will impose unnecessary costs to both operators and the regulatory agency with oversight requirements, be that CARB or the Air District. WM anticipates that our workforce to conduct this work in the field and to analyze data could increase two- to fourfold, depending on the site. WM estimates that the costs to hire third-party contractors to do the field work ranges from $60-100/hr (CARB's Economic Analysis assumed $59/hr). (OP_WM-30)

Agency Response:

CARB updated the economic analysis in the 15-Day Notice in response to this comment. In the 15-Day Notice, the labor rates used throughout the economic analysis for costs to regulated entities were adjusted to a rate that is consistent with the information provided by this commenter.

L.2-2 New wellhead pressure requirements will increase costs; may be passed to local communities

Comment: CARB has added federal requirements for enhanced monitoring and corrective action for pressure exceedances, along with stricter rules for recurring exceedances. These changes will significantly increase costs, which may ultimately be passed on to the local community. (OP_SacCo-14)

Agency Response:

No changes were made in response to this comment. As discussed in the ISOR (p. 59), requirements related to wellhead pressure exceedances were revised to be similar to federal rules to improve alignment. Refer to agency response in section IV.D.1-2 for more information regarding the need for stricter rules for recurring pressure exceedances.

L.2-3 Continuous gauge pressure recording would be costly

Comment:

Gas Collection System Pressure Monitoring

Under Section 95469(g) of the Draft Regulation, operators would be required to record the gas collection system gauge pressure on the vacuum side of the blower every 15 minutes and establish a pressure setpoint.

….

To comply with the requirement to record gauge pressure every 15 minutes, operators would need to install automated wellheads, which may cost up to $4,500 for the automated sensor per well, $100 per well to maintain the data documentation dashboard, and $1,000 per well for annual calibration. At a landfill with 150 wells, installation would cost roughly $850,000 plus tax and design cost. CARB has not identified the emissions reductions that would result from this provision and therefore has failed to establish that these requirements would be reasonable. (OP_WM-43)

Agency Response:

No changes were made in response to this comment. The commenter appears to be referring to the requirement to record gauge pressure of the gas collection system downstream of the blower system at least every 15 minutes (section 95469(g)). That measurement is only required at the blower system, not at each individual wellhead as the commenter suggests.

L.2-4 Liquid level monitoring and pump installation is costly

Comment:

Wellhead Monitoring - Liquid Level and Well Decommissioning Requirements

OCWR is concerned that the proposed requirements for semi-annual liquid level monitoring and potential installation of liquid removal pumps may impose significant operational and: financial burdens, particularly at closed sites or those with older infrastructure. For example, the estimated cost of semiannual liquid level soundings across one of our regions is approximately $70,000 per year, with individual pump installations potentially exceeding $15,000 per well, not including additional infrastructure such as air supply lines. (OP_OCWR-7)

Agency Response:

CARB made changes in response to this comment. In the 15-Day Changes, the default liquids level monitoring frequency was changed to annual, an allowance to step down the monitoring frequency through a sampling strategy was added for wells with repeated low liquids levels, and the requirement to install a liquids pump in response to repeated high liquids levels was removed. Staff made conforming adjustments to the cost analysis in the 15-Day Notice to reflect the reduced monitoring frequency and an improved understanding of the time required to perform liquids level monitoring.

L.2-5 New costs could divert resources from other environmental programs; costs underestimated

Comment:

Unfunded Mandate and Fiscal Harm to Ratepayers

Implementation of these amendments would require millions in additional public expenditure statewide, forcing solid waste agencies to divert resources from other essential environmental programs. SVSWA estimates that compliance with the proposed recordkeeping, sensor logging, and corrective action timelines would require a 50-70% increase in wellfield technician hours, additional gas analyzers, and database integration not presently funded. CARB has offered an unrealistic economic/environmental cost-benefit analysis that supports this expanded monitoring regime. (OP_SVSWA-3)

Agency Response:

No changes were made specifically in response to this comment. Numerous modifications in the 15-Day Changes provide flexibility to allow owners or operators to meet performance standards in the most cost-effective site-specific manner.

M. Community Impacts

1. Public Data Transparency and Notification

M.1-1 Public data accessibility

Comment:

Data Transparency and Public Access

CARB should require landfill emissions data — including surface monitoring results, exceedance reports, wellhead monitoring data, documents of repairs, and enforcement actions — to be made publicly available in a timely and accessible format. These reports are already required to be submitted to regulators; there is no reason they should not also be shared with the public. Communities deserve to know when methane or other gases are escaping into the air, what corrective actions are being taken, and whether those actions are effective. (OP_VVCA-7)

Comment: Remote sensing instruments and other monitoring technologies offer ample opportunities for timely mitigation and policy relevant insights, so we encourage CARB to coordinate and share landfill methane and operational data publicly and with other agencies of jurisdiction to ensure observational data are delivered to operators in a timely manner and to foster greater data transparency.

Sharing methane data both publicly and across agencies would maximize the environmental and community benefits of the regulation. While CARB does provide much of this data online, it is not especially user friendly for many stakeholders.

Methane detections—whether from operator-submitted surface emission monitoring, remote sensing data, or third-party observations—should be made publicly available in a more timely and accessible format. This could include a state-hosted dashboard, periodic reports, or other

vehicles for the public to request landfill-specific data, timelines for corrective action, and updates on recurring issues as well as any environmental measurements or operational data that may contextualize emissions detections. This level of data transparency can foster greater collaboration between stakeholders, trust in the regulatory process, context for emissions events, and continued improvements in landfill methane management practices. (OP_Carbon Mapper-4)

Comment: Despite the many areas of recordkeeping and reporting progress reflected in the Proposed Amendments (including several provisions that respond directly to recommendations from our previous comment letters) none of the amendments address the dire need for data transparency. We remain deeply concerned that this essential component of oversight and accountability has been entirely left out of the current draft. Transparent data access is not a peripheral issue, but is foundational to public trust and environmental justice outcomes.

We strongly recommend the creation of a publicly available data portal that provides real-time or near real-time access to landfill monitoring and operational data. This would allow communities to respond to air quality changes in real time and take appropriate actions to protect their health. Publicly available reporting is vital for environmental justice and community trust. At the very least, CARB should publish all annual, quarterly, and other required landfill reports on their internet website for public access. Impacted communities have a right to know local air quality conditions and the measures being taken to reduce pollution from neighboring polluting facilities. This system should include standardized digital uploads of all relevant data types, including SEM and wellhead monitoring data, GCCS operational data, SERP data, and other metrics.

A data platform would bring several critical benefits. Specifically, it would:

- Allow communities living near landfills to access timely and accurate information about local air quality.
- Empower researchers and advocates to identify systemic issues and improve collective understanding of landfill emissions trends.
- Strengthen CARB's credibility and leadership by demonstrating a commitment to transparency, accountability, and equity in enforcement and oversight – something that all Californians are lacking from the federal government.

Data transparency within the SERP framework: Communities must be informed when large methane plumes are detected. Plume alerts and monitoring data—whether collected by CARB, Carbon Mapper, or other qualified third parties—should be made publicly available in real time through an accessible data portal at the same time it is provided to landfill operators. Communities living near polluting facilities deserve timely notice of super-emitter events that may impact air quality. Access to near-real-time data would allow residents to make informed decisions about their health, such as staying indoors, using air purifiers, or avoiding outdoor activities during high-emission periods. (OP_CAW-66)

Comment:

- Create a publicly available data portal providing real-time or near-real-time access to SEM, wellhead, GCCS, SERP, and other relevant landfill data. This data portal could be maintained by CARB or by individual operators, as long as data is publicly available and accessible. At minimum, CARB should publish all landfill reports online.
- Include super-emitter event notifications and monitoring data in the public portal at the

same time they are provided to operators. (OP_CAW-69)

Comment: Ensure the data portal supports community engagement, researcher access, and transparency to strengthen accountability and environmental justice outcomes. (OP_CAW-71)

Comment: In 2025, it is indefensible that CARB provides no readily available public access to landfill data or reported problems –you must currently submit a public records request– undermining transparency and public trust in environmental oversight. While the Proposed Amendments significantly expand data collection and improve reporting formats, they fail to make any progress on sharing this data with the public, particularly the communities directly affected by landfill pollution. All landfill data reported to CARB, including the remotely detected plume data, should be made publicly available so communities can understand what is happening in their neighborhoods, as is already standard in other states like Oregon. (OP_CAW-4)

Comment: When landfills are allowed to self report with zero visibility to the communities they impact, where is the accountability?

The residents of Val Verde and neighboring communities have lived for years with the consequences of inadequate landfill oversight and accountability. Families, small children, pregnant mothers, elderly, and other vulnerable populations have suffered from unbearable odors, health impacts from toxic emissions, and a complete lack of transparency about the air they breathe while regulatory agencies and landfill operators exchange reports behind closed doors.

In March 2025, community members from several communities attended the CARB Board Meeting to plead for change with a clear message: stronger regulations are not enough– communities have a right to know what is in our air. Communities need access to information and early warning systems to protect themselves. The disaster at Chiquita Canyon Landfill is hurting so many people and could have been prevented. It is too late for the Val Verde and Castaic community, but it's not too late to prevent more harm from being done to other frontline communities. California can and should do better! (OP_VVCA-2)

Comment: Communities have a fundamental "right to know" what is happening at neighboring facilities – a principle CARB has acknowledged in other programs and reporting frameworks, including community air monitoring initiatives, public notification requirements, and emergency response protocols. Without clear access to real-time or near-real-time emissions data, exceedances, gas collection and control system (GCCS) downtime, planned construction, and enforcement actions, communities cannot make informed decisions to protect their health, advocate for corrective measures, or hold landfill operators accountable. (OP_VVCA-6)

Comment: CARB's proposed amendments may strengthen reporting and monitoring requirements for landfill operators, but they do nothing to ensure that the public can actually see or understand what is happening at these facilities. Under the current proposal, communities are still expected to trust a system that hides critical data and decisions from those most affected by them. That is unacceptable. (OP_VVCA-4)

Comment: The situation at The Avenal Landfill additionally demonstrates why transparency is essential. In 2019, gas wells at Avenal began exceeding 131°F, signaling potential underground combustion and serious operational issues. From 2020–2022, residents filed numerous odor complaints, and even during a public hearing for the landfill's federal Title V air permit renewal, the problem of high landfill gas temperatures was never disclosed to the

community. Just this year, a former air district air permitting employee working with the community of Avenal learned about the high landfill gas temperatures. Despite submitting over five public records requests to the local air district and the US EPA in 2025, they still have very little information about what is occurring underground at the Avenal Landfill. If an experienced air permitting professional with four years of experience is having difficulty getting the information needed, what chance do regular community members have in this current system?

Avenal community members are aware people have gotten sick, been diagnosed with cancer, and pregnant women have miscarried. Despite local non-profits sharing information about the high landfill gas temperatures with community members and regulatory agencies, almost two months have passed without air monitoring or updates regarding what has been done or what is happening. The lack of accessibility is unacceptable. Data accessibility must be structured with ordinary residents living near landfills in mind– the people who live, work, and raise families near these facilities. Community members deserve better. (OP_VVCA-5)

Comment: CARB should continue to promote transparency to achieve this goal by ensuring communities like Avenal that are affected by landfill methane emissions have access to the information regarding emissions and reparative measures in an accessible format and language. To fulfill these obligations, CARB should require all landfills to provide data about the composition and concentrations of landfill gas emissions and establish a public dashboard to share this information in real time. This dashboard should also provide updated information about leaks and corrective actions. (OP_IHRC-8)

Comment: Windfall Bio supports CARB's efforts to strengthen methane emissions reporting and mitigation efforts. We believe more transparent and accurate methane emissions reporting will incentivize investments in proactive mitigation efforts, including improved gas collection efficiency and application of oxidative covers. (OP_Windfall Bio-2)

Comment: Ensure easy public access to all landfill monitoring data to promote transparency and accountability and protect public health. (OP_RMI/EDF-10)

Comment: Additionally, CARB should require that all data is posted publicly and expeditiously. Data transparency about violations will help communities living near protect themselves during leak events. At landfills in both Michigan and North Carolina, after years of odor complaints and due to other compliance issues, the state agencies required fenceline monitoring and that the results be posted publicly, also requiring robust community engagement. Although the North Carolina landfill fenceline monitoring requirement is new (consent decree was signed in August of 2024), EGLE notes that odors from the Michigan landfill (though complaints are still received) are reduced. (OP_RMI/EDF-20)

Comment:

The Proposed Amendments include strong enhanced electronic recordkeeping and reporting requirements.

RMI and EDF commend CARB on the comprehensive inclusion of operator reporting on: surface emissions monitoring, meteorology, component leaks, collection frequency, downtime, dates, monthly wellhead readings, wellhead temperature, oxygen readings, corrective action, liquid levels, gas collection system expansion, waste acceptance rate, data sources, leak monitoring plans, cover monitoring, cover integrity, instrument calibration, GCCS pressure, and trends. Reporting requirements should include posting data publicly, particularly methane monitoring data as we recommend earlier in the comment. (OP_RMI/EDF-28)

Comment: We strongly support CARB's efforts to reduce methane emissions from municipal solid waste landfills and urge CARB to strengthen community health protections by incorporating community notification and engagement requirements into the Standardized Emissions Reduction Plan (SERP).

Children with asthma and other respiratory conditions are among the most vulnerable to air pollution. When large methane plumes are detected, they likely include other co-pollutants that can trigger asthma attacks and worsen respiratory symptoms.

Communities living near landfills—disproportionately low-income communities and communities of color—deserve to know immediately when these emissions events pose a potential risk to their community. Including mandatory, timely community notifications related to landfill methane emissions would ensure that residents living within range of the plume can take health-protective actions.

Currently, the Proposed Amendments require CARB to notify landfill operators within 7 business days when a large methane plume is detected. Controlled landfills then have 5 additional days to conduct monitoring, while uncontrolled landfills have 30 days. However, there is no requirement to notify affected communities or local air quality management districts in a timely manner. This gap leaves residents unaware and unprotected during potential air quality hazards. (OP_CCAC-1)

Comment: Lack of community and local agency notification: The current SERP framework does not include any requirement for notification to local agencies or community groups when large methane plumes are identified through remote sensing technologies. Under CARB's proposed framework, plume detections may originate from any approved source, which could include satellites, aerial flyovers, or other advanced monitoring systems that meet CARB's detection criteria. At present, satellite data (like that collected by Carbon Mapper) is communicated to the public through their online data portal, but there is a lag of several weeks between plume detection and public access. Under the proposed SERP, CARB would receive this data within days of detection and promptly notify the landfill owner or operator to investigate and mitigate the emission event.

Large methane plumes are not just climate signals—they often indicate substantial releases of co-pollutants such as volatile organic compounds and hazardous air pollutants, posing real and immediate risks to surrounding neighborhoods. Residents living near landfills—many of whom already face compounding odor, air quality, and health burdens—deserve to know when such events occur and what actions are being taken to address them. Including local Air Quality Management Districts (Air Districts) and making information public would improve transparency, accountability, and trust– ensuring that all stakeholders have timely access to critical information.

To strengthen accountability and public trust, we recommend that CARB:

- Require notification to local Air Districts when operators are alerted of a large plume and any actions taken to mitigate leaks to ensure timely enforcement follow-up if needed.
- Develop a public notification protocol for large emissions events detected by third parties. Notifications should be distributed via CARB's website or a public-facing dashboard that displays the date, location, general status of confirmed high-emission events and any mitigation measures implemented.

- Establish threshold-based alert criteria for plumes exceeding a certain methane concentration or persistence level, triggering more robust reporting and community updates. (OP_CAW-14)

Comment: Alert communities and local AQMDs of all SERP events and publicly post documentation of follow-up and corrective actions taken. (OP_CAW-18)

Comment:

Real-time Public Notification

CARB should require real-time public notification of emissions exceedances or significant odor or super emitter events. Residents should not have to rely on social media rumors, month-old data on third party provider websites, or news reports to learn that methane or toxic compounds are being released nearby. Communities must have access to real-time alerts, online dashboards, or public portals that allow residents to stay informed about local air quality conditions. (OP_VVCA-9)

Comment: We need quicker action, more monitoring, the use of more technology and actually requiring it. We know we have the technology, drones and satellites. We need to invest in getting that data to communities and the communities that are on the ground doing that work, getting that information to the community members. (T_VIP3/CEJC-3)

Comment: CARB must ensure that data and lapses in compliance are immediately available to the public, especially those located in communities surrounding landfills. Families need to be able to access real-time information on any issues with their landfill in order to make informed decisions on matters that could potentially impact their health. (OP_Bruce-5)

Comment: “Many communities made up primarily of people of color or people living on a low income are located near landfills. They are disproportionately exposed to many toxic contaminants.”

That exposure is a big reason why these rules matter. I write as an individual, but I’m informed by participating in the California Water Boards’ Wastewater Needs Assessment Advisory Group, and seeing the challenges of biosolids disposal (sewage sludge). When biosolids don’t meet standards for spreading on land, they need to go in landfills, where they produce large amounts of methane. For fenceline communities and all of us, CARB’s rule needs to control these emissions of methane and other gases. The proposed regulations make progress. More can be done.

- CARB needs a public website to show reported emissions and highlight the highest emissions. The site would let people monitor what directly affects them. CARB also needs to offer an email list for each county, which residents, community groups and local governments can sign up for, to receive notices of emissions in counties of their choice. This would be like the email lists which Water Boards offer for water information. (OP_Burke-1)

Comment: Por último, CARB debe garantizar que las comunidades tengan acceso completo a datos en tiempo real sobre fugas de metano y excedencias de temperatura, para que puedan tomar decisiones informadas sobre cómo protegerse a sí mismas y a sus familias.

English translation:

Finally, CARB must ensure that communities have full access to real time data on methane leaks and temperature exceedances, so they can make informed decisions about how to protect themselves and their families.

(B_Gutierrez-4) (B_Calderon-4) (B_Mascoso-4) (B_Rios-4)

Comment: We encourage CARB to make landfill emissions data publicly accessible in real time. Transparent monitoring will help ensure that leaks are detected quickly, so action can be taken before emissions spread and cause environmental harm. My generation fears for our future and the future of our planet. We deserve to have clean air, healthy lands, and climate policies that actually reduce emissions. (B_Env CA-3)

Comment: I'm here in support of the proposed amendments to the landfill methane regulation and believe that additional attention to data access for communities would further support health. (T_ALA-1)

Comment: We urge the Board to also adopt several enhancements. This includes: … to publish monitoring and compliance data for the public. (T_RMI-11)

Comment: And finally, we need transparency that include proactive work to notify surrounding communities if high temperature waivers are granted to the nearby landfills, as well as ongoing public posting of temperature and gas data that is both public -- both public and watchdog organizations can see and is available to them… (T_Schiavo-8)

Comment: And so, this is really critical. And also, you know, once problems exist, we've been having tons of delays in the ability to get information about what's happening at Chiquita Canyon. And so when we know there's a problem, we should definitely be able to access this information, including the public and other community organizations supporting it.

So, you know, there's -- there was no transparency about the 11 landfills that the EPA granted waivers to. Those are 11 landfills that are able to operate above safe temperatures without public transparency needed. (T_Schiavo-9)

Comment: I support the resolution saying reported information will be shared on a website. However, this is a very general statement and communities would be more protected if specifics were included in the resolution or regulation. A PDF submitted by the landfill operator with no explanation does not help an ordinary community member, but would comply with the proposed resolution, but it would very helpful if CARB staff provided easily understandable supporting background information and visually showed graphs of landfill wellhead temperatures and indicated where operator mitigations actions were occurring.

This would help visually show communities what is occurring at their landfill and if the mitigation actions being done are working at reducing temperatures. Updating the regulation to make submitted information be in this form already, or easily created from, would remove this burden from CARB staff. (T_CCEJN2-2)

Comment: I have traveled here from Val Verde, California, where I live a thousand feet from the Chiquita Canyon Landfill. We've lived there for 27 years, where they're experiencing the elevated temperature landfill event. I don't know if you've ever had an encounter with a cloud of methane and other landfill gases, but I do on a daily basis. You become dizzy, disorientated, nauseous. You get headaches, burning sinuses, and bloody noses. These are just a few of the short-term effects me and my neighbors experience. We are left to be concerned with over --

of our long-term effects. As of now, I know that myself and my neighbors to my left and my right have all had cancer, and that's been this last year. So, our community is asking to take action to protect other communities from our same fate by requesting three essential provisions in the updated regulations.

First, the data transparency that is easily accessible. Our communities have the right to know what's happening at our --at the landfills near us. Often, the data that is currently provided is hard to read and hard to access, so we would just Need more accessibility. (T_Howse, B.-1)

Comment: We cannot organize our lives when the safety of our air quality is constantly in question. That brings me to a core issue to access to understanding. So thank you for updating the advanced monitoring, first of all. And this critical step helps provide the technical data on methane and just must now be made accessible to everyone. The general population needs visual charts, clear charts, maps and straightforward explanations. So, having these visual aids is critically important.

So as my job as a special education teacher, my primary responsibility is to modify curriculum -- to remove barriers, but my students -- but we also need to have access -- accessibility to everybody in the public. So thank you. (T_Engle-2)

Comment: I'm here in support of the amendments as a member of the community of Val Verde. Val Verde is an amazing community. You're going to hear from a number of residents today to talk about what we're really losing, because there wasn't enough prevention in our community, and how much data transparency is important. And so with the Chiquita situation, we can really see what happens when we don't take preventative measures. Our community was calling AQMD and getting severely sick before regulators knew what was happening and knew there was toxic hazardous chemicals in our environment. (T_Orchid-1)

Comment: We sincerely thank CARB for prioritizing data transparency in the Board resolution. Making data publicly available is a huge step towards public trust, accountability and community safety, values I know that many people in this room uphold in their daily work. (T_CAW-3)

Comment: Third, real-time public notifications when danger and emission levels are detected. Communities must be alerted immediately again, so we can get ourselves to safety. Other things, such as wildfires and floods have detection. We think that, you know, we deserve the same. (T_Howse, B.-3)

Comment: I'm here to ask CARB to do some changes and they are very necessary. I'm asking for you to have more oversight in the communities and ask if you can stop those leakings that are bad for our health. If it's possible for CARB to inform to the communities with timing advance, when you have methane leaks, at least to be able to protect ourselves, our families, and our communities. (T_Ramos-1)

Comment: I want to align our recommendations in the coalition letters and the advocates before me, including Coalition for Clean Air and CAW and ask that the Board create a robust, publicly accessible system for community data that has bilingual translation and a commitment to access all available technologies within 18 months of adopting these amendments, so that the monitoring improves as quickly as the technology does and strengthening emission projections and previewing dangerous leaks.

Thank you again for your leadership and we urge your support for the recommendation and ask that you do everything in your power to help protect the community's health. (T_Pac Env-2)

Comment: We urge CARB to make landfill emissions data publicly available in real time. Transparency monitoring will help ensure that these leaks are detectible quickly, so action can be taken before emissions spread and cause environmental harm. My generation, our next generation, deserves clean air, healthy land, and climate policies that actually reduce emissions. (T_Env CA-2)

Comment: CARB needs to ensure that communities have full access to real-time data on methane leaks and temperature exceedances, so that they can make informed decisions about how to protect themself and their families. I want to say that my community has suffered through the Westly Tire Fire, the only tire incinerator in California. We've suffered through 35 years of burning 800 tons of garbage. We have the only landfill in our county. The other one is shut down due to methane issues. It was in Turlock. (T_GNC-3)

Agency Response to Combined Comments:

CARB made changes in response to these comments. In the 15-Day Changes, reporting was added when an owner or operator requests a waiver from another regulatory agency to operate a well at a higher temperature, including the request, supporting documentation, and the agency approval or denial. No other changes were made in response to these comments as many of these comments request increased transparency for data that will come from regulatory implementation. The Proposed Amendments include several improvements to reporting, including more frequent monitoring data submittal, to allow for more effective oversight and support greater data transparency. In adopting Resolution 25-14, CARB committed to greater transparency by directing staff to make reported information publicly available beginning in 2027, to share reported data with state and local agencies to protect public health, and to report on implementation by mid-2028. As part of ongoing implementation, CARB will make information publicly available about plume detections and the status of operators' monitoring and repair actions. Under CARB's existing voluntary plume notification efforts, staff also notifies the local air district at the same time as operators. If a plume is detected near a community, CARB will follow an expedited procedure to inform air districts, first responders, operators, and community members to protect public health. For additional information on the notification process when methane plumes are detected by remote-sensing, see agency responses in section IV.B.2 of this FSOR.

Staff further wishes to note that CARB and local air districts have committed significant resources over decades to develop increasingly sophisticated and comprehensive air quality monitoring networks to provide actionable air quality information to inform public health. See CARB's *Air Quality and Meteorological Information System* webpage to explore existing tools and resources including pollution maps and real-time local air quality data.

M.1-2 Concern that excessive public data volume could reduce usefulness

Comment:

General Comment - Public Data Reporting

The Draft Regulation will result in an unprecedented volume of data that will need to be collected, analyzed, and administered by both operators and CARB staff (and/or Air District staff should the Air Districts continue LMR enforcement under their MOUs with CARB). Elsewhere in our comments we describe the need to further refine the type and frequency of data collection with its intended purpose. This will avoid the collection of data for the sake of it, resulting in unnecessary costs for the landfills and for the regulators.

Another consequence of this significant increase in data collection is the bearing it has on some stakeholders' requests for increased public transparency. Experience with monitoring and reporting tells us that more data is not necessarily better, particularly if it is not contextualized for each of its intended uses and audiences. If anything, the volume of data generated by this rule could result in a "Prop 65 effect," where there is so much data that it essentially becomes unusable to those who are interested in understanding its impacts. (OP_Ind/Gov Coalition-32)

Agency Response:

No changes were made in response to these comments. CARB committed to making reported information available and proposed reporting changes that are expected to enable CARB to facilitate public data access, as discussed in the agency response in section IV.M.1-1.

2. Fenceline Monitoring

M.2-1 Require fenceline monitoring, especially for landfills with compliance/odor issues or those near communities

Comment: I want to advocate for fenceline monitoring for problematic landfills to be added to this regulation today. Fenceline monitoring at refineries in Kern County have given nearby residents actual data about what they're actually breathing instead of relying on industry infrequent inspections. When monitors at refineries detect elevated levels of pollution, a notification on a live website it triggered that helps notify community members.

This is especially valuable during H_2S releases that might have otherwise gone unnoticed until people start experiencing symptoms. If CARB is unwilling to add fenceline monitoring at landfills at this time, I would ask that CARB make a research commitment to establish a non-regulatory fenceline monitoring system at a problematic landfill. This would help CARB staff get the data themselves on frequency and concentration of methane releases across a landfill boundary and be able to start getting data on if methane releases across the landfill boundary are connected to community odor and/or health complaints.

This is not something that the waste industry is going to voluntarily do, so it is up to CARB. Communities living near landfills have the right to clean air and the right to know who and what landfill is putting into the air they breathe. (T_CCEJN1-1)

Comment: Specifically, we recommend that CARB:

…

- Include a fenceline monitoring requirement, or in the alternative, require landfills to conduct fenceline monitoring for at least six months to assist CARB in developing a fenceline standard in the LMR; (OP_EIP-4)

Comment:

CARB should have included a fenceline monitoring standard.

A described in our January 2025 Letter, in the past several years, EPA finalized fenceline monitoring requirements for the refinery, chemical manufacturing, coke oven and integrated iron and steel sectors. EPA promulgated these fenceline monitoring requirements and associated work practice requirements to mitigate fugitive emissions and other difficult-to-monitor sources, e.g. equipment leaks. Fenceline concentrations dropped by an average of 30 percent since the refinery sector's fenceline monitoring requirements went into effect.

Unfortunately, CARB did not include any fenceline standard in the proposed amendments to the LMR, nor did CARB explain its decision not to do so in the ISOR. EIP continues to urge CARB to include a fenceline standard in the LMR, or at the very least, require landfills to conduct fenceline monitoring for at least six months to assist CARB in developing a fenceline standard in the LMR.

EIP urges CARB to include a fenceline standard in the final LMR.

Although landfills and the refinery sectors are different, because of the large footprint of a landfill and variability in emissions, requiring fenceline monitoring—alongside more robust SEM monitoring and a super emitter response program ("SERP")—could indicate when, and generally, where, there are elevated emissions at landfills.

EPA chose to first establish a fenceline standard for the refinery sector to address fugitive emissions. EPA's reasoning for establishing the fenceline standard was that they were "concerned regarding the potential for high emissions from these fugitive sources due to the difficulties in monitoring actual emission levels." EPA reasoned that "[t]his approach would provide the owner or operator with the flexibility to determine how best to reduce HAP emissions to ensure levels remain below the fenceline concentration action level," and that "[f]enceline monitoring will identify a significant increase in emissions in a timely manner[,] which would allow corrective action measures to occur more rapidly than it would if a source relied solely on the traditional infrequent monitoring and inspection methods." EPA's rationale for establishing the fenceline standard was that

> [h]istorically, improved information through measurement data has often led to emission reductions. However, without a specific emission limitation, there may be no incentive for owners or operators to act on the additional information. Therefore, as part of the fenceline monitoring approach, we seek to develop a not-to-be exceeded annual fenceline concentration, above which refinery owners or operators would be required to implement corrective action to reduce their fenceline concentration."

Years later, EPA established similar fenceline standards for three other sectors, in large part due to the success of the refinery fenceline standard at reducing fugitive emissions.

Especially considering CARB's dual commitment in the LMR to reducing air toxics from MSW landfills, CARB is likely leaving meaningful, affordable and achievable emission reductions on

the table by not including a fenceline standard in the proposed amendments to the LMR. In fact, as previously explained in our January 2025 letter, state agencies already required fenceline monitoring in consent decrees for landfills {Footnote: “The Proposed Amendments would reduce emissions of landfill gas, including methane and copollutants like toxic air contaminants (TAC) and volatile organic compounds (VOC). This is accomplished through multiple provisions that result in improved gas capture, improved monitoring and testing of gas control devices with energy recovery, and improved surface cover.” 2025 ISOR at 113.}. Instead of placing monitors around the entire perimeter of the landfill, monitors are placed at strategic locations on the landfill perimeter—close to both the active face and surrounding communities (where applicable). In response to excessive odor complaints and a significant SET event, CARB and the South Coast Air Quality Management District (“SCAQMD”) are already requiring Chiquita Canyon Landfill to conduct monitoring along the fenceline. As suggested in our January 2025 Letter, CARB can look to the flyover study and associated modeling conducted by the Michigan EGLE and other agencies to determine the number of monitors needed.

However, any fenceline monitoring requirements that CARB considers should not serve only an informational purpose. Fenceline monitoring must be paired with an action level that when an operator exceeds it, they are required to perform corrective action. CARB should establish an action level for methane and other hazardous air pollutants that triggers root cause analysis and corrective action by the operator. Because methane could be produced by nearby sources—such as farms, wetlands, composting facilities—CARB should allow sources to submit site-specific monitoring plans that include site-specific modeling that assesses the particular landfills’ fugitive methane emissions. However, CARB should conduct robust oversight of these site-specific monitoring plans to ensure that they adequately address fugitive emissions from each particular landfill.

Moreover, CARB could draw from fenceline monitoring requirements in California’s own refinery community monitoring and fenceline monitoring requirements and recent federal fenceline monitoring requirements for refineries and coke ovens to establish methane concentration monitoring requirements. For example, CARB could consider establishing a methane action level that would trigger implementing a corrective action plan within twenty-four (24) hours. Corrective actions could include application of additional daily cover and/or installing/repairing horizontal collectors. CARB should also include in the established method and in the monitoring plan that the owner or operator shall collect and record meteorological data.

Finally, CARB should require that all data is posted publicly and expeditiously. At landfills in both Michigan and North Carolina, after years of odor complaints and due to other compliance issues, the state agencies required fenceline monitoring and that the results be posted publicly, also requiring robust community engagement. EGLE notes that odors from the Michigan landfill (though complaints are still received) are reduced. (OP_EIP-12)

Comment: EIP continues to encourage CARB to include a fenceline monitoring standard in the LMR. We included specific recommendations for how CARB could establish a fenceline standard in our January 2025 Letter. If CARB chooses to not include a fenceline monitoring standard in the LMR, EIP encourages CARB to require landfills to conduct fenceline monitoring for at least six months as part of an information request to inform developing a fenceline standard. (OP_EIP-21)

Comment: We urge the Board to also adopt several enhancements. This includes: to require fenceline monitoring near communities; (T_RMI-9)

Comment: CARB should require all landfills within a 10-mile radius of communities to implement live, fenceline monitoring to ensure communities can take timely action when toxics or air pollutants are present. (OP_CAW-5)

Comment: Fenceline monitoring: In addition to facility-specific monitoring, CARB should require fenceline monitoring at landfills to provide insight into the emissions that escape the landfill property and impact surrounding communities. Landfills are dynamic sources of methane, carbon dioxide, volatile organic compounds, toxic chemicals, and other gases, and even well-operated GCCS can have leaks or fugitive emissions that bypass point-source controls. Without monitoring at the fenceline, these emissions may go undetected as they affect local air quality, creating risks for community exposure that are not captured by internal SEM or wellhead monitoring alone.

Fenceline monitoring provides an independent, continuous measure of ambient air quality immediately outside the landfill boundary, giving regulators and communities a real-world indicator of emissions escaping collection and control systems. This type of monitoring is critical for protecting communities and the data allows communities to take immediate protective actions, such as avoiding outdoor activity or using air filtration, when there are emissions spikes or unusual emissions events.

We recommend that CARB require fenceline monitoring for all landfills. At minimum, fenceline monitoring should be mandatory for any landfill located within a 10-mile radius of an established community and any new landfill cited within 10 miles of existing communities. (OP_CAW-67)

Comment: Require fenceline monitoring for any landfill within 10 miles of an established community and for all new landfills within 10 miles of existing communities. (OP_CAW-70)

Comment: Fenceline Monitoring

Fenceline monitoring and community air monitors should be required at all landfills that have homes, schools, or businesses within a 10 mile radius. Perimeter monitoring systems are a key way to alert community members and landfill operators to potential issues in real time, prompt fast corrective action, and ensure that gas collection equipment are actually functioning. This can also be used as a proactive measure to build trust between communities, regulators, and landfill operators. (OP_VVCA-8)

Comment: Require fenceline monitoring at landfills near populations to better assess variable fugitive emissions and ensure adequate community health protections. (OP_RMI/EDF-9)

Comment: Commenters recommended CARB require fenceline monitoring as a tactic to catch variable fugitive emissions, a current gap in the Proposed Amendments.

Monitors should be placed at strategic locations on the landfill perimeter – close to the active face and near impacted communities. This is a gap in the Proposed Amendments that leaves communities vulnerable.

CARB can look to the flyover study and associated modeling conducted by the Michigan EGLE and other agencies to determine the number of monitors needed.[23] CARB should establish an action level for methane and other hazardous air pollutants that triggers root cause analysis

and corrective action by the operator. Because methane could be produced by nearby sources—such as farms, wetlands, composting facilities—CARB should allow sources to submit site-specific monitoring plans that include site-specific modeling that assesses the particular landfills' fugitive methane emissions {Footnote: In September of 2024, EPA's Office of Inspector General ("OIG") conducted an audit of the oversight of the benzene fenceline monitoring requirements for refineries. Env't Prot Agency, Office of Inspector General, Oversight to Ensure that All Refineries Comply with the Benzene Fenceline Monitoring Regulations, Report No. 23-P-0030 (Sept. 6, 2023), https://www.epaoig.gov/sites/default/files/reports/2023-09/_epaoig_20230906-23-p-0030_errata.pdf (last visited Sept. 19, 2023). The report included a finding that site-specific monitoring plans did not include required monitoring needed to verify offsite source contributions to fenceline benzene levels. Id. As a result, EPA approved site-specific monitoring plans for refineries relied solely upon modeling that likely overestimates nearfield source emissions, resulting in unwarranted downward adjustment to the delta c value. Id. CARB should note this OIG report and avoid these and similar issues when approving site-specific monitoring plans.} However, CARB should conduct robust oversight of these site-specific monitoring plans to ensure that they adequately address fugitive emissions from each particular landfill. (OP_RMI/EDF-19)

Comment: …[W]e encourage CARB to consider strengthening its draft rule by:

- Prioritizing community safety through fenceline monitoring and transparent data reporting; (B_US Reps-4)

Comment: Less methane will be less ozone, and less asthma, and less respiratory illnesses. I'd also like to ask CARB to continue these good efforts by considering fence line monitoring systems to allow for even faster and better data on methane and other air toxins. You may hear about cost and there certainly may be some. But let's relate this to health care for just a moment. The cost, for instance, of a measles epidemic, if we go down that road again, to both individuals and society are going to be far, far higher than the cost of vaccinating our children. (T_Mulligan-2)

Comment: We know what slow information there are for families who deal with bad air quality already. I support this rule, but I want to highlight two points that matter for the betterment for frontline marginalized communities of color.

We need continuous fenceline monitoring with real time public data. People who -- people should not file record requests to find out what their breathing. They deserve clear information the moment emissions arise. (T_Ruano-1)

Comment: We thank CARB for embracing data transparency that is easily accessible and express the need for fenceline monitoring to alert of potential threats sooner and real time public notification. These things are essential to protecting the people who live, work, or go to school near a landfill. The disaster at Chiquita Canyon Landfill was preventable.

Updating the regulations will better protect communities and prevent disasters like Chiquita from happening at other landfills. California is supposed to be the leader in environmental protection, but we're failing. How can we be leaders when our own people are being poisoned in their homes, while multi-billion dollar companies continue to profit. (T_VVCA-2)

Comment: Second, fenceline monitoring to alert of potential threats sooner. So, the technology exists, and we must require it. We need to know when we're in trouble. (T_Howse, B.-2)

Comment: So fenceline monitoring, I think it would have helped a lot of our community, so we could leave. We've been told lies, after lies, after lies. One thing I'd like to point out sitting here listening. There's two gentlemen. I think they're both from different landfills. I could be wrong, but from listening to them, it seemed like they were almost in support of this. I could be wrong, but I find it hard that, you know, the landfill that's poisoned us --like I've had -- gone through cancer twice. I don't hear them coming here trying to say, hey, this is a good thing, or that this should be done, or thanking you guys for doing this. So I think that's great that -- if I heard them correctly, I think it's great for them for doing that. (T_Stinson-2)

Comment: I am asking CARB to require continuous fenceline monitoring with public access... (T_Ruano-3)

Comment: I urge CARB to also ensure that these amendments include requirements for real-time fenceline monitoring with publicly available data, quarterly and annual reports published online and a public data dashboard displaying emissions and operational information as soon as practicable.

These measures will not only reduce methane emissions, but they will also build trust, accountability and healthier communities. Thank you for your leadership. (T_ALA-3)

Agency Response to Combined Comments:

No changes were made in response to these comments. The recommendation is out of scope of this rulemaking because fenceline monitoring was not considered in the proposal.

This proposal focuses on directly finding and fixing leaks at their source and other types of operational standards and monitoring to ensure gas collection systems are functioning as designed, which reduces emissions of co-pollutants and improves air quality. CARB and local air districts have performed community air monitoring surveys in response to nuisance complaints, and agencies have required operators to establish continuous air quality monitoring with community notifications as part of enforcement actions. Air districts, CARB, public health departments, and other regulatory agencies can and do conduct targeted air sampling to ensure that emissions do not exceed established health protective levels—where the need for such monitoring is indicated. Fenceline monitoring is a valuable tool at sites that are experiencing abnormal conditions. The proposal will add several direct indicators that help to identify sources that are at risk of higher co-pollutant emissions that could affect workers and neighboring communities.

For more information regarding CARB's existing tools and resources for air quality and greenhouse gas (GHG) emissions information, see agency response in section IV.M.1-1.

M.2-2 Consider pilot fenceline monitoring for data collection

Comment: Alternatively, at minimum, CARB should require all landfills to conduct fenceline monitoring for at least six months for the purpose of developing a fenceline standard.

Before EPA proposed new rules for the integrated iron and steel, coke ovens and chemical manufacturing sectors, EPA used its authority under Section 114 of the Clean Air Act to require some of the sources to conduct fenceline monitoring to obtain fenceline concentrations of hazardous air pollutants. The vast majority of sources conducting this monitoring measured hazardous air pollutant concentrations much higher than what they were estimating and reporting.

CARB also has data-gathering authority. CARB is permitted under 42 U.S.C.§7414(b)(1) to submit to the EPA Administrator a procedure for carrying out Section 114 information requests in California. CARB should similarly require either all or a subset of MSW landfills in California to conduct at least six months of fenceline monitoring to help CARB develop a fenceline standard for the LMR

Because CARB is the leading innovator in the regulatory landscape for landfill methane regulation, this process presents the perfect opportunity for CARB to continue to lead. Fenceline monitoring represents a major step forward in reducing fugitive emissions in recent years. Even on the precipice of finalizing what will likely be the strongest regulations in the country for MSW landfills, CARB should consider, at the very least, gathering more accurate data on fenceline concentrations of methane and hazardous air pollutants to establish a fenceline standard. As evidenced by the success of the refinery fenceline standard, CARB could be leaving meaningful and achievable fugitive emission reductions on the table by failing to even collect information needed to develop a fenceline standard. (OP_EIP-13)

Agency Response:

No changes were made in response to this comment. The recommendation goes beyond the scope of this rulemaking because fenceline monitoring was not considered in the proposal. See the agency response in section IV.M.2-1.

M.2-3 Do not require fenceline monitoring; it is complex, expensive, and would require years of engagement

Comment: Some stakeholders have suggested that the regulation require fence line monitoring at landfills in proximity to communities. These systems are technically complex and extraordinarily expensive; they would require years of engagement between CARB staff, Air District staff, and the operators to install and operate, and would likely require Air District rulemaking as well. The public will soon be able to review emissions from landfills and other stationary sources on an online platform CARB is developing because of CARB's Regulation for the Reporting of Criteria Air Pollutants and Toxic Air Contaminants (CTR). CARB should focus on implementation of CTR rather than pose onerous new requirements on every landfill. (OP_Ind/Gov Coalition-33)

Agency Response:

No changes were made in response to this comment. The comment is out of scope of the rulemaking because fenceline monitoring was not proposed in the Proposed Amendments.

3. Health Impacts and Environmental Justice

M.3-1 Address community health risks associated with elevated temperatures, subsurface fires, and emissions

Comment: Communities are the most impacted by decisions regarding landfill regulation and oversight. Residents, schools, and local businesses all rely on government agencies like the California Air Resources Board (CARB) to hold landfills accountable and to protect public health. That accountability has been missing for too long. An improperly operating landfill can destroy a community and ruin the lives of hundreds or thousands of residents.

The ongoing crisis at Chiquita Canyon Landfill is a tragic example of the disasters that can occur when there is a lack of effective regulation and meaningful oversight. Landfill operators will only do what is required of them and only when someone is watching. A similar event like Chiquita Canyon can never be allowed to happen again. While the waste management industry is going to talk about cost and affordability, they make billions of dollars of profit from landfills.

This updated regulation must protect Californians from experiencing Chiquita Canyon like events. (OP_VVCA-1)

Comment: When landfill emissions go undetected, nearby residents – especially young children – are among the first and most severely affected. Methane and toxic co-pollutants released from landfills can worsen asthma, harm developing lungs, and degrade local air quality. In California, over 1.6 million children under the age of five live near a municipal solid waste landfill. Protecting communities and vulnerable populations from these exposures requires an emissions monitoring and capture system that identifies and mitigates every leak and ensures swift corrective action.

However, the Proposed Amendments miss several mission-critical opportunities to strengthen alignment with CARB's mandate to deliver transformative emissions reductions and prioritize the health of California's most impacted communities. Chief among these are:

- Comprehensive improvements to surface emissions monitoring (SEM);
- Transparent public reporting of critical landfill emissions and performance data; and
- More stringent thresholds for preventing disasters and protecting environmental and public health. (OP_CAW-2)

Comment: It is also important to clarify that while landfills do not produce nitrogen oxides through decomposition, landfill operations do. Flaring, landfill-gas-to-energy combustion units, backup generators, heavy equipment, and diesel machinery are significant local sources of NOx. These NOx emissions, though external to the waste mass, combine with landfill VOCs and aerosolized aldehydes —and sunlight—to generate ground level ozone, a potent respiratory irritant and a major contributor to asthma attacks, airway inflammation, heart stress, and premature death.

Stronger monitoring, real-time leak detection, improved landfill covers, aggressive landfill leachate recovery, co-pollutant controls, and modern NOx-minimizing engineering technologies are urgently required. Reducing methane alone is not enough to reduce reactive landfill VOCs, eliminate toxic ozone and better protect air quality and public health. Reducing

methane alone is not enough: The urgent need to reduce reactive landfill VOCs, eliminate toxic ozone and better protect air quality and public health. (B_Sunflower-1)

Comment: I stood before you back in March and begged for you to take action, so that no other communities would have to suffer like mine has. I'm here today to tell you we are still being harmed by the Chiquita Canyon landfill. We are still suffering every single day.

I have transferred my children to different schools further away. I spend three hours a day driving my kids to and from school now. The commute has been a sacrifice, but it's been well worth it, because I know my children and breathing cleaner air, and I've seen their health improve.

The bloody noses, skin irritation, and breathing issues are less than before, because they're spending less time in the area. I signed them up for sports and extra curricular activities across town. And we spend as little time as possible at home. And when we are home, we stay inside, windows and doors shut tight. We are prisoners in our own home. (T_VVCA-1)

Comment: I'm from the Castaic community. And this may not be the most conventional way to present, but I wrote this…I wrote this to express the community's experience.

(Singing to Can You Feel the Love Tonight.)

I can see what's happening, and they don't have a clue. The County's blind. Here's the bottom line, it's up to me and you. The sick sweet smell of benzene. There's methane everywhere. And with all this poison in the atmosphere, disaster is in the air.

Can you smell the dump tonight? It's in the evening breeze. It's killing us, and they just tell us, call AQMD. Here's what I'm trying to tell you, but how to make you see, they're poisoning our kids. Impossible. That's just pure villainy. They're holding back. They're hiding. But why I can't decide. Is it corporate greed or just plain politics that pushes us aside.

Can you smell the dump tonight? It's in the evening breeze. It creeps inside our hearts and lungs, and makes our noses bleed. Can you smell the dump tonight? You needn't try too hard. It seeps inside our schools and houses. It's not just in our yards. But if you smell the dump tonight, it can be assumed, your healthy days on earth are over, ensure {CARB staff note: this is a transcription error; the commenter said “in short,” not “ensure”} Val Verde's doom.

(End of singing.)

Thank you for all that you're doing. (T_Arobalo-1)

Comment: So as many on the Board knows, and as has been discussed, Chiquita, in my district, has millions of gallons of toxic liquids that have been created and are continually being released. Cancer-causing gases, noxious fumes have been a result of the uncontrollable fire that's happening underground. And this has been leading to community members having out of control chronic bloody noses, headaches, nausea, tremors, heart palpitations, miscarriages, cancer clusters, and more. And we know that the true scope of the harm has been confirmed by recent CASPER Health Study, which revealed data far more alarming that what residents had reported just that we've heard anecdotally.

Cancer rates in surrounding neighborhoods have been eight times higher than the three-year county average. And miscarriages are occurring at 57 times the normal rate of LA County. One mother I met had five miscarriages just herself. These are not abstract numbers. These are

moms, and children, and grandparents, entire families living under these conditions that would be unthinkable in other settings. So this catastrophe that continues to harm our community did not arise out of nowhere. And I believe with the right data, the right transparency, coordination and the right authority for corrective action, it could have been avoided. And that's I think what is ultimately so frustrating about this situation. (T_Schiavo-1)

Comment: For me, it's very important to maintain our environment very clean to prevent fires. I'm here in favor of the proposal of the regulation to -- about -- I'm coming here from Stanislaus from the organization that is Valley Improvement Projects, known as VIP. That's it. (T_Acevedo-1)

Comment: I moved to Val Verde in 1998 and bought my first house. I fell in love with the quiet area, rich history, and close community. When we moved there, we were told, hey, don't worry. The landfill is closing. Well, two expansions later, in 2022 Chiquita Canyon Landfill has a growing underground elevated temperature event causing numerous health issues in my community.

In 2024, my wife was diagnosed with Stage 3 breast cancer. And oddly, 10 of my close neighbors either have or had cancer as well. My family of six are all dealing with health issues related to the toxins coming from the landfill reaction. (T_Howse, S.-1)

Comment: (THROUGH INTERPRETER):…We have a landfill inside of our community and it's actually across a street of my home. We have been affected with cancer, tumors, and other illnesses. Myself, I have been diagnosed with cysts. The same for my two daughters.

We ask you for a strict regulation, not only on paper. Please don't just say yes and act like you are going to do something and everything go to be -- everything go only to files. We also have a lot of problems with pests, mosquitos, mice, among others. We also have the gases that affect our health. We have the fever valley, cysts, gases, tumors.

I would like you for -- I would like for you to do something. The administrators of the landfill have been lying to us for too long. We don't have where to go, only you. You can regulate or disappear the landfill from our community. We also have a lot of accidents with the trucks. We have so many trucks in our communities who go to dispose the garbage. Besides that, they have a lot of contamination in the water. Please help Avenal community. (T_Villegas-1)

Comment: I'm on – here today, because many of your community have asked for strong stringent regulations, to acknowledge the reality of fires that are happening. We know that just from batteries alone, there is a fire every day in the United States from improperly disposed lithium batteries. Strong regulations help enact strong change in our communities, to protect not only the air and the water quality, but the health of the communities that live in and near the locations where the landfills occur, as well as the overall climate for all humans on this planet. (T_GL-1)

Comment: I stand here before you, not just as a resident in this community, but also as a parent, a neighbor, and special education teacher, who knows what it -- what it means to fight for the access to fundamental quality of life.

I'm here to state unequivocally that we must pass and enforce a methane regulation. And thank you for leading on that. For far too long, the air we breathe has been a hidden burden that my family, especially when in different areas of Val Verde, suffers from frequent headaches. But let me be clear, this is not psychosomatic. These conditions are mere --are not

mere inconveniences. They increase our health risks and lead to significant unbudgeted costs, primarily medical expenses.

The toll extends beyond my home. I have neighbors who have battled cancer, my next door neighbor actually. Just recently, a neighbor died of cancer and I cannot describe the fear this instills. Our environment should not carry the risk of a terminal diagnosis. This is why I fully support the measures and the, cost like Jennifer noted --mentioned to regulate this issue properly. We must be willing to pay more to secure the health and safety of our children. The consequences of delaying the information and actions are already disrupting our lives. This uncertainty has resulted in constant change, focusing on rescheduling activities like community events, and even change family plans including Thanksgiving upcoming. (T_Engle-1)

Agency Response to Combined Comments:

No changes were made in response to these comments. CARB appreciates the comments and thanks the commenters for sharing their experiences and perspectives, and for continuing to engage with CARB and other regulatory agencies working to address the impacts of landfill operations and SET events. While the purpose of the LMR is to reduce methane emissions from municipal solid waste landfills, capturing and destroying methane also potentially reduces emissions of any present co-pollutants in landfill gas, as described further the ISOR chapters IV and V. The Proposed Amendments are expected to deliver improved air quality and public health benefits through a number of strategies designed to reduce emissions and support safe and effective operation of landfill gas collection and control systems as described further in the ISOR chapters IV and VII.

As discussed further in the agency response in section IV.M.1-1, the Proposed Amendments expand recordkeeping and reporting and consistent with Resolution 25-14, staff will make reported information publicly available.

The comment regarding nitrogen oxides (NOx) minimizing engineering technologies is outside the scope of the rulemaking because the purpose of the LMR is to reduce methane emissions and does not set limits on criteria emissions from control devices. Many air districts have rules addressing NOx for equipment at landfills. Refer to ISOR chapter VI for more information.

M.3-2 Ensure regulation has teeth

Comment: I've been a resident of Castaic, which is near Chiquita Canyon Landfill, for 20 years. And in the last five years, I've had cancer twice. And going through the chemotherapy and the radiation, I would not wish that upon anybody. And while I was recovering from one of my surgeries, I -- one of my neighbors posted a picture of the carbon mapping. And it showed a plume from the landfill going all the way up into my community, which is about 2.3 miles away, and it covered Val Verde. And I live in the Hillcrest community of Castaic.

This -- I started researching and trying to find the data, so I really appreciate the clear data that you're going to make it for the public, because it is difficult to compare the different gases and understand them. But the thing that really got me is that the landfill near us, they do not maintain properly their equipment. There is no definition. The flares are always going down and there's no punishment for them when their equipment breaks down. When we don't have the data, there's nothing. So properly maintained equipment needs to have teeth. You need to

enforce the rules. The landfill is completely mismanaged and ignored the EPA and CARB's orders. And this needs to stop immediately.

When landfills can scrub data, that is wrong. Well managed needs to be defined. And as a parting note, I had to leave my community that I loved so much and so that my family would be safe. And it's really hard on us financially and we need - Thank you. (T_Frohling-1)

Agency Response:

No changes were made in response to this comment. One of the key goals of the Proposed Amendments was to enhance the enforceability of the Regulation. Accordingly, staff proposed new operational and monitoring requirements with specific quantitative limits, and additional recordkeeping and reporting requirements to facilitate effective oversight and more rapid response to improve CARB and air districts' implementation and enforcement of the regulatory requirements.

M.3-3 Relocate landfill away from local community

Comment: (THROUGH INTERPRETER): Hello. My name is Socorro Revolledo and I'm from Avenal in Kings County. I want to thank you first for your time to listen to us. We are a minority and sometimes we don't have people to listen to us. Only you can listen. You need to move the landfill out of our community. We are here not only in a personal basis. We also the voice of those who cannot be here, sick people, dying people, people that are still in hospitals with oxygen or dealing with other issues.

Also, we are here representing our kids and future generations. Move your landfill. There are mountains. There are deserts. There are places where no human beings are present. We are a minority and we need t o be taken care of. We have the signs here, not only because we were trained to do signs, we wanted to be heard. We want you to see us. Please help us. Thank you for your time. (T_Revolledo-1)

Agency Response:

No changes were made in response to this comment. The role of the LMR is to reduce methane emissions at controlled landfills and landfills that meet certain criteria for installing a GCCS, and in doing so will achieve co-pollutant emission reductions as well. This comment is out of scope of the rulemaking because the LMR does not a have a role in siting or permitting disposal operations.

N. Other Comments

1. Scope, Authority, and Applicability

N.1-1 Avoid regulatory overlap in surface cover and GCCS oversight

Comment: To begin with, we believe that CARB is overstepping its authority by including cover requirements from 14 CCR and 27 CCR (or beyond 14/27 CCR) that are under CalRecycle's and local enforcement agency's (LEA's) jurisdiction. Regulated facilities do not need CARB and the local air district, in addition to CalRecycle, the LEA, the Regional Water Quality Control Board (RWQCB) enforcing landfill cover requirements. (OP_L and D-17)

Comment: CARB's LMR is a component of the State's multipronged strategy to reduce GHG emissions in California—as the Initial Statement of Reasons (ISOR) notes, "the purpose of the LMR is to reduce emissions of methane from MSW landfills." When CARB workshopped the Draft Regulation in 2023 and 2024, CARB indicated that the intended scope of the proposed amendments would address the feasibility of further reducing methane emissions from landfills based on the increase in data collected by satellites, revising current operational best practices, and utilizing emerging methane detection technologies. While the Draft Regulation includes amendments with such scope, it also includes significant amendments attempting to address the operation and monitoring of landfill gas collection and control systems (GCCS), which has historically not been CARB's area of jurisdiction. (OP_WM-19)

Agency Response to Combined Comments:

No changes were made in response to these comments. As discussed extensively in the ISOR, landfill surface covers play an important role in capturing methane, odors, and co-pollutant emissions, and preventing intrusion of ambient air and excess precipitation. Research cited in the ISOR as well as staff's implementation experience has demonstrated that cover integrity and properties such as material type and thickness are important factors in effective collection of landfill gas. The Proposed Amendments do not set new cover requirements, but rather reference cover specifications in existing regulations. The Proposed Amendments target cover integrity assessments where potential performance issues have been identified to ensure effective operation of the GCCS to collect and destroy methane. CARB also notes that several adjustments were made in the 15-Day Changes to further focus on the most important areas (e.g., limiting cover integrity monitoring plans to only areas of daily and intermediate cover; and allowing 15 days to correct high oxygen before requiring a cover integrity assessments) and better align with the goal of ensuring surface cover integrity supports effective collection of landfill gas (e.g., by referring to Title 27 of the California Code of Regulations in section 95471(k)(5)(D)).

CARB's LMR has always specifically required and regulated the installation, operation, and monitoring of a GCCS, which is the system that captures and destroys methane and its proper operation is essential to effectively reduce methane emissions.

N.1-2 Ensure alignment with methane reduction goals; remove unrelated federal air toxics requirements

Comment: The basis for the LMR is the reduction of landfill methane as a greenhouse gas (GHG). As such, this rule is not the proper venue for the inclusion of federal air toxics requirements from the landfill National Emissions Standard for Hazardous Air Pollutants (NESHAPs). If CARB wants to impose federal air toxics requirements in a California rule, it should go through its own air toxics rulemaking. Therefore, we request that any proposed amendments, which reference or otherwise incorporate rule requirements from the landfill NESHAPs under 40 Code of Federal Regulations (CFR), Part 63, Subpart AAAA, should be removed from this rulemaking and subject to a separate air toxics rulemaking, if so desired by CARB. (OP_L and D-5)

Agency Response:

No changes were made in response to this comment. The commenter appears to be referring to gas temperature monitoring and corrective actions where Proposed Amendments contain some similar requirements as those contained in NESHAP (e.g., enhanced monitoring and downwell monitoring in section 95469(e)(3) and (4)).[39] As discussed in the ISOR (pp. 60-61), elevated temperatures can impede effective landfill gas capture. The requirements are intended to ensure effective operation of the GCCS to capture and destroy landfill gas. Doing so destroys both methane and hazardous air pollutants, and CARB's basis for adding these requirements in the Proposed Amendments is for control of methane emissions.

N.1-3 Add third party owner/operators to Applicability section of the regulation

Comment: Owner/Operator definition: If CARB intends to include owners or operators of entities that receive landfill gas from a MSW landfill that also operate any stationary equipment for the management/use of treated or untreated landfill gas or operate any stationary equipment for the combustion of landfill gas in the definitions, then the rule needs to add these entities to the applicability of the rule. (OP_Ind/Gov Coalition-30)

Agency Response:

No changes were made in response to this comment. The applicability (section 95461) of the LMR was not changed through the Proposed Amendments. The LMR applies to MSW landfills and places requirements on owners or operators of the associated gas collection and control systems that reduce emissions of the methane generated within MSW landfills. The current Regulation also directs owners and operators of gas control systems to take certain actions (e.g., "The owner or operator must monitor the gas control system…" in section 95469(b), and "The owner or operator must conduct an annual source test for any gas control device(s) subject to the requirements of sections 95464(b)(2)(A) or 95464(b)(3)(A)" in section 95464(b)(4)), which is defined to include any person or entity that owns or operates stationary equipment for the collection of landfill gas or that purchases landfill gas from an owner or operator of an MSW landfill. The Proposed Amendments change "purchases" to "receives" and removes the requirement that the entity the gas is purchased from the owner or operator of the MSW landfill as discussed in the ISOR (p. 106). This ensures that all gas control systems to combust or treat landfill gas are subject to the same performance standards, monitoring, testing, recordkeeping, and reporting requirements—regardless of ownership.

2. Implementation Timelines

N.2-1 Extend timelines for component and cover monitoring plan development

Comment:

Deadline for Completion of Component Leak and Cover Monitoring Plans Should be Clarified

[39] 40 C.F.R. Part 63, Subpart AAAA.

Section 95464(b)(5) and (6) require owners or operators to develop a component leak monitoring plan and cover integrity monitoring plan within 90 days after the effective date of the regulation. If a local agency lacks the internal capacity to prepare those reports itself, it may seek to have a consultant prepare those plans. In that case it is unlikely that 90 days would be enough time for a public agency to request proposals, obtain approval of the elected local governing body for the funds, select a consultant, and leave the consultant enough time to prepare the plans. For this reason, we suggest providing owners/operators at least 180 days to prepare and begin implementing these plans. (OP_RCRC-4)

Agency Response:

CARB made changes in response to this comment. In the 15-Day Changes, the date by which Component Leak Monitoring Plans and Cover Integrity Monitoring Plans must be developed was changed from 90 days after the effective date of the amendments, to July 1, 2027. This provides 180 days after the anticipated effective date of the Proposed Amendments for owners or operators to develop and begin implementing the required plans, as requested by the commenter.

N.2-2 Develop a phased implementation approach to address technical, operational, and financial challenges

Comment: Our review of the proposed regulations reveals that certain provisions present technical, operational, and financial challenges that may unintentionally hinder safe and effective landfill gas management. We respectfully propose that the Board consider modifying the regulations with operator input to develop a phased implementation approach that achieves environmental objectives while maintaining operational feasibility. (OP_ReGen-1)

Agency Response:

CARB made changes in response to this comment. In the 15-Day Changes, several provisions were given implementation dates beyond the anticipated effective date of the Proposed Amendments. This includes later compliance dates for developing component leak monitoring plans, developing cover integrity monitoring plans, submitting documentation of current alternative compliance options, reporting causes of changes in daily gas collection, reporting causes of wellhead parameter trends, and monitoring engine and gas turbine exhaust temperature.

3. Rulemaking Process

N.3-1 Inadequate collaboration and comment period

Comment: Since the proposed changes and additions are significant and will have a large financial and operational impact on landfills throughout California, we do not believe that 45 days is sufficient time to fully address all concerns from the proposed amendments. Therefore, we request that the public comment period be extended through January 31, 2026. (OP_OPAL Fuels-1)

Comment: While these comments reflect our best efforts to address the issues, as set forth below, we believe that 45 days is too brief for stakeholders to fully review—and for CARB to be fully informed of—the complex challenges of implementing CARB's vision. We look forward to

continued dialogue with staff and believe an additional comment period will be necessary and would benefit CARB, the industry, and the public.

Timing of the Rulemaking Process

The comments below reflect our best efforts to address our concerns about CARB's proposed updates to the LMR. However, given the complexities, we believe that forty-five (45) days is not sufficient time to fully review this draft rule and to provide comments to assure that CARB is fully informed about the challenges we foresee in implementing CARB's vision. The proposed changes and additions are significant and will have major impacts on how landfills design, build, operate, and monitor their LFG systems, cover, disposal operations, and other landfill infrastructure. These changes have significant financial and operational implications for landfill operators and ratepayers across the state.

Recommendation: We strongly recommend CARB staff provide another (45) day comment period after changes have been made by CARB, so they can continue consulting with landfill owners/operators in the state to better understand the impacts of the proposed changes and their associated costs, so that the proposed changes reflect real-world conditions and realities. (OP_Recology-2)

Comment:

Short Timeline for Reviewing and Commenting

Stakeholders have only been given a period of less than fifty days to review and comment on the proposed LMR amendments. Considering the proposed amendments, with changes and new additions, are significant and extensive, and would result in profound impacts on the landfill industry, the time provided for reviewing and commenting is insufficient for stakeholders to thoroughly review the proposed amendments and provide constructive and meaningful feedback. Therefore, the Sanitation Districts recommend that CARB consider extending the period for review and comment on the proposed LMR amendments by 60 days. (OP_LACSD-1)

Comment: Forty-five (45) days is not sufficient time to review and comment on this draft rule. The proposed changes and additions are significant and will have a massive effect, both financially and operationally, on landfills in the state. Further, many of the proposed amendments have not been thoroughly detailed by CARB as part of previous rulemaking efforts, so there are new issues that must be better vetted. Also, it appears that certain revisions draw from the draft Colorado LMR; however, that rule will not be final until December 2025, and it is undergoing that may change some of the requirements upon which CARB has relied. Therefore, we request that the public comment period be extended through January 31, 2026. Additionally, CARB should conduct at least one additional workshop to thoroughly review the proposed amendments and the rationale behind them, now that specific rule language is available. (OP_L and D-1)

Comment:

Inadequate Stakeholder Engagement and Technical Basis

These amendments appear to have been developed without meaningful consultation with local government operators, LEAs, or CalRecycle-agencies that possess the field experience to assess feasibility. The methodology and numeric thresholds in §95469(e) and §95471 were

apparently derived from laboratory conditions and fail to consider variability in climate, cover type, and site geology. (OP_SVSWA-6)

Comment: SVSWA respectfully requests that CARB suspend adoption of these amendments and engage with local operators, CalRecycle, and regional air districts to craft a technically sound and economically balanced regulation. (OP_SVSWA-10)

Comment: While there are many things in the LMR proposal that we feel are thoughtful and a step in the right direction, the needs of the people living next to these landfills – the very people who bear the health, safety, and environmental consequences – were left out of the conversation. (OP_VVCA-3)

Agency Response to Combined Comments:

No changes were made in response to these comments. A 45-day comment period is prescribed by the California Administrative Procedure Act (APA) which also establishes time limits on the overall length of the rulemaking process, making extended comment periods less feasible.

CARB staff engaged extensively with stakeholders and regulatory partners in pre-rulemaking from 2022 to 2025 including three public workshops, a community meeting, and numerous individual meetings. CARB staff engaged with communities living near landfills and took their feedback into consideration when crafting the Proposed Amendments. CARB staff continued to meet with stakeholders and regulatory partners after the 45-day comment period had closed to continue receiving informal feedback as staff drafted the 15-Day Changes. CARB values input from communities, partner regulators, operators and other stakeholders on regulatory development and wants to continue productive engagement going forward.

The purpose and rationale of each change in the 45-Day Changes was included in chapter III of the ISOR and thus a workshop was not necessary to explain the rationales.

N.3-2 Materials not translated into Spanish

Comment: I'd like to just highlight that the transparency piece in the regulation is very important to us, not just transparency and access to immediate information, so that we don't have to request public records is very important, especially for language -- language -- English language proficiency -- or people who lack English language proficiency.

Today, we saw some challenges with the interpretation. Your presentation is only in English. The documents and attachments on your website for this LMR update is only in English. This is not accessible and we must do better. In California, Spanish must be included in your access to information. (T_VIP1-3)

Agency Response:

No changes were made in response to this comment. For the December 18, 2024, workshop and the July 18, 2025, community meeting, Spanish versions of presentation slides and interpretation services in Spanish were provided. The 45-day Notice of Public Hearing included instructions for requesting documents be made available in another language, and those instructions were provided in both English and Spanish. Prior to

the November public hearing, CARB did not receive any requests to provide the documents in Spanish. Following the hearing, CARB voluntarily supplemented the *Board meeting public agenda* with a Spanish translation of the presentation slides on February 20, 2026.

N.3-3 Commitment to work with CARB through process

Comment: WM is committed to working with CARB to accomplish its goal of modernizing the LMR, delivering a workable rule for operators, and further reducing methane emissions in the most cost-effective manner possible. (T_WM-5)

Comment: We close by asking for the comments received from industry and local government to be fully vetted and continue a process that is iterative enough to allow for dialogue on all the items that I've mentioned and appreciate the time to comment today and all the work that's been put into this far. (T_RS-6)

Comment: We... look forward to working with [staff] on additional 15-day changes in the following... consistent with air district comments, harmonizing overlapping federal, State, and local regulations applicable to landfills to the extent feasible and identifying which of the additional proposed data collection and reporting parameters are necessary and useful to diagnose conditions at the landfill. (T_WM-2)

Agency Response to Combined Comments:

No changes were made in response to these comments. CARB staff appreciates collaboration and feedback from landfill owners and operators. The purpose and rationale for each of the proposed data collection and reporting parameters are provided in the ISOR.

4. U.S. EPA Emission Guidelines State Plan

N.4-1 Ensure LMR achieves U.S. EPA approval under Emission Guidelines

Comment: The LTF believe it critical that California gain full approval from the U.S. Environmental Protection Agency (EPA) for the LMR to be equivalent to their Emissions Guidance. This approval will ensure consistent implementation of the proposed regulation by local air districts. CARB needs to provide a timeline for re-submittal of the LMR to EPA for approval. (OP_SWANA-1)

Comment:

Submission of the Proposed Amendments to the LMR to U.S. EPA to Gain EG Equivalence

In 2016, the U.S. Environmental Protection Agency (U.S. EPA) published the Municipal Solid Waste Landfill Emission Guidelines and Compliance Timelines for Municipal Solid Waste Landfills (Emission Guidelines-EG), which require the installation of a landfill gas collection and control system at certain landfills. California utilized the Landfill Methane Regulation (LMR) for California's State Plan to implement the Emission Guidelines. In early 2020, U.S. EPA partially approved and partially disapproved California's State Plan. In May 2021, U.S. EPA finalized a Federal Plan to implement the Emission Guidelines for existing municipal solid waste landfills, which includes specific reporting requirements in addition to those required by CARB under LMR.

The LTF believes it is critical that California gain full approval from U.S. EPA for the LMR to be equivalent to the EG, which will streamline reporting and mitigation efforts. CARB needs to provide a timeline for re-submission of the LMR to EPA for approval. (OP_SWANA-13)

Agency Response to Combined Comments:

No changes were made in response to these comments. These comments are out of scope of the rulemaking because they pertain to broader federal-state procedural matters.

5. Organic Waste Diversion / Beneficial Use of Biomethane

N.5-1 Align LMR with SB 1383 goals and support beneficial biomethane use

Comment: Diverting organics from landfills has been identified by CARB as the most effective and cost-efficient long-term solution for reducing methane emissions from landfills. The landfill industry and wastewater sector have been attempting for years to work with regulators and legislators to address a host of issues and needs, such as increased funding for infrastructure, permit and regulatory streamlining, and programs for utilizing biomethane. These challenges have stalled efforts to meet the SB 1383 organic diversion mandates. The Little Hoover Commission in their report entitled “Reducing California’s Landfill Methane Emissions: SB 1383 Implementation – June 8, 2023” has urged the State to provide funding, improve coordination among State agencies and better share the responsibility for SB 1383 implementation, and expand market opportunities for recycled organic waste, including biomethane. CARB should make all efforts to be consistent with these recommendations. (OP_SWANA-4)

Comment: Diverting organics from landfills has been identified as the most effective long-term solution for reducing methane emissions from landfills. From the SB 1383 Initial Statement of Reasons:

> *Achieving these targets will reduce an increasing amount of greenhouse gas emissions, ultimately achieving annual reductions of at least four Million Metric Tons of CO2 equivalents (MMTCO2e) annually by 2030. In addition, one year of waste diversion avoids 14 MMTCO2e of emissions over the lifetime of waste decomposition*.

This is compared to the LMR methane reduction of 1.5 MTCO2E over a 10-year period. Further, in 2016 the Legislative Analyst Office (LAO) identified programs that promote organics recycling and digester research and development, as the most cost effective (cost per ton) greenhouse gas reduction strategy. As an example, the average cost effectiveness of the top 21 reduction strategies was determined to be $57 per ton reduced with numbers as high as $725 per ton reduced; organics and recycling loans were $4 per ton reduced. However, despite the obvious advantages of focusing on the organics diversion strategy, the draft Little Hoover Commission Report (released June 2023) found that the organic diversion deadlines are not being met and efforts to achieve these mandates must involve significant increase in efforts by regulators working with municipal and industry partners. Municipalities, the landfill industry, along with their partners in the wastewater sector have been attempting to work with regulators and legislators for many years on a host of issues, such as increased funding for infrastructure, permitting, regulatory streamlining and programs for utilizing biomethane. Many of the most important efforts have been met with roadblocks that have stalled efforts to meet

the SB 1383 organic diversion mandates. All the efforts and issues are too numerous to summarize here.

The LTF strongly recommends that CARB reach out to associations that have been at the forefront of promoting these issues to fully understand the efforts that will be needed. The LTF will gladly work with CARB staff on identifying these groups. (OP_SWANA-22)

Comment:

Alignment with Senate Bill 1383 (SB 1383)

OCWR requests that CARB ensure that any updates to the LMR are aligned with the objectives of Senate Bill 1383, which mandates a 75% reduction in organic waste disposal and a significant increase in organics recovery and recycling.

We note that the successful diversion of organic material (such as food waste) from landfill disposal, as mandated by SB 1383, will decrease LFG quantity and quality over time. These factors negatively impact the potential beneficial use of LFG. Therefore, ensuring LMR alignment with SB 1383 objectives is crucial, particularly concerning the site-specific feasibility of beneficial use projects. (OP_OCWR-2)

Comment:

Beneficial Use of Landfill Gas

In line with our mission, OCWR is supportive of utilizing LFG for energy recovery when feasible. However, the feasibility of projects like gas-to-electricity and pipeline injection relies on the quantity and quality of the LFG, which can differ significantly based on factors such as the age of the landfill, the type of waste, and the operational status.

LFG quantity and quality will decrease over time due to the diversion of organic material (SB 1383). Without sufficient gas quantity and quality, beneficial usage is infeasible, as currently there is no proven technology available for the beneficial use of LFG with relatively low energy content. Therefore, OCWR recommends that CARB include site-specific feasibility as a consideration for the beneficial use of landfill gas. (OP_OCWR-13)

Agency Response to Combined Comments:

No changes were made in response to these comments. The Proposed Amendments provide greater clarity around the process of requesting and approving semi-continuous operation and permanent shutdown of the GCCS at closed landfills with declining gas generation. Additionally, the Proposed Amendments provide greater clarity around conditions under which wells can be decommissioned. These changes improve the ability to plan for declining gas generation and make appropriate changes to the GCCS and its operation.

Waste already in place will continue to decompose and produce methane for decades. These emissions will continue to need to be controlled even as organic waste disposal decreases.

As a correction, CARB notes that the 1.5 million metric tons of CO_2e figure from the 2009 LMR ISOR is the annual reductions by 2020, not the cumulative 10-year total.

N.5-2 Accelerate biomethane market development and implement Board commitments to meet SB 1383 goals

Comment: Today, I'm not opposed or supporting the Regulation. Today, I'm carbon neutral talking about the future of biomethane.

As you know, biomethane leaks from landfills over 30 years, but I can produce biomethane for RNG in 30 days. So SB 1383 has a purpose to divert organics from the landfills to make biomethane. So this LMR will generate more biomethane. If you reduce methane with controls, we have more biomethane to use. And there's no reason to destroy biomethane in a flare. We've got to harness that biomethane in order to make fuels for the refuse trucks.

Landfill operators have a tough time to permit internal combustion engines, so a lot of people just flare it. Flare, flare, flare. There's no reason to do that when we can actually make bio-CNG at the landfill and put it back in the same trucks that go to the landfill. Landfills are remote. They don't have a PUC pipeline nearby at a remote landfill. CARB staff wants us to take biomethane and take it to hard-to-decarbonize industries. We are decarbonizing our own industry. We don't need to pipeline it to other people where there's no pipeline exists. So what will happen is that CARB has been talking about having a biomethane workshop for the last three and a half years. And every month I'm up here asking for that workshop and what happens to the future of biomethane.

Today, didn't even address it. Do we flare it or put it back into the trucks? The Advanced Clean Fleet Rule on the public agencies are requiring ZEVs. There's no reason to put a ZEV in place when the public fleet can use biomethane from the public landfills as cost effective today.

So I look upon staff here is let's hold that hearing. For three and a half years I stand in front of you, talk about the future of biomethane, and it's deafened on this Board. Let's have that hearing soon and harness biomethane. (T_EA-1)

Comment: Landfill gas capture is an important first step, but it is only part of the equation. We also have to focus much more on what to do with all of the biomethane that will be captured. Right now, the Public Utilities Commission is rapidly shutting down the markets for biomethane. This Board has recognized in the past in Resolution 23-13 that the Board needs to identify and help to develop new markets for biomethane, long-term reliable and multiple markets. And the Board has not yet moved forward on that.

We are years behind in meeting the requirements of SB 1383, methane reduction in general, but landfill diversion in particular. And so we really need the Board not just to adopt these regulations, but to help identify and develop new markets that we can put biomethane to beneficial use. Right now, the amount of landfill gas that is leaking and the amount of landfill gas that is captured and flared is equivalent to a billion gallons a year of gasoline or diesel. If we put all that landfill gas to beneficial use, we could displace a billion gallons of petroleum products that are used in California every year.

So, in addition to adopting these regulations, we urge the Air Board to implement Resolution 23-13 and help identify and build new markets for biomethane utilization. (T_BAC-2)

Agency Response to Combined Comments:

No changes were made in response to these comments. The LMR is focused on collecting and destroying methane in landfill gas and does not mandate, prohibit, or encourage any particular method of methane destruction.

N.5-3 Allow membrane oxygen enrichment technology for methane-to-fuel conversion

Comment: Landfill Methane Regulations only reference methane emission recovery/sepration technologies that concentrate the methane at a very high and uneconomical cost. Landfill Methane Regulations do not reference recently patented innovations (Inventor Kolodji, Black Swan, US Patent No. 12,465,884 B2, Issued Novermber 11, 2025) that most economically convert methane emissions from landfills into a high heating value fuel by way of membrane oxygen enrichment. The mature (60 year+) science and commercial practice of Oxygen Enrichment has used concentrated oxygen to locally increase the heating value of fuel streams such as refinery sulfur recovery and steel production for decades and can also be used for dilute methane as produced from landfills. This proven science and technology has been around for over 50 years as summarized and promoted by USDOE, see USDOE Process Heating Energy Tip Sheet #3, Oxygen Enriched Combustion; DOE/GO-102005-2178, September 2005. The practice of separating and producing concentrated nitrogen (from 79% to 90+%) and also producing concentrated oxygen (from 21% to 60 %O2) directly produced from air has been most economically produced and commercially practiced gas separation with membranes for 50+years. Generon (largest manufacturer in California), Membrane Technology and Research Incorporated (also in California), and other manufacturers (Air Products in Missouri is world's largest air separation manufacturer in the world, and Honeywell/UOP ,the world's largest membrane manufacturer for gas separation, and Schlumberger's Cynara, the next largest competitor, both with membrane manufacturing operations in California) have been commercially manufacturing these systems in a circa $100 million dollar industry. California's membrane manufacturer, Generon, has most economically performed membrane air separation with Black Swan's recently patented device that reduces membrane costs and energy consumption by up to 50%, with an up to 10% higher performance than conventional membranes for the past almost five years. I strongly encourage CARB to consider regulations that allow this most economic methane emission conversion to fuel innovation that enables a profit to be made out of methane emission reductions from landfills by making a profit from converting methane emissions to into a valuable fuel. (B_Kolodji-1)

Comment: The -- there's a U.S. -- there's a recent patent as of just last week actually, November 11th, that is the most economically to convert methane emissions from landfills into a high heating fuel by way of membrane oxygen enrichment. This is a mature 60 plus year science and commercial practice -- commercially practiced technology that has been used by refineries and self-recovery in steel production for decades, and can also be used to dilute -- for dilute methane as produced from landfills. This proven science and technology has been around for 50 years.

As summarized and promoted by the U.S. Department of Energy in their oxygen enrichment combustion tip sheet from September 2005. The practice of separating and producing concentrated nitrogen from 79 to 90 percent, and also producing concentrated oxygen directly from air raising it from 21 to 60 percent O_2, has been most economically produced and

commercially practiced gas separation with membranes for over 50 years. So -- and we have some of the largest membrane manufacturers in the world here in California. This is a circa hundred million dollar industry. And we can -- I strongly encourage CARB to consider regulations that allow this most economic methane emission conversion to fuel innovation that enables a profit to be made with methane emission reductions from landfill and also convert the methane emission to valuable fuel. Thank you, CARB. Keep up the good work. (T_Kolodji-1)

Agency Response to Combined Comments:

No changes were made in response to these comments. The Proposed Amendments do not limit the types of landfill gas control devices that can be used so long as they can meet the methane destruction and other performance requirements therein.

N.5-4 Rural communities exempt from SB 1383

Comment: Our nonprofit has also successfully shut down the last two incinerators in the state of California, and we are very proud of that. Now our county is working to reduce the -- everything that we are going to be putting in the landfill. Thirteen thousand households in our rural communities are exempt from SB 1383, and all of their green waste goes to the landfill and will continue to go to the landfill. (T_VIP1-1)

Comment: And so, now as Bianca has said, that green waste that I'm one of those 13,000 residents that doesn't have a way to dispose of my green waste, because our census tract is too small. Give me a break. So anyway -- so that's all going to go to the landfill. So I totally support this, but it has to have teeth. (T_GNC-4)

Agency Response to Combined Comments:

No changes were made in response to these comments. These comments do not address the Proposed Amendments and are thus out of scope of this rulemaking.

N.5-5 Recognize composting and renewable natural gas as essential public services

Comment:

Recognition of Composting and Renewable Natural Gas (RNG) as Essential Public Services

OCWR requests that CARB consider modifying the Landfill Methane Regulation to explicitly recognize composting operations and renewable natural gas (RNG) facilities located at publicly owned landfills as essential public services.

These facilities play a critical role in supporting California's climate goals by diverting organic waste from landfills, reducing methane emissions, and producing low-carbon fuels. According to the US EPA, 64% of the state's composting facilities are co-located at publicly owned landfills, highlighting the importance of public-sector leadership in integrated waste management. Recognizing these operations as essential would help ensure regulatory consistency, support long-term infrastructure investment, and reinforce the importance of integrated waste management systems operated by public agencies in achieving statewide environmental objectives. (OP_OCWR-1)

Agency Response:

No changes were made in response to this comment. This comment is out of scope of the rulemaking because the LMR does not designate facilities as essential or non-essential – it sets requirements for the reduction of methane emissions from MSW landfills.

6. Miscellaneous

N.6-1 Conduct CEQA Environmental Analysis, including impacts, mitigation, and alternatives

Comment: The ISOR claims that the proposed amendments are exempt from the California Environmental Quality Act ("CEQA"), citing multiple categorical exemptions, and also referencing that CARB has an approved certified regulatory program. CARB has, however, in the process ignored that the California Legislature has imposed additional CEQA obligations that apply to the proposed amendments to the Landfill Methane Rule.

Public Resources Code section 21159 states:

> *An agency listed in Section 21159.4 shall perform, at the time of the adoption of a rule or regulation requiring the installation of pollution control equipment, or a performance standard or treatment requirement, including a rule or regulation that requires the installation of pollution control equipment or a performance standard or treatment requirement pursuant to the California Global Warming Solutions Act of 2006 (Division 25.5 (commencing with Section 38500) of the Health and Safety Code), an environmental analysis of the reasonably foreseeable methods of compliance. In the preparation of this analysis, the agency may utilize numerical ranges or averages where specific data is not available; however, the agency shall not be required to engage in speculation or conjecture. The environmental analysis shall, at minimum, include all of the following:*
>
> *(1) An analysis of the reasonably foreseeable environmental impacts of the methods of compliance.*
>
> *(2) An analysis of reasonably foreseeable feasible mitigation measures.*
>
> *(3) An analysis of reasonably foreseeable alternative means of compliance with the rule or regulation.*
>
> *(4) For a rule or regulation that requires the installation of pollution control equipment adopted pursuant to the California Global Warming Solutions Act of 2006 (Division 25.5 (commencing with Section 38500) of the Health and Safety Code), the analysis shall also include reasonably foreseeable greenhouse gas emission impacts of compliance with the rule or regulation.*

The proposed amendments require the installation of air pollution control equipment, impose an increased performance or treatment standard relating to landfill gas. Moreover, Public Resource Code section 21159 specifically calls out that regulations adopted pursuant to the Global Warming Solutions Act are included as regulatory proposals that are to be analyzed under that section.

While CEQA generally authorizes lead agencies to use categorical exemptions when appropriate, and authorizes agencies to rely upon certified regulatory programs when the rulemaking documents sufficiently cover the environmental impacts of a proposed regulation, the California Legislature has imposed specific requirements on CARB as one of the agencies listed in Public Resources Code section 21159.4 to analyze: (1) the reasonably foreseeable environmental impacts of the methods of compliance; (2) the reasonably foreseeable mitigation measures; and, (3) the reasonably foreseeable alternative means of compliance. None of that analysis appears in the rulemaking record for this regulation.

In addition, to avail itself of its certified regulatory program, the written documentation of the certified regulatory program must include mitigation measures to minimize any significant adverse effect on the environment of the activity. The rulemaking record in this proceeding is devoid of any such analysis. Accordingly, CARB cannot rest on its certified regulatory program because the current rulemaking record does not satisfy the requirements of Public Resources Code section 21080.5 as a alternative environmental analysis. (OP_WM-78)

Comment: It is unclear whether the rulemaking meets the criteria for the California Environmental Quality Act (CEQA) exemption that CARB has noted. The proposed rule will have major impacts on how landfills design, build, operate, and monitor their LFG systems, cover, disposal operations, and other landfill infrastructure. Those changes will in turn have environmental impacts that have not been previously vetted under CEQA. Further, CARB has not adequately addressed other alternatives that could have been used to achieve the same goals. Therefore, the rulemaking should go through its own full CEQA process. (OP_L and D-2)

Agency Response to Combined Comments:

No changes were made in response to these comments. CARB responded to these comments prior to the Board hearing. Please refer to that response, available at:

> CARB. (2025, November 19). *Responses to Comments on the Environmental Analysis for The Proposed Amendments to the Regulation on Methane Emissions from Municipal Solid Waste Landfills*. *https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2025/LMR/responsetocomments.pdf*.

N.6-2 Clarify definitions, scope, and applicability

Comment: Key concerns include:

…

- Ambiguities in definitions, scope, and applicability, particularly regarding gas collection systems, interior versus exterior wells, component shutdown timelines, and the applicability of federal exemptions for treated fuel engines. (OP_SMAQMD-4)

Agency Response:

CARB made changes in response to this comment. In the 15-Day Changes, requirements that are only applicable to interior wells and/or vertical wells were indicated. No other changes were made in response to this comment. This is introductory summary language and the commenter provided detailed comments about

these topics later in their letter. Those specific comments are responded to elsewhere in this FSOR by topic category.

N.6-3 Relax requirements for landfills with lower expected gas collection gains from the Proposed Amendments

Comment:

Appendix C - Analysis of Criteria Pollutant Emissions from Landfill Gas Control Devices

…

Table C-2 is an estimate of the potential increase in methane collection and emissions of Nox, CO, PM, and 502. The footnote to the table indicates that air districts without any additional estimated gas capture are not listed in the table. The evaluation that generated the table did not find an increase in collection in the Yolo Solano Air Quality Management District. This indicates that staff do not anticipate that the proposed regulation will generate additional landfill gas capture at YCCL. Considering this evaluation, we would like the regulation to allow for relaxed monitoring, relaxed data collection on control devices, and relaxed reporting requirements for landfills in Air Districts that are not anticipated to have substantial additional landfill gas collection from this regulation. (OP_YoloCo-42)

Agency Response:

No changes were made in response to this comment. The analysis being referred to was further characterized in chapter V of the ISOR. The ISOR (p. 117) stated that "…this analysis is not intended to predict what will happen at any *individual* landfill. Rather it is meant to be a broadly applicable average method to attain an overall average estimate across the total set of controlled landfills subject to the LMR." Further, staff notes that due to the performance-based approach of the Proposed Amendments, sites with fewer persistent exceedances will trigger the most stringent requirements less often (e.g. more frequent monitoring, additional analyses, and increased mitigation).

N.6-4 Adjust definition of "construction and demolition wastes"

Comment: The definition of construction wastes in § 95475(a)(5) on pp.66-67 includes all housing construction materials. It needs to exclude straw bales, since they can rapidly decay to methane. (OP_Burke-11)

Agency Response:

No changes were made in response to this comment. This comment is out of scope of the Proposed Amendments because it does not refer to any changes proposed in the 45-Day Notice. For informational purposes, refer to CARB's 2010 FSOR (p. 7),[40] which clarified that inert waste such as construction and demolition waste may contain minor amounts of decomposable waste.

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[40] CARB. (2010, May). *Public Hearing to Consider the Adoption of a Regulation to Reduce Methane Emissions from Municipal Solid Waste Landfills: Final Statement of Reasons for Rulemaking*. Filed May 5, 2010. *https://www.arb.ca.gov/regact/2009/landfills09/landfillfsor.pdf*.

N.6-5 Clarify which wells are part of the GCCS

Comment: §95475((19) – Gas Collection System Definition

- Some wells may not actively extract gas but may leak; clarify which wells are considered part of the gas collection system. (OP_SMAQMD-33)

  Agency Response:

  No changes were made in response to this comment. Component leak monitoring applies to all components that contain landfill gas at positive pressure (e.g., a well that does not actively extract gas). This requirement stands alone without the need to define specific types of wells.

  The gas collection system includes any component employed to achieve the operational standards of the LMR (such as the requirement to operate so that there is no leak that exceeds 500 ppmv at any component under positive pressure or any location on the landfill surface, and the requirement to design and operate the collection system to draw all the gas toward the gas control system).

N.6-6 Improve clarity, consistency, and timelines to avoid confusion and delays

Comment: In general, the proposed LMR structure is unclear and inconsistent.

- Some provisions do not contemplate further regulatory applicability when an initial requirement is not completed or is disapproved.
- Some sections are unclear due to self-referencing requirements.
- Some definitions and references remain from the previous regulation and are obsolete, and many new proposals and terms lack definitions.
- There is inconsistent use of defined terms between some sections. (OP_South Coast AQMD-3)

Comment: The proposal imposes regulatory deadlines on CARB and/or delegated air districts to approve or disapprove permit and plan applications. Based on South Coast AQMD staff's experience with current applications for landfills, staff will not be able to comply with the proposed timelines with current staffing and resource levels. CARB staff stated that the intent is for air districts to disapprove the application, triggering the need for a subsequent application that would re-start the timeline. This potentially never-ending loop of disapprovals and subsequent applications would result in unnecessary delays. Instead, staff suggests that CARB works closely with air districts to understand the challenges faced and add reasonable timelines in the proposed LMR. (OP_South Coast AQMD-4)

Comment: The procedures for the flow of information to and from CARB in the proposed LMR is unclear. There are many new requirements with short timeframes without regulatory language that acknowledges the actual time it takes to accomplish such tasks. Staff experience has shown that some of the timeframes in the proposed LMR are infeasible unless the language is amended. (OP_South Coast AQMD-6)

Agency Response to Combined Comments:

CARB made changes in response to these comments. In the 15-Day Changes, timelines for agency review of design plans (sections 95464(a)(1) and (2)) were

extended from 120 days to 180 days, timelines for review of GCCS semi-continuous operation and shutdown requests were extended from 120 days to 180 days and changed to begin upon receiving a complete request (sections 95467(c), (f), and (f)(2)(B)), and the 120-day timeline for review of an alternative compliance option request was set to begin on the date that all information requested by the Executive Officer is received (section 95468(c)). These changes help provide sufficient time for agency reviews and reduce the need to deny requests when incomplete information is submitted.

Additionally, several timelines for actions by regulated entities were extended in the 15-Day Changes to reflect the time that may be needed for those tasks including the timelines to do the following:

- Install a GCCS after design plan approval at an active landfill (changed from 6 months to 12 months)
- Respond to a remotely detected emission plume notification (changed from 5 days to 10 days for performing monitoring; changed from 8 days to 15 to days for reporting on monitoring outcomes)
- Follow up on screening detections in unsafe-to-walk areas (changed from 5 days to 10 days by default; changed from 10 days to 30 days for cases where specialized personnel/equipment are needed)
- Initiate repairs in response to a surface emissions exceedance detection (changed from 3 days to 5 days)

In the 15-Day Changes, several definitions were added or removed in response to comments and feedback that identified specific terms that were lacking or obsolete (e.g., “CARB,” “Compliance Inspection,” “Perimeter”).

Procedures for submitting information to CARB is clear. Section 95470(b)(9) as numbered after the 15-Day Changes provides the website where all reports, notifications, and requests must be submitted. Owners or operators are required to submit contact information in their annual reports which CARB staff use to communicate with regulated entities.

N.6-7 Retain “must” instead of “shall” for clarity and enforceability

Comment: Repeated change from “must” to “shall” needs justification or to be dropped. Courts have given “shall” many weak meanings, while “must” is an unambiguous requirement. Unless there’s a court interpretation which the state needs to follow, the change signals a weakening of the rules. CARB staff report says “This change is necessary to clearly communicate required actions.” However it doesn’t cite cases for why staff think “shall” is clearer than “must”, when other agencies go the other direction. Interesting that staff use "must" throughout the rest of their own report.

California Prison Industry changed from shall to must in 2021, and gave a thorough explanation. *“Nearly every jurisdiction has held that the word ‘shall’ is ambiguous.”9 “U.S. Supreme Court issued a decision in Gutierrez de Martinez v. Lamagno that under certain contexts, shall could be construed as may… many opinions have interpreted shall to mean must, while others have interpreted it to mean may or will.”10 Since 2007, rule 1, Note 3 of Federal Rules of Civil Procedure, has said the “rules replace ‘shall’ with ‘must,’ ‘may,’ or*

'should,' depending on which one the context and established interpretation make correct in each rule."11 California Mental Health Rules use shall, but define it to mean must.12 "Black's Law Dictionary reports at least five distinct, and sometimes contradictory, meanings for the word [shall] including has a duty to, should, may, will, and is entitled to. And courts have interpreted shall to mean must, may, will, and is among others. In short, shall is complicated because it is vague." (OP_Burke-13)

Agency Response:

No changes were made in response to this comment. The statutory and regulatory framework governing California administrative rulemaking does not prohibit use of "shall" in regulations. California regulations commonly employ "shall" to establish mandatory requirements, California Government code section 14 provides that "'Shall' is mandatory and 'may' is permissive."

N.6-8 Prohibit or impose moratorium on leachate recirculation

Comment: Simply requiring recordkeeping and reporting on leachate volumes used for recirculation and areas of application as proposed in § 95470(a)(1)(U) and § 95470(b)(6)(E) is insufficient to address the significant environmental and safety risks associated with leachate recirculation practices.

Leachate recirculation accelerates waste decomposition and methane generation, which can substantially increase the likelihood of fugitive emissions. It also heightens risks of odor issues, slope instability, and subsurface heat events—all of which undermine the intent of these amendments to reduce methane emissions and improve landfill performance. The goals of leachate recirculation (to accelerate decomposition and extend landfill capacity) are fundamentally incompatible with California's climate objectives and CARB's broader methane reduction strategy.

We strongly recommend that CARB prohibit leachate recirculation at all California landfills. At minimum, CARB should establish a moratorium on new or expanded leachate recirculation operations until sufficient data demonstrate that the practice can be conducted without increasing methane emissions or endangering landfill integrity. Recordkeeping and reporting alone do not provide adequate mitigation for the risks posed by this practice. (OP_CAW-80)

Comment: Ban leachate recirculation to prevent flooded wells. (OP_RMI/EDF-11)

Comment:

Leachate recirculation practices

RMI and EDF support the proposed liquid level monitoring provisions, but we urge CARB to explicitly prohibit leachate circulation activities at landfills. Leachate recirculation is the practice of reintroducing collected leachate into a landfill, which increases the total moisture in the landfill and accelerates methane generation. Liquids impact the integrity and efficiency of gas collection systems and leachate recirculation can increase system downtime and leaks. (OP_RMI/EDF-25)

Agency Response to Combined Comments:

No changes were made in response to these comments. At this time, CARB does not have information about the prevalence or effect of leachate recirculation practices in

California to inform whether a prohibition of the practice is appropriate. The Proposed Amendments include recordkeeping and reporting of the volume of leachate and all other liquids added or recirculated. As discussed in the ISOR, this reporting is necessary to determine heat input capacity and expected gas recovery, and will also improve CARB's understanding of the potential relationships between liquids management and methane recovery.

N.6-9 Shorten agency review timelines to 15–30 days

Comment: Most deadlines for government review are not urgent enough. Government reviews need to be done in 15 or 30 days, not 120. Taking 4 months to say yes or no, followed by the time for the applicant to act, or revise the application, is too much delay. Many actions will be similar, and staff can become quick at reviewing. The rule can be 15 days, with the option to take another 15 days in a minority of cases. (OP_Burke-12)

Agency Response:

No changes were made in response to this comment. Regulatory agencies need adequate time to evaluate any request or review, including, as needed, any engineering review, records review, management review, and site visit or compliance inspection. Staff consulted with air district partners about the time needed to review various requests or plans and found that agencies expressed the need for more time in some instances. In the 15-Day Changes, several agency review timelines were extended, including for review of design plans and review of GCCS semi-continuous operation and permanent removal requests.

N.6-10 Extend timelines for corrective actions

Comment:

Unrealistic Timelines and Enforcement Provisions

The compressed corrective action deadlines-many shortened from 120 to 60 days or less-ignore the realities of permitting, procurement, and construction at active landfill sites. The proposed rules assume near-instantaneous availability of materials, engineering staff, and contractor support, which is inconsistent with California's public procurement laws and local permitting processes. (OP_SVSWA-5)

Agency Response:

CARB made changes in response to this comment. Several timelines for owner or operator action were extended in the 15-Day Changes, including installing a GCCS after approval of a design plan at an active landfill, monitoring in response to a remotely detected plume notification, following up on a screening detection in unsafe-to-walk areas, and initiating surface exceedance repairs. These timelines are appropriate and achievable, and do not assume "near-instantaneous availability of materials, engineering staff, and contractor support."

In the example provided, the commenter appears to be referring to proposed changes to the requirements when positive pressure is measured in a wellhead in section 95469(e)(1). That subsection maintains the same timeline to correct positive pressure (120 days) as in the current Regulation. In the Proposed Amendments, additional

intermediate requirements were added for root cause analysis, corrective action analysis, and an implementation schedule. As explained in the ISOR (p. 59), these changes are necessary and largely consistent with federal rules.

N.6-11 Enforce strict timelines for compliance

Comment: One of the things that we have seen through this process is there's an extreme ability for landfill operators to delay. And so, you know, the rule comes down what they have to do or the directive. They'll come up with a plan. That takes a while. Then the plan doesn't meet the standard, so it goes back and forth forever. And it's like we continue to just wait, and wait, and wait for action to actually happen. And that has to stop. There has to be real timelines and real accountability built into this, so that action needs to happen as quickly as possible, because we know time is our enemy, when we are talking about the creations that can create a SET event. (T_Schiavo-6)

Agency Response:

No changes were made in response to this comment. The Proposed Amendments include specific action timelines throughout. Owners or operators must act within those timelines to maintain compliance.

N.6-12 Ensure amendments protect worker health and safety

Comment: Our team fully recognizes the need to update the LMR to incorporate proven new technologies as well as the necessity for enhanced predictive monitoring and data capture. While our coalition is supportive of these goals, they need to be achieved in a manner that allows facility owners and operators to safely and efficiently manage their operations. (OP_Ind/Gov Coalition-1)

Comment: Our focus is to achieve the stated goal of greater predictive and response capability while preserving a work environment that is safe and practical for our field teams to implement. (OP_Ind/Gov Coalition-2)

Comment: The Regulation must accommodate the landfill's core functions and best practices for health and safety. (OP_WM-24)

Comment: We... look forward to working with [staff] on additional 15-day changes in the following... ensuring worker safety and core landfill functions are not compromised. (T_WM-3)

Agency Response to combined Comments:

No changes were made specifically in response to these comments; however, numerous modifications were made in the 15-Day Changes that help to ensure the Proposed Amendments promote efficient, effective, and safe operation of landfills, including more flexibility to implement site-specific solutions and extending the timeline to perform follow-up monitoring in unsafe-to-walk areas.

N.6-13 LMR must not conflict with other regulations

Comment: The Regulation must not conflict with federal, state, and local landfill regulations that are intended to reduce emissions from landfills. (OP_WM-23)

Agency Response:

No changes were made in response to this comment. The requirements of the Proposed Amendments do not conflict with or impede compliance with existing federal requirements as discussed in the ISOR Chapter X. CARB notes that having more stringent requirements does not inherently create a "conflict" and that the Proposed Amendments include more stringent requirements than are found in other landfill regulations to maximize methane emission reductions.

N.6-14 Use terminology "subsurface fires" rather than "SET events"

Comment: I would like to encourage everyone to stop using like the legal side-stepping language such as SET events, and instead call what's happening what it is, subsurface fires. I believe that disrespects the people living near these landfills. (T_CCEJN2-3)

Agency Response:

No changes were made in response to this comment. As discussed in the ISOR, the term "subsurface elevated temperature (SET) events" is used as a general term to describe when temperatures of gas withdrawn from the waste mass are found to be above regulatory thresholds. The Proposed Amendments set measurable performance standards that require corrective action to be taken.

N.6-15 Develop California Environmental Protection Agency coordinated response to prevent landfill fires

Comment: I stand before you today supporting the rule, and supporting the resolution, but to issue a bit of a warning. Our landfills are burning to the ground and we need to do something about it. This rule needs to be the first step, not the last step, in what CARB does and the CalEPA, other boards and directors do, to get a unified response to this crisis. I was recently talking to one of the enforcement folks at Region 9 in Cal -- in U.S. EPA and was surprised to hear them say that there are two major catastrophes happening in California. One is that people are still drinking contaminated water, which I know is not CARB's problem, and two, is that our landfills are burning to the ground.

So, this rule is a great first step and I want to thank the staff for working so diligently on it, but it needs to be just the first step. We need CalEPA to develop a coordinated response to prevent landfill fires and to do a much better job enforcing the vast array of landfill regulations that we have and do a better job of integrating the response. (T_CCAT-1)

Agency Response:

No changes were made in response to this comment. Setting up an interagency process is beyond the scope of this regulation and the comment is not directed to CARB. However, CARB notes that the California Environmental Protection Agency (CalEPA) has convened Multi-Agency Critical Action Teams to oversee the coordinated response to elevated temperature events at landfills, as discussed at the November 2025 Board hearing.

N.6-16 Require automated alarms for continuously monitored parameters

Comment:

Several paragraphs on pp.9-13, 31-32 require sampling every 15 minutes and need to require automated alarms to report actionable conditions immediately and require action within a day. (OP_Burke-3)

Agency Response:

No changes were made in response to this comment. It is appropriate to allow owners or operators flexibility in how they design alarms or other similar functions to maintain regulatory compliance.

N.6-17 Maintain authority within CARB

Comment: I want to thank all the people from traveling all across the state to bring us their meaningful experiences with this landfill-related pollution. I think, you know, everybody gets it in the room. There's a few people that don't. We heard some really bizarre stuff about procurement from the rural counties. We heard Waste Management pull out its pockets about cost when they count their money by billions. I think it was 22 last year. And then we also heard something interesting from Republic Services about their desire to work with the regional air districts.

As someone who submitted a records request -- somebody mentioned earlier that no family should have to submit a records request to find out what they've been exposed to. As someone who has submitted those to my regional air district, I was surprised to -- well, I pretended to be surprised, when they told me that they had no records on temperature or criteria pollutants, because that's not what they call them, right?

So my regional air district, San Joaquin Valley Air Pollution Control District, likes to play dumb about the pollution that they monitor at their landfills. So I really -- I want to -- I want to bring those up. There's all reasons for this Board to keep this authority here in this room and to pass the most stringent rule possible, and to really consider that we have the technology for fence-line monitoring and early alert systems.

I can show you how to do it. I actually learned how to do it by partnering with CARB. CARB and I have developed multiple ground level monitoring systems, and we can warn people, and we can provide behavioral interventions, so that people can protect themselves and they don't have to go do forensic pathology on what they were exposed to. And if we do that, maybe we don't ever have to hear anybody harmonize with nose bleed again.

So thank you for your time and let's get the most stringent rule and keep the authority in this room. (T_CEJC-1)

Agency Response:

No changes were made in response to this comment. CARB values partnerships with local air districts, which are familiar with facilities and operators in their jurisdictions.

See agency responses in section IV.M.2 for more information on fenceline monitoring.

N.6-18 Withdraw or substantially revise the proposal

Comment:

Request for Regulatory Reconsideration SVSWA urges CARB to:

- Withdraw or substantially revise the proposed amendments.
- Retain the current corrective action timelines and enforcement structure.
- Develop a tiered compliance approach that distinguishes between large private regional facilities and small or publicly operated landfills. (OP_SVSWA-7)

Agency Response:

No changes were made specifically in response to this comment; however, see the agency response in section IV.A.2-2 for more information regarding modifications made in the 15-Day Changes to provide greater flexibility and extend corrective action timelines. The Proposed Amendments include several provisions that distinguish between smaller landfills with lower gas generation or annual waste acceptance, and maintain existing cost-saving measures for well-maintained and closed landfills in recognition of science-based factors such as their lower potential to emit methane.

N.6-19 Take advantage of new technology

Comment: As technology can shine a lot on issues at landfills, we have to create a rule that allows CARB to be nimble and take advantage of new technology that can make a huge difference in the speed of information and the accuracy of that information. (T_Schiavo-4)

Agency Response:

No changes were made in response to this comment. The Proposed Amendments are designed to take advantage of new technologies, including the requirements in sections 95469(b), 95471(d), 95471(e), and 95469(e)(8). These improvements are expected to foster further development and application of advanced technologies to detect issues promptly and reduce emissions.

N.6-20 Increase public comment time and strengthen civil rights protections in CARB programs

Comment: I first want to say this two minutes for public comment is really disrespectful of these very serious issues that families are coming in here pleading, having to deal with cancer and the fallout from the lack of real leadership that CARB should be providing.

Although I do support your updates and amendments, but your actions and your leadership roles is horrific. First of all, you need to increase the amount of time for the public to come and discuss these issues with you, so that there is a sincere feeling that you are listening and addressing these issues, which currently you are not.

Secondly, you need an overhaul of your civil rights department. Our Black communities, in particular -- others are probably going through it too, but I'm speaking on Black communities and our CBOs that have been working on this E-Bike Program diligently trying to get it to people who would not have this opportunity otherwise. We have become a target of your

former administrator. Thank God someone got rid of that administrator. But the E-Bike Program should have remained in place, because there were those that did administer them successfully through the Small Pilot Program. So you had boots on the ground willing to do it, yet you chose a racist. Pedal Ahead Ed Clancy, with the support of CARB, that went after our families personally and attacking the whistleblower. Mr. Rodriguez that came forward that you settled a lawsuit with and paid him. Yet, you leave our communities in limbo.

Shame on you, CARB. You've got to do better. Board, you need to hold your leadership within CARB accountable and contact those of us that actually have the facts and the emails to show what I'm talking about. Thank you. (T_Williams-1)

Agency Response:

No changes were made in response to this comment. CARB thanks the commenter for their support of the Proposed Amendments. Reasonable time limits are imposed on verbal testimony to ensure that all stakeholders have an opportunity to speak during the meeting. Additional comments can be submitted in writing at the Board hearing and are considered with the same weight as verbal testimony.

The other comments are out of scope of this rulemaking because they are not specifically directed at the proposed CARB action or the procedures followed by CARB in proposing or adopting the action.

N.6-21 Timelines and working face gas collection are primary issues requiring further attention

Comment: The primary areas that we see requiring further attention include timelines and methods of gas collection at the working area of the landfill... (T_RS-3)

Agency Response:

CARB made changes in response to this comment. In the 15-Day Changes, additional flexibility was provided for the timing and methods of gas collection in areas of new waste deposition (section 95464(a)(5)).

N.6-22 Focus on reductions of short-lived climate pollutants

Comment: I really want to thank the Chair and the staff for your very strong comments about the urgency of reducing methane and other short-lived climate pollutants. And I hope that this is a moment where the State will go back to prioritizing the reduction of short-lived climate pollutants, because it really appears from this Board, the Public Utilities Commission, and other State agencies that California has lost focus on that urgent climate priority over the last several years and we need to refocus on it. (T_BAC-1)

Agency Response:

No changes were made in response to this comment. CARB agrees that reducing emissions of methane and other short-lived climate pollutants is integral to broader efforts to combat climate change, and is committed to continued implementation of policies that reduce methane emissions.

N.6-23 Improve emissions inventory completeness and transparency

Comment: I just wanted to also thank you for going to COP, Chair Sanchez and Governor Newsom. I'm very proud that California was so well represented. I know my Supervisor, Member Hopkins, has been. And it seems like very important that California be represented there. So I just wanted to send my gratitude to you guys for doing that.

Also, I wanted to just -- I don't think I'm going to be back here for the public comment period. But with regard to your important emissions inventory, I think that's just a groundbreaking effort. And I think that California, for better or worse, has a great responsibility to get our emissions inventory, you know, very tight. And my study of it so far, I'm just looking for, you know, is it capturing all the emissions. If it's not, which I know there are some exempt activities, you know, can we capture that portion of emissions that is basically exempt, so we have a picture of the total emissions the State is trying to address and what activities are being addressed, and which ones still need to be addressed.

So I think that would be a great addition to your program, and I look forward to seeing that and helping if there's any way I can help, but also to, you know, encourage maybe there to be a staff presentation on the emissions that we are trying to address and those that are -- that have escaped kind of the regulatory framework so far. So thank you guys again for all your important work. (T_Burr-1)

Agency Response:

No changes were made in response to this comment. This comment is out of scope of the rulemaking as it addresses international climate coordination and the greenhouse gas inventory, not the Proposed Amendments.

N.6-24 Driving Clean Assistance Program (DCAP)

Comment: I wanted to comment on the Driving Clean Assistant Program. And I have wanted a green car for years and affordability was a barrier. I also live in the Sierras. So when I saw that DCAP was offering the grant in my area, I was really excited and even more happy to have received that grant. The staff are super helpful, because it was difficult to be able to see cars, since I live so far away. So I've been driving like gas guzzling family car for a long time. And I did find the right car for me and that's really given me freedom to be able to go places, because it's 30 miles round trip just to go to town. (T_Brewer-1)

Comment: Hello, everybody. So Lim Cheung and I'm a DCAP participant. So I apply to the DCAP Program, because I wanted to make a change. So not just for myself but for the environment. And my old car was a really inefficiency and not very eco-friendly, so it burned through gas and add to the pollution in my area. I have always believed in doing my part to reduce emissions, but the cost of switching to an -- to an EV was expensive, until I found DCAP. So thanks to the program, I was able to replace my old car with a much cleaner, more efficient one. The biggest change for me has been piece of mind. I know I'm driving something that's better for the planet. And that matters to me. I'm also saving money on gas and maintenance.

But beyond the savings, I just feel good to be part of the solution, to know that I'm contributing to cleaner air and a healthier future for my community. I'm really grateful for the support DCAP

provided. It made a big difference in my life and I hope more people get the chance to benefit from it too. Thank you. (T_Cheung-1)

Agency Response to Combined Comments:

No changes were made in response to these comments. These comments are out of scope of the rulemaking as they address the Driving Clean Assistance Program, not the Proposed Amendments.

N.6-25 Address livestock methane emissions

Comment: I close by reminding Board members of a different but related topic, and that is that I ask CARB to urgently address our state's much larger anthropogenic source of methane, livestock. Please order effective action in that arena. (T_ECA/CAC-4)

Agency Response:

No changes were made in response to this comment. This comment is out of scope of the rulemaking as it pertains to methane emissions from livestock, not the Proposed Amendments.

V. Summary of Comments and Agency Response on the 15-Day Changes

This chapter contains the summary of comments received during the 15-day comment period and the associated agency responses. The same comment formatting notes apply to this chapter as described in chapter IV. No changes were made in response to any of the comments in this chapter. Table 5 contains the list of written comments received during the 15-day comment period, including the name of the commenter, date the comment was received, affiliation of the commenter, and commenter code used in this FSOR.

Table 5. Written Comment Received During the 15-Day Comment Period

Commenter, Date	Affiliation	Commenter Code
Su Sheng, 4/02/2026	Individual	F_Su
Joe Kilzer, 4/07/2026	Individual	F_Kilzer
Kevin Rodgers, 4/13/2026	California Association of REALTORS	F_CAR
Lisa Couch, 4/14/2026	Individual	F_Couch
John Borrego, 4/16/2026	Yolo County Central Landfill	F_YoloCo
Gretchen Bennitt, 4/16/2026	Yolo-Solano Air Quality Management District	F_YSAQMD

Commenter, Date	Affiliation	Commenter Code
Todd Shibata, 4/16/2026	Riverside County Department of Waste Resources	F_RCDWR
Alberto Ayala, 4/17/2026	Sacramento Metropolitan Air Quality Management District	F_SMAQMD
Benjamin Kling, 4/17/2026 [a]	Beta Analytic, LLC	F_Beta Analytic
Marcel Howard, 4/17/2026	Global Alliance for Incinerator Alternatives	F_GAIA
Aeron Arlin Genet, 4/17/2026	Santa Barbara County Air Pollution Control District	F_SBCAPCD
Paul Burke, 4/17/2026	Individual	F_Burke
Miguel Zermeno, 4/17/2026	City of Los Angeles	F_City of LA
Britton Schwartz, 4/17/2026	Santa Clara Law School's International Human Rights Clinic	F_IHRC
Niki Wuestenberg, 4/17/2026 [a]	Republic Services	F_RS
Dylan Hoffman, 4/17/2026	Solid Waste Association of North America	F_SWANA
Julia Manging, 4/17/2026	Recology	F_Recology
Jason Aspell, 4/17/2026	South Coast Air Quality Management District	F_South Coast AQMD
Nick Lapis, 4/17/2026	Californians Against Waste	F_CAW
Christine Wolfe, 4/17/2026 [b]	Waste Management of California	F_WM
Jennifer Elkins, 4/17/2026	Grassroots Organizers for Accountable Landfills	F_GOAL
Christy Pestoni, 4/17/2026	Waste Connections	F_WCN
Warisa Nilzawa, 4/17/2026	Los Angeles County Sanitation Districts	F_LACSD
Kendra Kent, 4/17/2026	Tetra Tech MGG	F_Tetra Tech

Commenter, Date	Affiliation	Commenter Code
Katherine Blauvelt, 4/17/2026	Full Circle Future	F_FCF

[a] These comments included attachments with reports or product literature. These attachments are out of scope of the rulemaking because they are not specifically directed at the proposed CARB action or the procedures followed by CARB in proposing or adopting the action.

[b] This comment included an attachment of their previously-submitted 45-day comment letter. That attachment is out of scope of the 15-Day Notice. Responses to the 45-day comments are provided in Chapter IV.

A. General Comments

1. Support for Proposed Amendments

A.1-1 General statements of support

Comment: In summary, the Sanitation Districts commend CARB staff for their proactive efforts to strengthen the Landfill Methane Regulation. We support CARB's initiatives to protect public health and the environment by reducing methane emissions and promoting safe, effective landfill operations. We appreciate the opportunity to participate in this rulemaking process and remain committed to providing input that supports practical and sustainable implementation. (F_LACSD-12)

Comment: I strongly support CARB's continued leadership in strengthening methane emissions control and advancing California's climate goals. The proposed amendments, including updates to monitoring, operational, and control provisions (e.g., Sections 95462–95471), represent an important step forward. (F_Su-1)

Comment: We would like to thank you and your staff's engagement and willingness to meet to discuss the proposed rule. During the 45-day comment period, WM submitted comments that urged the California Air Resources Board (CARB) to adhere to five major principles with the intent of achieving balance between feasibility, cost-effectiveness, asset protection, and a desire to advance innovation:

- The Regulation must not constrain CARB, sister agencies, and operators to address and manage site-specific conditions associated with subsurface elevated temperature (SET) events.
- The Regulation should not require costly additional data collection and reporting unless such data is necessary and useful to diagnosing conditions at the landfill.
- The Regulation must not conflict with federal, state, and local landfill regulations that are intended to reduce emissions from landfills.
- The Regulation must accommodate the landfill's core functions and best practices for health and safety.
- The Regulation should provide a framework for operators to use emerging technologies for purposes of finding and fixing discrete emissions.

WM submitted extensive feedback on specific provisions of the LMR with the intent to streamline administration of the rule. We would like to thank CARB for several elements of the 15-day rulemaking. First, the 15-day rulemaking does not require costly additional fenceline

monitoring, which is not warranted for most facilities, where, in many cases, air monitoring already occurs, and which is more properly under the jurisdiction of local air districts. Second, we appreciate CARB making several changes responsive to concerns raised by WM that protect the spirit of the regulation while providing for greater practicality in implementation. (F_WM-2)

Comment: We support and appreciate the goals of the Landfill Methane Rule (LMR) and the changes made to the regulatory text between the 45-day comment period draft and the 15-day comment period draft. Our feedback is to specific regulatory text and targets what we believe will help move these goals forward as effectively as possible considering the intrinsic nuances and variability of landfill operations. (F_YoloCo-1) (F_WCN-1)

Agency Response to Combined Comments:

No changes were made in response to these comments. CARB appreciates the comments and thanks the commenters.

2. Stringency of the Proposed Amendments

A.2-1 Do not weaken the stringency of the proposal

Comment: Santa Clara Law School's International Human Rights Clinic (IHRC) continues to support CARB's mission to strengthen methane regulations in order to achieve SB 32's goal of 40% GHG emission reduction of 1990 levels by 2030.2 We believe that CARB has included several important steps towards this in its April amendments. However, we are also concerned about a number of CARB's April amendments because they significantly weaken the LMR amendments' ability to contribute to this important target. We believe that, although CARB should work with landfill operators to better understand their limitations, some of the amendments water down the October version of the amendments too extensively, with little explanation of the basis for these changes. Therefore, we respectfully request CARB reconsider some of the April amendments, as detailed [herein]. (F_IHRC-1)

Comment: Thank you for the opportunity to weigh in on the proposed revisions to the Landfill Methane Regulation. Unfortunately, many of the proposed changes appear to scale back critical protections that limit harmful emissions. Methane and related pollutants pose real health threats for millions of Californians. Effective regulations are essential to ensure leaks are quickly addressed and communities are adequately protected.

Looking ahead, we encourage staff and the Board to revisit these areas when you return to report on and update the rule in mid-2028. That milestone will be an important opportunity to evaluate how the rule is performing in practice, assess unintended emissions or enforcement challenges, and incorporate new data, technologies, and best practices. Given the rapidly evolving landscape of methane monitoring and mitigation, periodic updates will be essential to ensure the regulation continues to reflect the strongest, most effective approaches to protecting public health and reducing emissions. (F_FCF-1)

Comment: We urge CARB to uphold the regulations which were unanimously adopted by the Board in November, and to refrain from weakening the rule which helped protect communities from landfill fires. Federal regulations under the Clean Air Act set the floor for landfill operating standards; as a national leader in climate and environmental policy, California has a responsibility to not only meet, but exceed, those standards. You must hold strong. Basic

accountability, compliance with federal law, and transparency are not negotiating positions; they are the foundation on which these regulations must stand. Our families are depending on you. (F_GOAL-9)

Comment: California's Landfill Methane Regulation, when completed, will serve as a model for the entire country to follow, so an air-tight rule is critical. This set of amendments includes a few important improvements in reaction to the enforcement and implementation reality on the ground. The majority of these amendments, though, represent a loosening of the rules that guard against dangerous landfill emissions.

We understand that some areas require flexibility and appreciate the tailored approach staff took. However, a few specific changes represent unreasonable leniency that endangers landfill-adjacent communities and risks opening the door to ongoing emissions. Beyond these critical, immediate improvements, we have outlined a number of flexibilities that we encourage the staff and the board to re-examine the benefit of when you return to report on and update the rule in mid-2028.

When landfill emissions go undetected, nearby residents – especially young children – are among the first and most severely affected. Methane and toxic co-pollutants released from landfills can worsen asthma, harm developing lungs, and degrade local air quality. In California, over 1.6 million children under the age of five live near a municipal solid waste landfill. Protecting communities and vulnerable populations from these exposures requires an emissions monitoring and capture system that identifies and mitigates every leak and ensures swift corrective action. Unfortunately, the Proposed Amendments weaken some key provisions of the original proposed regulation, straying from CARB's mandate to deliver transformative emissions reductions and prioritize the health of California's most impacted communities. Chief among these are:

- Large downtime allowances inconsistent with Federal rules.
- Lengthy uncontrolled period for new waste.
- Potential perpetual loophole for well non-function.
- Large unscanned areas around exceedances detected during SEM (F_CAW-1) (F_GAIA-1)

Agency Response to Combined Comments:

No changes were made in response to these comments. The 15-Day Changes address Board direction, feedback from CARB's regulatory partners, and comments from the public. As discussed at the November 2025 Board hearing, the changes are intended to improve flexibility while maintaining timely action by operators to protect public health and minimize emissions. The 15-Day Changes improve flexibility to ensure the most effective site-specific solutions can be used, provide alternatives or limited exceptions for special circumstances, adjust timelines to ensure feasibility, phase in compliance on a limited number of items that might require new plans and equipment at some facilities, and provide a pathway to ramp down and discontinue monitoring that requires temporary removal of wellheads while maintaining the objective of focusing more intensive monitoring in areas with persistent measurable deviations. The changes also include new reporting to support greater transparency and enforceability. These changes are necessary to support safe and effective operation of the landfill and its

GCCS, and do not compromise the anticipated benefits of the original proposal. Where these comment letters provided specific recommendations, those are responded to elsewhere in this chapter of the FSOR.

A.2-2 Further strengthen the LMR

Comment:

CARB Has Clear Legal Obligations to Strengthen the LMR Amendments

We once more would like to emphasize that in the face of scientific uncertainty, CARB should apply the precautionary principle throughout this revised regulation. This means that even when there is scientific uncertainty about the adverse health effects of landfill emissions, CARB should enact regulations that are protective of public health. {Footnote: Industrious Labs. Golden Opportunity: California's Roadmap to Slashing Methane Emissions from Landfills (March 2025), https://cdn.sanity.io/files/xdjws328/production/75bb242795e667a2d5abf3cbf552858f6da5f455.pdf. Note that the report modeled outcomes from compliance with SB 1383's mandate to divert organic waste away from landfills and found that these additional regulatory requirements are needed to meaningfully reduce landfill methane emissions in the short and medium term; diversion of organic waste alone will not be sufficient to meet the state's methane emissions reduction targets.} Therefore, for known climate pollutants like methane, the precautionary principle directs CARB to implement more stringent monitoring requirements and reduce areas of the landfill that are excluded from compliance, GCCS downtime, and other opportunities for methane emissions to go undetected and unremediated. This is also in line with California's increasingly ambitious targets to reduce GHGs in the state, as outlined in CARB's 2022 Scoping Plan. {Footnote: Office of Air Quality Planning and Standards, United States Environmental Protection Agency, "Improvements to Working Face and Daily Cover to Reduce LFG Emissions," (October 2024), The recommendations suggest minimizing the size of the working face, implementing a system to monitor methane emissions from the working face area, and installing appropriate alternative daily covers. Crucially, the paper reaffirms that all the necessary technology and approaches for reducing methane emissions from landfill working face areas are currently available. Id. at 6-10.}

CARB's efforts to strengthen the LMR are also critical to fulfilling climate commitments made by the United States and by California, particularly given that methane is a powerful greenhouse gas and that landfills represent the second largest source of methane emissions in California. The United States is a signatory to the Global Methane Pledge, where countries have committed to working to reduce methane emissions by taking domestic action and "focusing on standards to achieve all feasible reductions in the energy and waste sectors." {Footnote: "The uncertainty associated with the [Unmanned Aerial Vehicle]-based methods discussed in this paper is as broad as it is difficult to determine and compare, because each step of any method introduces a source of uncertainty and specific studies in this regard are limited." } Additionally, California itself has gone even further by launching the Subnational Methane Action Initiative, where CARB plays an integral role in achieving these emissions reduction goals. {Footnote: For example, there may not yet be strong data to demonstrate the cumulative and synergistic effects of the various landfill gases, including methane, VOCs, HAPs, and criteria air pollutants, upon human health. Regulation in the face of such uncertainty must err on the side of protecting vulnerable residents.} By enacting the proposed

amendments and adding or retaining the stricter requirements outlined here, CARB will be directly fulfilling its responsibilities in this regard.

In the International Court of Justice's Advisory Opinion on Climate Change, the Court stated that countries have duties under customary international law to prevent environmental harm and use due diligence as the standard for preventing such harm. This means that appropriate rules and measures must be put in place that regulate polluters and create effective enforcement and monitoring systems. {Footnote: Although it is outside the scope of this comment to provide detailed feedback on the more technical aspects of the proposed amendments, we support efforts to improve GCCS, for example by minimizing downtime, and cover integrity, such as the added requirement to submit a cover integrity plan and address repairs on a monthly basis.} Additionally, regulatory bodies must apply the precautionary principle to mitigate potential harm in the face of scientific uncertainty. CARB can contribute to California's obligations to reduce environmental harm by amending the LMR to promote effective enforcement and monitoring.

The Inter-American Court of Human Rights also stated in its Advisory Opinion on the Climate Emergency and Human Rights that governments have obligations to "eliminate [short-lived climate pollutants] as quickly as possible." Here, CARB should take this to mean that it should not delay in adopting the strongest possible LMR amendments and undertaking continued regulatory action to help eliminate short-lived pollutants like methane to the greatest extent possible. Governments also have an obligation to provide government-held information relating to the causes and impacts of climate change, including that of methane emissions, to the public and particularly to affected communities; this helps the public participate in environmental protection goals, access justice in relation to it, enables effective protection of rights, and guides environmental and social impact assessments. (F_IHRC-8)

Comment: Furthermore, the Inter-American Court found that governments must closely supervise and monitor public and private activities generating greenhouse gas emissions and evaluate their compliance with environmental regulations in relation to the risk they pose. To effectively do so, governments must create strong mechanisms to monitor these activities and make necessary recommendations to ensure mitigation targets are met. The government must inform the public about these targets and the strategies in place to achieve them in a timely and effective manner. CARB should implement similar risk assessments into its existing mitigation and monitoring framework and prioritize transparency to ensure Californians are adequately informed about polluting actors. (F_IHRC-10)

Agency Response to Combined Comments:

No changes were made in response to these comments. See the agency response in section IV.A.2-1 that is responsive to these comments.

A.2-3 The 15-day changes did not adequately address concerns with the original proposal

Comment: Consistent with our mission, Recology continues to support California's efforts to reduce landfill methane emissions and the effectiveness of the LMR. However, despite some improvements in the 15-day revisions, several concerns raised in our prior comments remain unresolved. These outstanding issues raise serious concerns regarding the feasibility, safety, and implementation of the proposed regulation. Many provisions continue to remain

impractical, overly prescriptive, or insufficiently supported by operational or technical justification.

The scope and complexity of the proposed amendments would benefit from further revision to ensure that the final regulation is both effective and implementable. Without further refinement, certain provisions of the rule are likely to create operational challenges, unintended consequences, and inconsistencies in implementation across facilities and jurisdictions.

As such, we offer the following updated comments and recommendations. We remain committed to working collaboratively with CARB to ensure that the final regulation achieves its intended environmental benefits while remaining feasible and effective for landfill operators. (F_Recology-1)

Comment: WM remains committed to working with CARB to ensure the emission goals of the LMR are achieved without further diminishing landfill capacity in California and ensuring that California's remaining landfills are affordable for solid waste ratepayers. WM also reiterates our interest in continuing to work with CARB and interested stakeholders as remote detection technology evolves to understand how it can be implemented effectively.

Unfortunately, WM continues to feel that the rule will result in significant costs without comparable benefits. WM will continue to work with CARB and its sister agencies at the federal, state, and local level to analyze the data generated through the LMR and other programs to determine what data is most useful in diagnosing issues at landfills and what, if any, is the most useful in preventing expensive corrective action measures. (F_WM-18)

Agency Response to Combined Comments:

No changes were made in response to these comments. CARB believes that the 15-Day Changes appropriately addressed concerns raised that were within the scope of the Proposed Amendments. Chapter IV provides agency responses to each formal comment provided during the 45-day comment period and at the Board hearing. Staff remained engaged with stakeholders throughout the process to solicit and incorporate feedback into the 15-Day Changes while maintaining the objectives and anticipated benefits of the original proposal. Where these comment letters provided specific recommendations, those are responded to elsewhere in this chapter of this FSOR.

B. Remotely Detected Methane Emission Plumes

1. Notification Requirements

B.1-1 Notify Districts in addition to landfill owners/operators of remotely-detected methane plumes

Comment:

COMMENT 2: Satellite Methane Detection Notification

We understand CARB's position is that plume notifications will be handled through internal coordination only and that you believe the LMR may not directly apply to local air districts. However, we continue to recommend that your rule explicitly require notification to the applicable air district when a remotely detected methane plume is identified. Some of those emissions may fall strictly under air district authority, not CARB's. Thus, including this provision

would improve transparency and ensure that the agency responsible for local oversight is informed of significant methane events, regardless of how CARB manages coordination internally. (F_SMAQMD-4)

Comment:

Satellite methane detection notification to Air Districts

We urge CARB to include an explicit requirement in the regulation for CARB to notify the applicable local air district whenever a remotely detected methane plume is identified (§95469(b)). Section 95469(b) establishes requirements for responding to remotely detected methane plumes. Local air districts have federal and local enforcement authority related to landfill operations within their jurisdiction. CARB should therefore require that the applicable local air district be notified when a remotely detected methane plume is identified at a landfill within its jurisdiction. If regulatory changes are not considered, please coordinate with air districts on the finalization of CARB's Standard Operating Procedures to ensure timely notification is provided to all co-regulators of these requirements. (F_SBCAPCD-5)

Comment: Section 95469(b) of the proposed amendments provides for the Executive Officer to notify an owner or operator of a remotely detected methane emission plume, and requires the owner or operator to take certain actions after being notified of the plume. This section should be modified to require simultaneous notification to the District in which the facility resides, should that District have an MOU with CARB to enforce the Regulation. (F_YSAQMD-2)

Agency Response to Combined Comments:

No changes were made in response to these comments. CARB appreciates the air districts' interest in overseeing operator compliance when sources within their districts are sent plume notifications. CARB launched the satellite methane detection and notification program in May 2025. Several months prior to that launch, CARB staff initiated outreach efforts and met with CAPCOA and individual air districts (and other regulators) to introduce preliminary procedures and solicit feedback on how to best collaborate. In response to air district feedback, CARB's existing practice is to include air districts on plume notifications simultaneous to operator notification.

CARB staff understand and appreciate districts' desire to specifically write this process into the regulatory text; however, the Memoranda of Understanding between CARB and Air Districts Regarding Implementation and Enforcement of the LMR is an alternative mechanism for documenting coordination procedures that can be more flexibly adapted to the needs of either party.

2. Owner/Operator Response Requirements

B.2-1 Responsibilities of regulated entities and districts if CARB sends a plume notification after the allowable window

Comment: 95469(b)(1)(B) – "The Executive Officer shall send the notification to the email address supplied pursuant to section 95470(b) within seven business days of CARB receiving the remote monitoring data. The notification shall contain all of the following information…"

- It is unclear if notification is provided beyond the seven business days whether it nullifies the subsequent requirements for the facility to act on the data, and if so, whether the burden falls on the air districts to conduct inspections in response to the notifications. We recommend that the seven-day requirement be included as a separate bullet for clarity. (F_South Coast AQMD-9)

Agency Response:

No changes were made in response to this comment. This comment is out of the scope of the 15-Day Notice because it refers to remotely detected plume notification requirements proposed in the 45-Day Changes. For additional information see agency responses in section IV.B.

B.2-2 Reduce monitoring area to 100-meter radius

Comment: 95469(b)(2)(A)(1): WM urges CARB to reduce the monitoring area to a 100 meter radius to be consistent with CARB's Oil and Gas Regulation. (F_WM-15)

Agency Response:

No changes were made in response to this comment. This comment is out of scope of the 15-Day Notice because it does not refer to any changes proposed in that notice. For informational purposes, refer to the agency response in section IV.B.3-2. CARB also notes that the area requested by the commenter is not materially different from the area in the Proposed Amendments: the area of a 100-meter radius circle is 7.8 acres while the area of a square with dimensions 600-ft x 600-ft is 8.3 acres.

B.2-3 Incorporate a Standardized Anomaly Protocol for remote data validation

Comment: Section 95470: Recordkeeping and Reporting Remote Monitoring Integration. LASAN requests incorporating a Standardized Anomaly Protocol for remote data validation within the 15-day review window. If automated or remote sensors detect a 'plume' anomaly or a sensor communication failure, the owner/operator should have the right to flag these events as "Data Validation Event pending Manual verification" without triggering an immediate notice of violation, provided a manual verification is performed within 72 hours. This provides the owner operator to review data and the reported information to distinguish between actual environmental exceedances and sensor malfunctions, preventing unnecessary administrative burdens for both the operator and the state. Without such a protocol, automated data remote sensing triggers may result in false exceedances, which is inconsistent with the regulation's intent to identify true emissions events. (F_City of LA-5)

Agency Response:

No changes were made in response to this comment. This comment appears to refer to section 95470(b)(7) because it mentions remote data and plumes. That subsection describes reporting required by the owner or operator after receiving a notification of a remotely detected emission plume from the Executive Officer. Those requirements are only operative after the Executive Officer provides a notification pursuant to section 95469(b)(1). It does not require the facility owner or operator to remotely monitor their facility or identify plumes. Additionally, please note that a remote plume detection notification is not a notice of violation – it only triggers required follow-up actions.

C. Surface Emissions Monitoring and Component Leak Monitoring

1. Monitoring Spacing and Frequency

C.1-1 Tighten spacing and/or increase frequency

Comment: Insufficient five foot radius for scanning after SEM exceedance

Surface Emissions Monitoring (SEM) is already performed at a large grid size on an infrequent basis, allowing for emissions in large parts of the landfill to go undetected for long periods of time. In the current SEM procedure, there is over 20 feet between where handheld methane detectors take measurements, as technicians only have to cover the landfill with a 25 foot grid. To help fill this gap, technicians are required to scan the area around SEM exceedances to find the entire area of the breach.

Section 95471 (c)(2)(B) of the Proposed Amendments clarifies a minimum radius area that must be scanned for further exceedances around a SEM exceedance. Clarifying a minimum size is a strengthening improvement. However, this size chosen is much too small. With over 20 feet of unmonitored surface on either side of the SEM path, larger areas around a known compromised location should be checked. A 15-foot radius check should be required around known deficiencies. (F_CAW-4) (F_GAIA-4)

Agency Response:

No changes were made in response to this comment. As pointed out by the commenters, adding a minimum search radius is intended to strengthen the requirement. Section 95471(c)(2)(B) where this requirement is contained further specifies that this search must establish the entire area exceeding the concentration limit. Thus, the search area is expanded if elevated concentrations are detected within this five-foot radius around the initial exceedance (i.e., each additional point within the initial five-foot radius requires its own five-foot radius to be monitored). Staff's experience is that surface emissions tend to be fairly localized, and when larger leak areas are identified they more often follow a linear shape e.g., along a crack or erosion rill, rather than a circle. Such a large search radius (15-foot radius as suggested by the commenter equates to a search area nine times the size of a 5-foot radius) is unlikely to yield significantly more detections, and could even result in a less thorough search of the most important area immediately surrounding the initial detection. The approach ensures the entire area with exceedances is identified, while not unnecessarily expanding the monitoring area where such a large radius is unlikely to identify further exceedances.

C.1-2 Let legacy closed landfills remain on annual SEM schedules

Comment:

Section 95469: Surface Emissions Monitoring (SEM)

For facilities meeting the Legacy Closed Landfill criteria with three consecutive years of compliance, we recommend the ability to maintain or reduce SEM frequency to an annual schedule. Given the advanced decay and low internal pressure of these sites, the risk of surface exceedances is significantly lower than at active facilities. (F_City of LA-3)

Agency Response:

No changes were made in response to this comment. This comment is out of the scope of the 15-Day Notice because it does not refer to any changes proposed in that notice. For additional information, see agency response to section IV.C.2-3. For more information on why staff proposed every-three-quarters frequency to replace annual frequency, see the rationale provided on pp. 44-45 of the ISOR.

C.1-3 Do not change to every third quarter monitoring

Comment:

Section 95469: Monitoring Frequency & Seasonal Conflicts

The shift from annual monitoring to "every three quarters" for clean grids (95469(c)) creates significant logistical and safety challenges. Seasonal Risk: This schedule forces monitoring into the first and fourth quarters, overlapping with the holiday season and California's rainy season. Operational Risks: Wet conditions compromise instrument accuracy and increase safety risks for field personnel, particularly on slopes and capped surfaces. This proposed frequency may conflict with the practical ability to obtain accurate and representative monitoring data under field conditions, potentially undermining data quality objectives within the regulation.

LASAN recommends maintaining annual monitoring for Legacy Closed Landfills. (F_City of LA-4)

Comment: 95469(a)(1)(C): WM urges CARB to move to annual monitoring as every three-quarter monitoring will create unnecessarily complex scheduling and budgeting for landfills with demonstrated compliance records. (F_WM-13)

Agency Response to Combined Comments:

No changes were made in response to these comments. These comments are out of scope of the 15-Day Notice because they do not refer to any changes proposed in that notice. For informational purposes, see the agency response in section IV.C.2-3 for more information. Additionally, most landfills are already performing monitoring on a quarterly basis and are able to successfully perform SEM in compliance with the regulation throughout all seasons.

Please also note that monitoring frequency changes in sections 95469(a)(1)(C) and (2)(C) are not applicable at an individual grid level. For more information on this topic, refer to the agency response in section IV.C.2-7.

C.1-4 Allow 10-day repair period before returning to quarterly SEM

Comment: 95469(a)(1)(D): WM urges CARB to provides operators with demonstrated history of compliance opportunity to correct deficiencies within ten calendar days before resumption of quarterly SEM. (F_WM-14)

Agency Response:

No changes were made in response to this comment. This comment is out of scope of the 15-Day Notice because it refers to modifications that were made in the 45-Day

Changes. For informational purposes, please see the agency response in section IV.C.2-4 for more information.

2. Repairing and Re-monitoring Surface Emissions

C.2-1 Allow 10-day corrective action and remediation period

Comment:

Section 95469 (a)(1)(B): Corrective Action Initiation and 10-Day Remediation Period

The proposed amendments increase the time to initiate corrective action from 3 to 5 days. While the Sanitation Districts appreciate the added flexibility, we believe a 10-day period would allow sufficient time to evaluate site conditions and implement effective corrective measures. This change would also align requirements with existing federal and local regulations (U.S. EPA NESHAP Subpart AAAA and SCAQMD Rule 1150.1), which prioritize prompt corrective action and follow-up monitoring over strict initiation deadlines. (F_LACSD-2)

Agency Response:

No changes were made in response to this comment. This comment requests a return to the requirement in the current Regulation. A timeline for initiating corrective action ahead of the 10-day re-monitoring date was added in the 45-Day Changes to help minimize the time that methane is emitted. See agency response in section IV.C.3-2 for more details about why CARB maintained a requirement to initiate repair.

C.2-2 Support for prohibiting SEM after wetting the landfill surface

Comment:

Wetting the landfill surface qualifying as a rain event

CARB already acknowledged that a wet landfill surface changes emissions readings, which is why SEM can not be performed after a rain event. An amendment to section 95471 (c)(1)(E) clarifies that artificial wetting of the landfill surface also precludes SEM. This closes an obvious loophole and is an important improvement. (F_CAW-8) (F_GAIA-8)

Agency Response:

No changes were made in response to this comment. CARB appreciates the comment and thanks the commenter.

C.2-3 Clarify meaning of measurable precipitation regarding SEM timing after wetting landfill surface

Comment: This comment concerns §95471(c)(1)(E) and §95471(d)(4)(F), which require that surface emissions monitoring (SEM) be conducted only when “there has been no measurable precipitation or application of water or other liquids in the preceding 72 hours.” Clarification is requested regarding the meaning and intent of “measurable” as it applies to water or other liquid applications used for routine dust control at landfill sites.

Routine industry practice at many landfills is to apply water or other dust-suppressant liquids daily, and in some areas potentially multiple times per day, to maintain compliance with

conditions in air permits. Depending on weather conditions, the volume applied, the area of application, frequency of application, and local surface conditions (for example, recently graded cells or large open surfaces), routine dust-control activities could reasonably meet a literal interpretation of “measurable.”

If routine dust control triggers the 72-hour wait period, operators face a Catch-22: they must either delay critical SEM and follow-up monitoring or suspend dust suppression, risking visible-emissions permit violations and potential associated public-health and compliance concerns.

To avoid unintended operational conflicts and to ensure SEM remains practicable and effective, CARB is requested to either:

- Define “measurable” in quantitative terms (for example, by specifying a minimum volume per unit area that would constitute a measurable application); or
- Explicitly exempt routine landfill dust-control applications from the 72-hour restriction when those applications are unrelated to SEM remediation; or
- Clarify that only deliberate surface-wetting intended as part of the mitigation efforts would trigger the 72-hour postponement for SEM monitoring.

The apparent intent of the provision appears to be to avoid false negatives caused by recent, substantial wetting of the surface that would mask emissions, rather than to preclude SEM. Clarifying the current language would minimize the risk of creating unintended operational conflicts that could hinder both emissions monitoring and air quality compliance. (F_Tetra Tech-2)

Agency Response:

No changes were made in response to this comment. As described in the 15-Day Notice “Summary of Proposed Modifications” item 134, the intention of adding “or application of water or other liquids” in subsections 95471(C)(1)(E) and (d)(4)(F) was to ensure a sufficient time has elapsed before monitoring is conducted because liquid can fill pore spaces and temporarily suppress surface emissions, leading to inconclusive or invalid monitoring results.

Staff’s understanding is that application of water or other suppressants for dust control purposes typically involves misting (applying a small amount of liquid) and only occurs where vehicles or heavy equipment are driven, and thus is practiced on a relatively small portion of the landfill’s total surface. In contrast, staff’s rationale referred to the common practice of “watering in” soil following a cover repair to remove air pockets, which typically involves application of a larger quantity of water directly on the area to be re-monitored. In the majority of cases, with appropriate planning, this restriction will not necessitate delaying SEM. Under the current Regulation, the common meteorological definition of measurable precipitation equal to or greater than 0.01 inch has been applied. Owners or operators are encouraged to meet with CARB and/or air district staff to determine whether an alternative compliance option is necessary to account for site-specific circumstances.

Nothing in the LMR should be interpreted to limit existing health and safety regulations.

C.2-4 Revised exceedance framework increases operational burdens without clear evidence it will result in improved emissions control

Comment:

Surface Emissions Monitoring Requirements

While CARB has made minor adjustments to corrective action timelines, the revised exceedance framework introduces additional requirements that may not be achievable under typical field conditions. The structure for addressing exceedances, including recurring exceedance provisions and associated monitoring requirements, does not adequately account for the localized and variable nature of landfill surface emissions. These requirements increase operational burden and compliance risk without clear evidence that they will result in improved emissions control. (F_Recology-6)

Agency Response:

No changes were made in response to this comment. This comment does not appear to be raising concerns with modifications in the 15-Day Changes and does not provide specific details about what requirements they view as not achievable or increasing operational burden and compliance risk. The rationale for all changes was provided in the ISOR and 15-Day Notice.

C.2-5 Do not require immediate notification after third exceedance and allow requests to delay well installation

Comment: 95469(a)(1)(B)(3): WM urges CARB to remove the notification requirement as corrective action will be noted in quarterly reports. On demand notification will overwhelm the enforcement agency. Additionally, we urge CARB to include a provision to allow a landfill owner or operator to contact the Executive Officer if there are circumstances out of the operator's control that result in delayed installation such as non-availability of equipment or engineers. (F_WM-12)

Agency Response:

No changes were made in response to this comment. This comment is out of scope of the 15-Day Notice because it does not refer to any changes proposed in that notice. For informational purposes, CARB provides the following.

CARB respectfully disagrees that this notification requirement will overwhelm implementing regulatory agencies. As described in the ISOR Appendix B, staff analyzed historical data on reported initial and re-monitoring concentrations and based on that data estimated 44 instances of third exceedances statewide per year. Additionally, these notifications do not require any specific reviews or approval, but are important to enable regulators to confirm that effective mitigation measures are in place during construction, that an amended design plan is submitted, and that the site returns to compliance within the allowable timeline. See ISOR p. 43 for additional details on the rationale for including this notification.

C.2-6 Revert to 120-day corrective action deadline

Comment: In paragraph 73, CARB changes the proposed regulation and removes the 120-day limit on timeline proposals by landfill operators. While it is understandable that operators may need longer to complete corrective actions, a hard numerical limit should be placed on timeline proposals. A "prompt" corrective action is a subjective term that may be lost in practice, leaving landfill-adjacent communities with no meaningful recourse in the event of exceedances. If CARB is unsure about an appropriate timeline for corrective actions, the issue should be researched to find an appropriate but specific limit rather than allowing the regulations to remain vague on this critical point. We encourage CARB to return to the previously proposed language on this point. (F_IHRC-4)

Agency Response:

No changes were made in response to this comment. Setting a specific numerical timeline could limit the options available to remediate an exceedance and potentially leave a more complete or robust repair option unavailable. Because the request and approval must occur within set time windows, the request must demonstrate why the time is needed for the corrective action, and it must be at least as effective to repair the exceedance.

3. Recurring Surface Emissions Exceedances

C.3-1 Limit response to only triggering grid and reduce timeline to return to quarterly frequency

Comment: {CARB staff note: Commenter quoted 15-Day Changes text of section 95464(a)(4).}

The County reiterates our previous comment to this section. Specifically, the requirement to complete a collection system assessment and a cover integrity assessment for 'all adjacent grids' changes the assessment area from 50,000 sf. to 450,000 sf. We recommend changing this requirement to doing the assessments in (A) to the grid, but either not including or significantly limiting the additional surface emissions monitoring in adjacent grids.

The County appreciates that the adjacent grids were dropped from the requirement for the monthly monitoring requirement. The County continues to recommend three months with no exceedances be the threshold for returning to quarterly monitoring for the grid that exceeded the threshold. This seems like plenty of time to ensure that repairs/changes are holding, without creating excessive extra work. (F_YoloCo-4)

Comment: {CARB staff note: Commenter quoted 15-Day Changes text of section 95464(a)(4).}

Waste Connections supports previous industry comments to this section. Specifically, the requirement to complete a collection system assessment and a cover integrity assessment for 'all adjacent grids' changes the assessment area from 50,000 sf. to 450,000 sf. We recommend changing this requirement to doing the assessments in (A) to the grid, but either including or significantly limiting the additional surface emissions monitoring in adjacent grids.

Waste Connections appreciates that the adjacent grids were dropped from the requirement for the monthly monitoring requirement. Waste Connections also recommend three months with

no exceedances be the threshold for returning to quarterly monitoring for the grid that exceeded the threshold. This seems like plenty of time to ensure that repairs/changes are holding, without creating excessive extra work. (F_WCN-4)

Comment: Grid Assessment Requirements (§ 94569(a)(4)(A))

This section requires both a collection system assessment and a cover integrity assessment on all adjacent grids whenever a single grid shows recurring exceedances. The requirement to conduct both collection system assessments and cover integrity assessments on all adjacent grids whenever a single grid experiences recurring exceedances introduces investigation requirements that are disproportionate to the localized nature of most surface emission exceedances.

Surface methane exceedances typically arise from localized settlement, isolated well performance variation, temporary cover disturbance, intermediate cover desiccation, or localized gas migration pathways rather than system-wide performance issues. Because landfill surface monitoring programs are resource-intensive and weather-dependent, expanding assessment obligations beyond affected grids may unintentionally reduce monitoring efficiency by diverting personnel and equipment away from targeted corrective actions. Assessing every adjacent grid creates an exponential increase in workload based on a localized issue and will likely detract from the regulatory goal of allowing the operator to focus its resources on the grids that require corrective action. Recommendation: Adjacent grids should not be subject to automatic collection system and cover integrity assessments. (F_RS-2)

Agency Response to Combined Comments:

No changes were made in response to these comments. These comments are out of scope of the 15-Day Notice because they do not refer to any changes proposed in that notice. For informational purposes, refer to the agency response in section IV.C.4-2.

C.3-2 Adjust definition of recurring instantaneous exceedances

Comment:

Section 95469 (a)(4): Recurring Surface Exceedances – Assessment and Monitoring Requirements

There is no change in the proposed 15-day text in this subsection from the previous 45-day version. The proposed amendments continue to require enhanced monitoring for recurring exceedances, defined as five exceedances for instantaneous and three exceedances for integrated monitoring. As noted in the Sanitation Districts' November 10, 2025, comment letter, some subsequent instantaneous exceedances within the same 50,000-square-foot monitoring grid may not be related to one another. Exceedances that occur in the same location and show a consistent pattern should be considered recurring. If exceedances are not spatially correlated or do not indicate a continuing condition, they should be treated as new. The current wording does not clearly address this distinction, resulting in significant operational burdens and unjustified costs for landfill operators, with no meaningful environmental benefit.

The Sanitation Districts recommend that CARB refine this amendment to clearly define a recurring instantaneous exceedance within a surface gas monitoring grid. For example, a recurring event could be defined as five initial (excluding re-monitoring) instantaneous

exceedances within a rolling 12-month period, with each exceedance within a 20-foot radius of at least two others in the same grid. This clarification would ensure compliance requirements are clear and achievable, and would promote confidence in the fairness and practicality of the regulation. This approach provides a technically sound basis for identifying recurring conditions by considering both exceedance frequency and spatial correlation. It distinguishes between localized issues and unrelated, dispersed exceedances within the same grid. (F_LACSD-3)

Agency Response:

No changes were made in response to this comment. This comment is out of scope of the 15-Day Notice because it does not refer to any changes proposed in that notice. For informational purposes, refer to the agency response in section IV.C.4-4.

C.3-3 Clarify whether remotely detected methane plumes count as initial exceedances towards recurring surface exceedance threshold

Comment: This comment concerns §95469(b), which requires operators to address remotely detected emission plumes. It is not clear how exceedances identified through remotely detected plume monitoring and re-monitoring under §95469(b) will be treated in relation to the recurring surface exceedance provisions in §95469(a)(4). Clarification is needed on whether the initial plume detection or the exceedances discovered during plume-triggered monitoring and the 600-foot by 600-foot investigation area will be counted as "initial exceedances" toward the thresholds that trigger recurring surface exceedance requirements.

To achieve the regulation's environmental objectives while allowing for practical, reliable operation, the following clarifications and adjustments are requested for consideration:

- Explicitly state in §95469(b) that neither initial remotely detected plume monitoring exceedances and re-monitoring do not count towards "triggering" the requirements of §95469(a)(4); or
- Provide clarification in section §95469(a)(4) that includes a "trigger value" regarding initial remotely detected plume monitoring exceedances or exceedances detected during re-monitoring. (F_Tetra Tech-3)

Agency Response:

No changes were made in response to this comment. Remotely detected plumes are not exceedances of the surface methane emissions limits in section 95465 and thus do not count toward the recurring surface exceedances threshold. Exceedances that are detected in the follow-up monitoring conducted in response to a plume notification pursuant to section 95469(b)(2) do count toward the recurring surface exceedances threshold. This is clear within the proposed regulatory text, so no change is needed.

4. Component Leak Monitoring

C.4-1 Allow component leak monitoring at energy recovery facilities during planned outages

Comment:

Section 95469(c): Component Leak Monitoring – Positive Pressure Components

There is no change in the proposed 15-day text in this subsection from the previous 45-day version. The amendments continue to require quarterly leak checks of components containing landfill gas under positive pressure, which are typically found at flare stations and energy recovery facilities. While leak checks and repairs at flare stations can generally be performed as required, repairs at energy recovery facilities often require shutdowns, interrupting the beneficial use of landfill gas. SCAQMD Rule 1150.1 permits component leak monitoring and repairs at energy recovery facilities during planned outages, recognizing operational constraints. Aligning CARB's requirements with this approach would promote regulatory consistency and operational safety, ensure effective leak management, and maintain the beneficial use of landfill gas. Therefore, the Sanitation Districts strongly recommend that flexibility be provided to energy recovery facilities to continue providing environmental benefits without putting them at a disadvantage. (F_LACSD-4)

Agency Response:

No changes were made in response to this comment. This comment is out of scope of the 15-Day Notice because it refers to modifications that were made in the 45-Day Changes. For informational purposes, refer to the agency response in section IV.C.7-8.

C.4-2 Applicability of component leak monitoring plans to offsite facilities

Comment: {CARB staff note: The comment below was attached to section 95464(b)(5) of the 15-Day Changes. It refers to applicability of component leak monitoring plans.}

Does this also include offsite facilities? (F_SBCAPCD-10)

Agency Response:

No changes were made in response to this comment. This comment is out of scope of the 15-Day Notice because it does not refer to any changes proposed in that notice.

5. Unsafe to Walk Areas

C.5-1 Provide process to request extensions for follow-up monitoring in unsafe-to-walk areas

Comment: The LMR continues to lack necessary flexibility to address worker health and safety concerns for surface emissions monitoring and corrective action in unsafe-to-walk surfaces. WM strongly urges CARB to provide landfill operators a process by which the operator may notify the Executive Officer if conditions exist which pose risk to worker health and safety which would preclude the operator from conducting handheld SEM or corrective action and provide a reasonable timeline where those risks will no longer preclude the operator from performing the required actions. (F_WM-6)

Agency Response:

No changes were made in response to this comment. In the 15-Day Changes, the timelines for following up on a screening detection in an unsafe-to-walk area were extended to ensure adequate time for safely conducting follow-up activities. If site-specific circumstances prevent the ability to safely follow up within those extended timelines, the owner or operator may request an alternative compliance option pursuant

to section 95468. Such request must include the reason for delay, demonstrate that efforts were promptly initiated, and include the expected timeline to complete the repair.

C.5-2 Meteorological restrictions for drone methane detection

Comment: {CARB staff note: The comment below was attached to section 95470(a)(1)(H) of the 15-Day Changes. It refers to drone-based platforms used for screening unsafe-to-walk areas.}

Are the same meteorological conditions applied for drone methane detection? I would assume these might be different. How are these verified? (F_SBCAPCD-18)

Agency Response:

No changes were made in response to this comment. This comment is out of scope of the 15-Day Notice because it refers to modifications that were made in the 45-Day Changes. For informational purposes, CARB provides the following.

The same restrictions regarding wind speed and precipitation apply to screening in unsafe-to-walk areas as for typical SEM (see sections 95471(d)(4)(E) and (F)). Any instrument used to perform screening in unsafe-to-monitor areas must be used according to the manufacturer's recommendations (section 95471(d)(4)), including any meteorological conditions.

6. SEM Exceedance Violations in Compliance Inspections

C.6-1 Support clarification that exceedances in compliance inspections revert SEM relaxations

Comment:

Regulatory Improvements that Address Implementation Challenges

The amendments also include some important improvements that recognize real-world roadblocks to effective enforcement. The below changes show a keen understanding of the weaknesses in the past regulation that have allowed a disconnect to develop between the reported outcomes and on-the-ground realities. These are important improvements that should be maintained:

1. Successful compliance inspections as an element of the overall compliance record

Throughout the regulation, there are multiple places where a continuous clean compliance record can trigger relaxed monitoring or operating requirements. Most of the data underlying these records is self-monitored. The amended regulation makes the important clarification that data from compliance inspections must also match the clean record of the reported data in order for operators to qualify for relaxed requirements. This is absolutely critical, as oversight and enforcement entities are greatly weakened without it. Regulators' data, as well as the landfill's self-reported data, must be considered for regulatory landfill management decisions. (F_CAW-6) (F_GAIA-6)

Agency Response to Combined Comments:

No changes were made in response to these comments. CARB appreciates the comments and thanks the commenters.

C.6-2 SEM exceedances found by inspectors should not be an immediate violation

Comment: Surface Monitoring Exceedances (§ 94569(a)(1)(D) and (a)(2)(D)) The proposed language stipulates that any surface monitoring exceedance found by an inspector constitutes an immediate violation, subjecting the operator to “no-fault” civil penalties, assessed daily, until the “leak” is considered remediated, and even subjecting the operator to potential misdemeanor charges. (Health and Safety Code §§ 42404, 42400.) Historically, landfill methane rules have treated surface emissions monitoring exceedances as performance indicators requiring corrective action rather than strict-liability violations absent an opportunity to cure. This is a significant shift from the previous sanction, which simply required a return to quarterly monitoring.

- Active landfills are required by state regulations to use twelve inches of compacted intermediate soil cover over areas of the landfill that are not currently active but have not yet reached final permitted fill elevations. (17 CCR § 20700(a).) This intermediate soil cover is subject to voids, cracking, and depressions due to exposure to the elements, including rain, wind erosion, earthquakes, settlement, barometric pressure changes, and other natural conditions that are unpredictable and occur spontaneously. Therefore, surface exceedances can and do occur sporadically and without notice, even under best management practices. The emission will often occur between quarterly or even monthly surface monitoring events. That is why the regulation specifies what corrective action should be taken by the operator where such surface “leaks: are found. By replacing the "return to quarterly monitoring" corrective action pathway and replacing it with immediate daily violations and civil penalties, the rule becomes purely punitive rather than remedial.
- Furthermore, under § 95470(b)(5), operators must provide CARB with a 15-day advance notice of scheduled monitoring. If CARB performs a compliance inspection before that window lapses and identifies an exceedance, the operator is penalized without a cure period. Controlled-release testing studies demonstrate that walking surface monitoring methodologies based on portable hydrocarbon detectors are problematic and sensitive to meteorology, ground conditions, survey-grid spacing, operator path selection, and interpretation variability. Because these tools are screening-level work-practice methods rather than quantitative emissions measurements, they should not serve as automatic strict-liability enforcement triggers without confirmatory evaluation. There are well-known and substantial questions regarding the efficacy and variability of surface monitoring using a portable hydrocarbon detector. See, “Simplex-Landfill Methane Controlled-Release Study: Measurement Performance From the Second Experimental Campaign,” Fluxlab and Tarek Abichou, March 2026. The following quotations are taken from this article, which is attached for your review.

  In most cases, the walking MGSEM [handheld hydrocarbon detector surface emission monitoring] methodology failed to detect active emission sources or incorrectly localized

detected emissions. (p. 12) False positives were common in the MGSEM results, where the participant detected concentrations above threshold when there was no source within 15 m. (p. 13) The regulatory EPA Method 21 MGSEM work practice (500 ppm threshold and 30 m spacing) did not perform well, consistent with longstanding concerns. Despite rapid advances in UAV-based detection technologies, MGSEM exhibited the lowest detection performance among the methodologies evaluated across the past two years. Field observations and modeling together suggest that, under real-world conditions, MGSEM detections are largely probabilistic—occurring when the survey path happens to intersect an emission source—or dependent on operator skill and interpretation of audio, visual, and olfactory cues. These factors can produce variable and non-equivalent outcomes across sites and users. Consequently, MGSEM performance using 200- or 500-ppm thresholds is expected to depend strongly on meteorology, ground conditions, survey-grid design, path spacing, and operator aptitude. (p. 19)
[Emphasis added.]

Recommendation: Where an operator is duly performing quarterly or monthly surface monitoring, where applicable, and is promptly repairing any exceedances found during the operator's inspections, exceedances discovered during compliance inspections should trigger a corrective-action period rather than immediate daily violations. This approach maintains alignment with emissions-reduction objectives while preserving consistency with established landfill methane regulatory frameworks. (F_RS-1)

Comment:

Section 95469 (a)(1)(D) and Section 95469 (a)(2)(D)

The 15-day changes add the language, "*including during compliance inspections*" throughout many LMR sections to clarify that the results of regulatory inspections count towards the site's overall monitoring efforts. We agree that this reflects existing practice, however, we believe it will be more practical if the landfill operator is notified of exceedances found during an inspection so that the results can be verified by landfill staff.

Additionally, in the two referenced paragraphs (Section 95469(a)(1)(D) and (a)(2)(D)), the language, "*Any exceedance of the limit specified in ____ detected during any compliance inspections are a violation of this subarticle*", was added. We strongly object to this language and request it be removed. By adding this language any exceedance detected during an inspection would now be considered a violation. In contrast, if the landfill operator were to detect it outside of an inspection, it would simply trigger timelines for repair. In this situation a Notice of Violation is undeserved and can bring about severe complications, especially if the site is a Title V facility, which means a facility is subject to citizen suits. The LMR contains many provisions for dealing with chronic surface monitoring exceedances. We suggest that if an exceedance is detected during an inspection, it simply be added as a monitoring event in the site's monitoring efforts similar to the same language used in other sections. Also, as suggested above, we recommend that CARB allow the site to verify the inspection monitoring results. Finally, if CARB wishes to formalize exceedances found during their inspection, we suggest issuing a Notice to Comply to the landfill owner and/or operator, similar to the practice of many air quality management districts. (F_SWANA-5)

Agency Response to Combined Comments:

No changes were made in response to these comments. The change referred to in the comments was a clarification to align with the longstanding implementation of the LMR that exceedances found during a compliance inspection are violations upon the discovery of those exceedances. Section 95465 prohibits any location exceeding the surface methane emission standard. Section 95469 includes specified repair periods for exceedances located during the required monitoring performed by owners or operators which do not apply to exceedances located by regulators during a compliance inspection.

C.6-3 Support for SEM exceedances during compliance inspections counting as violations

Comment: We support paragraph 53's amended emphasis that exceedances detected through compliance inspections count against exceedance requirements. Stringent standards are important for the proper regulation and oversight of landfill closures, which as noted above, can have significant impacts on adjacent communities for decades into the future. (F_IHRC-7)

Agency Response:

No changes were made in response to this comment. CARB appreciates the comment and thanks the commenter.

D. Wellhead Standards and Monitoring

1. Continuous Wellhead Monitoring

D.1-1 Allow adoption of remote wellhead monitoring and specify exceedances fewer than 15% of readings is not a violation

Comment: {CARB staff note: Commenter quoted 15-Day Changes text of section 95469(e)(8).}

Waste Connections believes that remote continuous wellhead monitoring and automated well head adjustment could be an important tool a landfill operator can use to improve the performance of the gas collection and control systems at municipal solid waste landfills to aid in optimizing gas capture and minimize fugitive landfill methane emissions. We recommend including elements in the LMR that allow for the adoption of remote wellhead monitoring by landfill operators also including based upon a mutually informed understanding protections for operators from notices of violations in some circumstances. At a minimum this section should include text that states that exceeding parameter thresholds in fewer than 15 percent of the readings is not a violation of this section. Landfill operators may also be compelled to move towards use of automated wellheads by the inclusion of some type of data privacy rights under this section. (F_WCN-5)

Comment: {CARB staff note: Commenter quoted 15-Day Changes text of section 95469(e)(8).}

The County believes that remote continuous wellhead monitoring and automated well head adjustment is one of the most important tools a landfill operator can use to improve the

performance of the gas collection and control systems at municipal solid waste landfills to optimize gas capture and minimize fugitive landfill methane emissions. To this end, the County recommends including elements in the LMR that incentivize adoption of remote wellhead monitoring by landfill operators, including protections for operators from notices of violations in some circumstances. At a minimum this section should include text that states that exceeding parameter thresholds in fewer than 15 percent of the readings is not a violation of this section. Landfill operators may also be compelled to move towards use of automated wellheads by the inclusion of some type of data privacy rights under this section. (F_YoloCo-5)

Agency Response to Combined Comments:

No changes were made in response to these comments. In line with these comments, the Proposed Amendments are designed to reduce barriers to using continuous wellhead monitoring and automated tuning. In the 45-Day Changes, staff proposed establishing alternative thresholds to determine when an exceedance of a wellhead parameter has occurred in wellhead monitoring data that is collected more frequently than weekly (section 95469(e)(8)). Inclusion of this section clearly replaces the thresholds described in sections 95469(e)(1)-(7) when an owner or operator is using the continuous wellhead monitoring as the means of complying with the Proposed Amendments (with the latter clarification made in the 15-Day Changes).

In the 15-Day Changes, further modifications were made that reduce barriers to using continuous wellhead monitoring technologies including reporting of averages rather than all raw data in section 95470(b)(4)(C) and minor modifications to test methods in sections 95471(l) and (n).

Recordkeeping is required for all data collected. It is unlikely that the data collected in this case would qualify as private or privileged data because it is emissions data and not confidential business information. California Government Code Section 7924.510(d) provides that "all air pollution emission data, including those emission data that constitute trade secrets as defined in subdivision (f), are public records." CARB evaluates requests for trade secret information consistent with title 17 California Code of Regulations sections 91011 and 91022.

2. Positive Pressure

D.2-1 Exclude zero-pressure readings in positive pressure determinations

Comment:

Section 95469(e)(1): Positive Pressure Corrective Action – Inclusion of Zero Pressure

There is no change in the proposed 15-day text in this subsection from the previous 45-day version. As stated in the Sanitation Districts' November 20, 2025, comment letter, adding zero-pressure readings as a criterion for wellhead adjustments and enhanced monitoring provides no benefit and imposes unnecessary burdens on landfill operators. Zero wellhead pressure does not always indicate a system deficiency or loss of control; it may reflect proper system balancing under certain conditions. Attempting to correct zero pressure could result in overpulling a gas collector, leading to excessive vacuum, air intrusion, elevated oxygen levels, increased subsurface temperatures, and long-term system issues.

U.S. EPA NSPS Subpart XXX and SCAQMD Rule 1150.1 apply corrective actions only to actual positive pressure conditions, not zero-pressure readings. Aligning Section 95469(e) with these regulations would provide consistency across agencies. The Sanitation Districts, therefore, recommend that CARB exclude zero-pressure readings from positive-pressure conditions. This would provide regulatory clarity and avoid unnecessary steps. (F_LACSD-5)

Agency Response:

No changes were made in response to this comment. This comment is out of scope of the 15-Day Notice because it refers to modifications that were made in the 45-Day Changes. For informational purposes, refer to the agency response in section IV.D.1-7.

D.2-2 Allow flexibility in addressing recurring pressure exceedances

Comment:

Section 95469(e)(2): Recurring Pressure Exceedances

The proposed 15-day changes require a collection system assessment within 30 days and additional monitoring if three positive pressure readings occur at the same well within 12 months. Short-term positive pressures often result from normal operations, such as barometric changes, condensate buildup, or routine wellfield adjustments, and do not indicate system failure or increased emissions. Requiring extended monitoring for such routine events would impose significant burdens. In addition, operators may unnecessarily increase collector vacuum to offset positive readings, which could lead to air intrusion, higher oxygen levels, higher wellhead temperatures, and reduced methane quality. The Sanitation Districts recommend that CARB allow flexibility in addressing pressure-related issues. (F_LACSD-6)

Agency Response:

No changes were made in response to this comment. This comment is out of scope of the 15-Day Notice because it refers to modifications that were made in the 45-Day Changes. For informational purposes, refer to the agency response in section IV.D.1-3.

D.2-3 Monitoring requirements should focus on sustained or meaningful deviations and allow operational flexibility

Comment:

Recurring Pressure Exceedances & Well Head Monitoring

While some improvements have been made (e.g., adjusted timelines and thresholds), the requirements for corrective action, recurring exceedances, and enhanced monitoring remain overly prescriptive. The proposed framework does not fully account for normal operational variability, including transient pressure or temperature fluctuations. The requirement that a single exceedance of 131°F triggers enhanced monitoring is not reflective of normal operational variability and may result in unnecessary escalation of monitoring and corrective actions.

Transient temperature fluctuations can occur for a variety of non-systemic reasons and are not necessarily indicative of a broader performance issue. The current framework does not sufficiently distinguish between isolated events and sustained conditions requiring intervention.

Monitoring requirements should focus on sustained or meaningful deviations and allow for operational flexibility. (F_Recology-7)

Agency Response:

No changes were made in response to this comment. This comment does not appear to be raising concerns with modifications in the 15-Day Changes and therefore is out of scope for the 15-day comment period. For informational purposes, refer to the agency responses in sections IV.D.1-3 and IV.D.2-2.

D.2-4 Ambiguities susceptible to circumvention in recurring positive pressure threshold

Comment: {CARB staff note: The comment below was attached to section 95469(e)(2) of the 15-Day Changes. It refers to which measurements are included in the threshold for recurring pressure exceedances.}

Section 95469(e)(2) is ambiguous and susceptible to circumvention. Because months under corrective action pursuant to section 95469(e)(1) or section 95464(c) are excluded, it is unclear when the “three positive-pressure readings within any 12-month period” threshold is triggered; specify whether exceedances recorded during corrective-action months count toward the threshold and how the 12-month look-back is evaluated.

Add circumvention provisions to ensure recurrent pressure exceedances are tracked by collection area or well lineage so decommissioning/replacing a well cannot reset the count. (F_SBCAPCD-17)

Agency Response:

No changes were made in response to this comment. This comment is out of scope of the 15-Day Notice because it refers to modifications that were made in the 45-Day Changes. For informational purposes, CARB provides the following.

Months during which corrective actions for positive pressure are ongoing are excluded because the recurring positive pressure requirements are intended to apply to situations where positive pressure is returning despite having previously completed corrective action that temporarily brings the pressure into compliance.

D.2-5 Define elevated temperature

Comment: Section 95464(c)(3) sets forth requirements for a "fire or elevated wellhead temperature” but does not define "elevated”. If this is meant to mean any temperature greater than 62.8 degrees Celsius (145 degrees Fahrenheit), please clarify. (F_YSAQMD-5)

Agency Response:

No changes were made in response to this comment. This comment is out of scope of the 15-Day Notice because it refers to modifications made in the 45-Day Changes. However, CARB provides the following for informational purposes.

CARB did not set a specific standard for an elevated wellhead gas temperature in this subsection. This provides flexibility to consider multiple factors (e.g., temperature above the regulatory thresholds or what is normal at that well, a rapid increase, or visual and

odor indicators). Not defining what numerical value is associated with “elevated” is also consistent with similar provisions in federal rules that provide for exceptions to negative wellhead pressure for a “fire or increased well temperature”.[41]

3. Temperature

D.3-1 Carbon monoxide trigger for downwell temperature monitoring

Comment: Carbon monoxide (CO) is an important sign of combustion reactions. The amendment to section 95464(b)(6) to use 100 ppmv of CO as a trigger for downwell temperature monitoring is a responsible layer of protection against runaway elevated temperature reactions. (F_CAW-10) (F_GAIA-10)

Agency Response:

No changes were made in response to this comment. CARB appreciates the comments and thanks the commenters.

D.3-2 Lower temperature threshold and shorten time between monitoring intervals

Comment: We are deeply concerned about the following changes that CARB has proposed:

1. Downwell Monitoring Temperature Threshold: A threshold of 145°F remains dangerously high, and a six-month monitoring interval is far too infrequent. Conditions inside a landfill can change substantially from week to week. Temperatures above 131°F indicate that there is a problem and heat generating chemical reactions may be occurring. Landfills with downwell temperatures above 131°F need to be closely monitored, as temperatures can quickly increase once a chemical reaction has begun. We are seeing this at landfills across the state and we saw this at Chiquita, where temperatures continue to rise. Effective regulation requires proactive detection of thermal anomalies — not a reactive response after a crisis has already begun. We urge CARB to lower the 145°F threshold, and shorten the monitoring interval to reflect the urgency these situations demand. (F_GOAL-4)

Agency Response:

No changes were made in response to this comment. The threshold that triggers additional assessments, oxygen limitations, and – after 60 days – enhanced and downwell monitoring was maintained at 131 °F. This is designed to determine the actual temperature the well is exposed to (i.e., if corrective action is needed because the downwell measurement shows that the actual temperature exceeds 145 °F), inform the appropriate steps to ensure that temperatures are stabilized to avoid reaching the maximum limit of 145 °F, and ensure such exceedance is promptly detected.

Downwell monitoring can only be transitioned to a six-month interval if carbon monoxide is below 100 ppmv, and otherwise remains monthly, until temperatures are returned below 145 °F. Carbon monoxide is a standard parameter used to indicate the potential presence of a heat-generating chemical reaction and thus low carbon monoxide

[41] 40 C.F.R. § 60.34f(b).

provides evidence that such a reaction is likely not occurring and a less frequent measurement schedule is appropriate. As discussed in the 15-Day Notice, downwell temperature measurements typically require disconnecting the well from vacuum and/or removing the wellhead each time a measurement is taken, which may pose safety concerns and result in the release of landfill gas during the measurements. These changes appropriately balance the need to perform downwell monitoring with the objective of focusing more intensive monitoring where it is most needed to support safe and effective operation.

D.3-3 Align well temperature threshold limits with federal rules

Comment: §95464(d); §95469(e)(3)–(4): The LMR establishes multiple wellhead temperature thresholds (55 °C and 62.8 °C) with associated monitoring and corrective actions. Under 40 CFR 60 Subpart XXX §60.762(b)(2)(iv), landfills may elect to comply with 40 CFR 63 Subpart AAAA, which provides a single temperature standard and unified monitoring framework. The 15-day changes retain both thresholds without recognizing this federal opt-in provision. As a result, landfills electing Subpart AAAA must still comply with both thresholds, creating conflicting requirements. CARB should revise §95464(d) and §95469(e) to recognize the federal opt-in provision and allow compliance with a single temperature standard. (F_SMAQMD-1)

Comment: We strongly recommend that the final Regulation on Methane Emissions from Municipal Solid Waste Landfills be aligned and consistent with federal regulations 40 CFR 63 Subpart AAAA and 40 CFR 60 Subpart XXX. This alignment would improve landfill operator clarity and compliance with the requirements, as well as ease of implementation and enforcement by air districts. Examples of areas that are not aligned include:

…

e. Under 40 CFR 60 Subpart XXX §60.762(b)(2)(iv), qualifying municipal solid waste landfills may elect to comply with 40 CFR 63 Subpart AAAA in place of Subpart XXX's operational standards, compliance provisions and monitoring requirements. When a landfill exercises this opt-in provision, it becomes subject only to the equivalent Subpart AAAA requirements, including a single wellhead temperature standard and consistent monitoring obligations. This federal flexibility is designed to streamline compliance and eliminate duplicative or conflicting operational requirements. By incorporating both temperature standards without an opt-in provision —55 °C (40 CFR 60 Subpart XXX) and 62.8 °C (40 CFR 63 Subpart AAAA)—the updated LMR effectively eliminates the federal opt-in pathway for new or modified California landfills. Even when a landfill properly elects Subpart AAAA compliance under federal law, the state rule would continue to require adherence to both thresholds, defeating the purpose of the federal allowance and creating conflicting regulatory obligations. (F_SBCAPCD-4)

Comment:

Section 95469 (e)(3)

The 15-Day Changes to the LMR specifies assessment and/or correction action for landfill gas temperatures that exceed 55 degrees Celsius. In CARB's Notice, Number 84 provides rationale specific to this section of the 15-Day Changes to the LMR. Number 84 states "This change is consistent with federal regulations on well temperature". The RCDWR does believe that this statement is consistent with the federal regulations specified in 40 CFR Part 60

Subpart AAAA. Landfills that are subject to Subpart AAAA are required to perform corrective measures for temperature exceedances above 62.8 degrees Celsius.

Federal regulations have different landfill gas well temperature standards, depending on the status of the landfill. The RCDWR does not believe that it is accurate to broadly refer to federal regulations and apply a single landfill gas temperature threshold when differing federal regulations have differing landfill gas temperature standards.

RCDWR recommends that the LMR be updated such that the landfill gas temperature threshold and standard are the same, 62.8 degrees Celsius. This would match federal regulations for the larger, active landfills in California and would provide those landfill operators a less complicated operational pathway to compliance. (F_RCDWR-2)

Agency Response to Combined Comments:

No changes were made in response to these comments.

The Proposed Amendments set a temperature corrective standard of 145 °F, which is consistent with the Subpart AAAA standard.

As discussed in the ISOR, extensive discussions with academics, consultants, and regulators revealed agreement that wellhead temperatures between 131-145 °F can indicate that heat-generating chemical reactions may be occurring, and wellhead temperatures can significantly underestimate the actual temperature the well is exposed to. Staff chose to require collection system and cover integrity assessments and progressively limit oxygen beginning at 131 °F to stabilize temperatures and avoid reaching the maximum limit of 145 °F. Similarly, enhanced and downwell monitoring must begin sooner to inform appropriate preventative or corrective actions. For example, downwell monitoring provides prompt and actionable information for the operator to properly manage the wells, such as by revealing whether a reaction is occurring at a deep or shallow depth which can indicate whether to increase or reduce vacuum. These additional actions at a lower temperature are more stringent than the requirements in subpart AAAA, but do not conflict with them.

Item 84 in the 15-Day Notice “Summary of Proposed Modifications” describes the rationale for the specific change (interior wells) that was made in the 15-Day Changes in section 95469(e)(3), not the rationale for that section overall. That is consistent with all three federal rules on landfill gas control that were discussed throughout the ISOR and 15-Day Notice. The contention was not that the same actions are required at the same temperature thresholds.

D.3-4 Monitoring requirements are too prescriptive

Comment: WM remains concerned about requirements related to downwell temperature monitoring. While we think it is appropriate that the 15-Day changes rely on metrics other than solely temperature to govern the frequency of downwell temperature monitoring, our concerns about the extent of such monitoring required, from both a cost and a health and safety perspective, remain. The LMR takes an overly prescriptive approach to monitoring and reporting, which will create significant amounts of work for both operators and staff at the agencies responsible for enforcement. CARB has not provided sufficient justification for this prescriptive approach. Furthermore, the economic analysis does not fully account for the initial

expense and recurring maintenance costs for equipment that could be used to conduct downwell monitoring at the frequency required. (F_WM-5)

Agency Response:

No changes were made in response to this comment. Downwell measurements provide actionable data to observe and respond to changes in subsurface temperatures. For information about the importance of downwell monitoring, see the agency response in section IV.D.6-2. The comment regarding the cost analysis is out of scope of the 15-Day Notice because it does not refer to any changes proposed in that notice. For informational purposes regarding the cost analysis of proposed wellhead monitoring requirements, refer to ISOR Appendix B, chapter IV, section I.

D.3-5 LMR lacks a variance process for higher temperatures

Comment: WM remains concerned that the LMR prescribes significant investigative and corrective requirements following a wellhead detection above 131°F, which significantly deviates from existing practice and will bring in many more wells and landfills than are currently subject to federal enhanced monitoring. Most critically, the LMR continues to lack a variance process that recognizes that individual wells may operate above 145°F for greater than 120 days within normal average CH4/CO2 and hydrogen ratios, demonstrating there is neither a subsurface oxidation event nor a SET event. We urge CARB to provide landfill operators a reasonable compliance pathway for wells where it can be positively demonstrated that elevated temperatures are not a symptom of a larger issue. Failure to include such a provision could result in violations being issued to landfills with wells that are otherwise operating within normal parameters. (F_WM-4)

Agency Response:

No changes were made in response to this comment. Proper operation and maintenance of the GCCS, comprehensive monitoring, and early intervention in response to changing subsurface conditions are necessary for methane control and to limit the consequences for public health and safety that can result from severe and prolonged SET events. Setting explicit temperature limits and correction time periods appropriately incentivizes such actions. Temperatures above 145 °F are outside the normal operating range and present risks of damage to the GCCS and the potential for additional temperature increase.

The comment does not suggest how it can be demonstrated that the temperatures are not a symptom of a larger issue or likely to evolve into a more significant problem. For example, Krause et al. (2023)[42] recounts an example of a landfill in which elevated temperatures occurred initially without a decrease in methane or increase in carbon monoxide, yet over time the SET event expanded and caused failure of gas collection wells.

[42] Krause, M., Detwiler, N., Eades, W., Marro, D., Schwarber, A., & Thabet, T. (2023). Understanding landfill gas behavior at elevated temperature landfills. *Waste Manag.* Author manuscript; available in PMC 2024 June 15. *https://pmc.ncbi.nlm.nih.gov/articles/PMC10405139/pdf/nihms-1910907.pdf*.

4. Oxygen

D.4-1 Only include oxygen concentration limits on interior wells extending into refuse and having elevated temperatures over 131°F

Comment: Section 95469(e)(5): Wellhead Oxygen Monitoring

This subsection requires wellhead monitoring and remedial actions to reduce the oxygen content in “interior wells” to less than 5 percent. As stated in the Sanitation Districts’ November 10, 2025, comment letter, oxygen concentrations above 5 percent alone do not indicate a potential landfill fire or over-drafting. Landfill operators must balance gas collection system operations to maximize energy recovery while maintaining compliance. Overly restrictive oxygen limits would impose unnecessary burdens without providing environmental benefit.

For example, shallow interior wells within cover soils are designed to control surface emissions by applying a localized vacuum that draws air inward. These wells do not penetrate the refuse mass and may have higher oxygen concentrations due to their design and cover conditions. Air intrusion depends on these factors and cannot be fully prevented without reducing the effectiveness of emission controls.

In addition, the U.S. EPA recognized that this could be an issue; hence, they removed the operating standards for oxygen and nitrogen at gas collectors from the Municipal Solid Waste Landfills New Source Performance Standards (NSPS) and Emission Guidelines (EG), allowing operators to implement site-specific landfill gas control measures to limit surface emissions and control subsurface gas migration. Therefore, the Sanitation Districts strongly urge CARB to impose oxygen concentration limits only on interior wells that extend into refuse and have temperature readings above 131°F, rather than on all interior wells. This approach would focus on wells with actual issues and avoid unintended consequences to environmental protection. (F_LACSD-7)

Agency Response:

No changes were made in response to this comment. The Proposed Amendments recognize that operators must carefully balance the need to minimize surface emissions and odors without inducing air intrusion, as discussed in the ISOR. The Proposed Amendments do not require oxygen content to be brought below 5% unless temperatures are also elevated. Instead, assessments are required to investigate whether any issues with the collection system or cover integrity are contributing to those levels, and repairs are needed to address any issues found. CARB encourages operators to meet with staff to discuss site-specific details and design specifications of non-standard collector types.

5. Wellhead Parameter Trend Analysis

D.5-1 Additional monitoring should not be required in response to trends if the temperature and oxygen remain below absolute thresholds

Comment: Section 95469(e)(7)(A)-(B): Wellhead Parameter Trend Analysis

The Sanitation Districts acknowledge CARB’s intent to monitor interior gas wells for increasing temperature and oxygen trends that may indicate potential subsurface reactions. However,

triggers based solely on relative increases do not account for normal variability in landfill gas system operation. Factors such as atmospheric pressure changes, routine wellfield balancing, condensate accumulation or removal, and temporary operational adjustments can affect readings without indicating a subsurface reaction.

A 20°F increase in the interior well temperature or a 2% increase in oxygen may warrant evaluation. However, such increases do not necessarily indicate a subsurface reaction or require enhanced monitoring if the resulting temperature remains below 55°C (131°F) and no other abnormal landfill conditions are present. For example, U.S. EPA guidance (EPA/600/R-21/285) identifies a typical operating temperature range for landfill gas wells of approximately 90°F to 131°F.

The Sanitation Districts recommend that enhanced monitoring not be required when wellhead conditions remain within the normal operating range. If the interior well temperature remains below 55°C (131°F) and the oxygen concentration remains below 5 percent, subsequent monitoring should confirm whether the observed trends are sustained or temporary fluctuations. Confirming sustained trends would better distinguish between normal variability and potential subsurface reactions, ensuring enhanced monitoring and assessments are implemented only when warranted. (F_LACSD-8)

Agency Response:

No changes were made in response to this comment. As discussed in the ISOR, significant changes in wellhead parameters can be an indication of instability or damage that is worth investigating to allow for timely intervention to prevent increased emissions, GCCS downtime, or other operational complications before absolute thresholds are exceeded. Weekly enhanced monitoring in response to a significant rapid change in temperature is required so that if the rapid trend continues and surpasses the temperature thresholds, or carbon monoxide concentration rises, it will be detected promptly. The assessments in response to a significant and sustained increase in oxygen content (e.g., from 2% to above 4%) are required because such a change could indicate that a leak has formed.

6. Carbon Monoxide

D.6-1 Allow alternative carbon monoxide wellhead monitoring methods

Comment:

Section 95471(o)(5): Monitor and Determine Carbon Monoxide Concentrations

This subsection outlines sampling procedures and identifies U.S. EPA alternative methods for measuring carbon monoxide concentrations at landfill gas wellheads. In addition to the listed methods (e.g., U.S. EPA ALT- 144 and U.S. EPA ALT-145), other alternatives, such as U.S. EPA ALT-143, can achieve the same monitoring objectives. The Sanitation Districts recommend that CARB expand this subsection to include additional applicable alternative methods, such as U.S. EPA ALT-143. (F_LACSD-11)

Comment:

CO Measurement Methods (§ 95471(o)(C) & (D))

We encourage CARB to add provisions for the use of colorimetric (e.g., Draeger, etc.) tubes to measure carbon monoxide concentrations in the field. Colorimetric detection tubes such as Draeger tubes are widely used throughout the landfill industry as screening-level diagnostic tools for evaluating subsurface conditions and guiding operational decisions. In addition, colorimetric tubes are quick to use and provide data “on the spot”. Immediate field data availability allows field and management teams to evaluate and make direct operational decisions, which is particularly important when evaluating elevated temperature conditions or potential subsurface oxidation indicators.
Directionally accurate and immediately available data should be preferred over “perfect” data that can slow decision-making.

Operational Impact: Draeger tubes provide immediate, cost-effective field results. Transitioning to gas chromograph will likely require third-party lab analysis or expensive on-site equipment, increasing costs and, more importantly, delaying response times.

Recommendation: CARB should explicitly add provisions to allow the use of colorimetric tubes as an acceptable screening-level carbon monoxide monitoring method for landfill gas. (F_RS-6)

Agency Response to Combined Comments:

No changes were made in response to these comments. Staff’s understanding is that colorimetric tubes and portable gas analyzers (e.g., EPA ALT-143) methods for measurements of carbon monoxide are prone to error through either moisture effects (landfill gas is typically very humid) or interference from other species that may be present in landfill gas. Staff was unable to obtain comparative data demonstrating their accuracy, reliability under a range of conditions and gas compositions, and equivalence to the proposed methods. See the agency response in section IV.D.5-1 for more information.

D.6-2 Reduce frequency of carbon monoxide monitoring; do not impose penalties while operator is in good faith attempting to lower subsurface temperature

Comment:

High Temperature/CO Wells (§ 94569(d)(3)(C) and (e)(4)(E) & (F))

Regarding Section 94569(d)(3)(C), we recognize the intent of CARB wishing to see additional data on warmer wells, but if a well is warm due to biological or abiotic conditions and the heat is not the result of a subsurface oxidation (SSO), collecting additional carbon monoxide readings weekly is not useful. Carbon monoxide is a byproduct of early-stage methanogenesis and it is commonly found in warm and elevated temperature landfill gas when methane concentration is low, carbon dioxide is elevated, and hydrogen is present. If those conditions are present, while the presence and concentrations of CO may be interesting or a point of curiosity, monthly data are not useful in terms of guiding the management of the well. Therefore, we propose that if a warm or elevated temperature condition is not the result of an SSO, that CO monitoring be required weekly for 4 events in order to provide baseline data, and that semi-annual readings be taken thereafter to provide a more useful body of data. Daily

civil penalties should not be assessed on a “no fault” basis when the operator cannot feasibly correct the high temperature condition.

- Inability to Correct Some High-Temperature Wells. Not all high-temperature wells can be brought below the 145-degree threshold. High temperature conditions can be caused by a variety of factors beyond the operator’s reasonable control, which cannot be feasibly corrected, including abiotic heat generation due to waste composition, and biologically produced heat due to normal waste degradation mechanics. The corrective action required in these circumstances should be to encourage the operators to increase heat removal via gas and liquid extraction from the waste mass. The collection of additional data on a frequency that does not enhance decision-making processes only serves to divert resources from the task that should be front-and-center, which is gas and, if present, liquid removal to reduce the buildup of heat within the waste mass.

  It is also important to note that if warm or elevated temperature conditions exist, even with aggressive heat removal efforts, those warm conditions are likely to persist for years (up to 15 to 20 years as reported for some landfills). This further highlights that unnecessarily frequent data collection only results in a multitude of data that will not shorten the duration of the situation, nor drive a different result.

- Furthermore, for wells with high temperatures as defined in the regulation, there is a logical inconsistency between subsections E and F that needs clarification. Subsection (E) suggests it is a violation if a well over 145° F cannot be corrected, period. However, Subsection (F) triggers a violation if corrective action for a well over 170°F is not completed within 15 days. What happens if corrective action is initiated when temperatures are over 145°F or 170°F but the efforts prove unsuccessful? Is the operator in violation despite a good-faith effort to correct the issue?

Recommendation: If a warm or elevated temperature condition is not the result of an SSO, CO monitoring should be required weekly for 4 events in order to provide baseline data. Semi-annual readings should be taken thereafter. Also, civil penalties should not be assessed for conditions beyond an operator’s reasonable control. This "strict liability" approach for subsurface conditions is punitive and fails to account for the technical realities of landfill gas management. So long as an operator is timely performing good faith efforts to correct a well’s high temperature, a violation with resulting daily civil penalties should not be assessed. Otherwise, an operator could be placed in a state of perpetual non-compliance with the regulation, with no ability to correct the violation. This would raise serious legal concerns regarding fundamental fairness, a lack of due process, and the imposition of excessive fines and penalties. (F_RS-3)

Agency Response:

No changes were made in response to this comment. Carbon monoxide is generated by exothermic reactions in landfills and has long been used as a reaction indicator as only

low concentrations have been measured in landfill gas within the normal temperature range.[43]

The commenter suggests reducing the frequency of carbon monoxide monitoring if the SET event is determined not to be due to subsurface oxidation, but does not recommend a method to make such determination and does not provide alternative monitoring parameters for consideration.

In response to the request for clarification of subsections (E) and (F) in section 95469(e)(4), subsection (E) establishes that a violation has occurred if corrective actions are not completed and the well returned below 145 °F within 120 days. Subsection (F) specifies the actions and corresponding timelines when temperature is 170 °F or above and the carbon monoxide concentration is greater than or equal to 1,000 ppmv, and establishes that a violation has occurred if corrective actions are not completed within 15 days.

See the agency response in section IV.D.4-2 for more information regarding requests for alternative monitoring requirements. For more information regarding the need for explicit temperature limits and correction time periods, see the agency response in section V.D.3-5.

In cases of non-compliance, civil penalties are assessed based on the facts of the case and consistent with *CARB's Enforcement Policy* and applicable Health and Safety Code provisions. CARB has a process in place that provides due process should a violation occur, which is identified in CARB's Enforcement Policy. Penalties may be assessed under strict liability but could also fall into different categories depending on aggravating or mitigating facts. The penalty amounts were defined by statute by the Legislature and are proportional depending on the gravity of the case, taking into consideration multiple factors, as explained in CARB's Enforcement Policy. There is not enough specificity to respond to the commenter's inquiry on future hypothetical violations as each case is fact specific. Further discussion on potential future noncompliance and hypothetical penalties is beyond the scope of this rulemaking.

7. Other Wellhead Comments

D.7-1 Align conditional shutdown provisions with NESHAP

Comment: 95464(d): WM urges CARB to align conditional shutdown provisions with NESHAP by requiring operation for 15 years in total and reducing SEM history from three years to one year. (F_WM-10)

Agency Response:

No changes were made in response to this comment. Permanently shutting down the GCCS means the loss of active methane control from any gas that continues to be generated. Therefore, a long-term record of SEM compliance is needed to demonstrate

[43] Krause, M., Detwiler, N., Eades, W., Marro, D., Schwarber, A., & Thabet, T. (2023). Understanding landfill gas behavior at elevated temperature landfills. *Waste Manag.* Author manuscript; available in PMC 2024 June 15. *https://pmc.ncbi.nlm.nih.gov/articles/PMC10405139/pdf/nihms-1910907.pdf*.

that the final cover is robust and provide confidence that exceedances are less likely to occur when the GCCS is shut down. One year is insufficient to establish a reliable record, especially because closed landfills may qualify for a relaxed SEM frequency (once every three quarters). The requirement to demonstrate three years with no exceedances ensures that landfills will have at least one monitoring event in each season included in that historical record.

The comment regarding 15 years of operation is out of the scope of the 15-Day Notice because it does not refer to any changes proposed in that notice. For informational purposes, CARB provides the following.

As discussed in the ISOR, landfills continue to generate gas after ceasing waste acceptance, typically for many decades. The length of time that the GCCS has been operational has little bearing on whether that system needs to continue to operate. Requiring operation for 15 years after last accepting waste, helps ensure that gas generated from waste in place is being captured. Note that staff is not aware of any landfill requests to permanently shut down the GCCS less than 15 years after closure. In contrast, many landfills are projected to continue to generate substantial quantities of gas and require a GCCS to comply with the LMR—and other federal, state, or local requirements—for several decades after closure, depending on size and other factors.

D.7-2 Non standard to have landfill gas system operations and maintenance manual

Comment: 95469(e)(4)(D): It is not standard industry practice for a landfill to have a landfill gas system operations and maintenance manual. (F_WM-16)

Agency Response:

No changes were made in response to this comment. The commenter appears to be suggesting that operators do not generally have written procedures and plans for how to operate and monitor the gas collection and control system. This is contrary to CARB's understanding, especially given the feedback CARB has received from operators regarding the unique design and safety considerations of each landfill, and the importance of avoiding one-size-fits-all requirements. Nevertheless, the added language does not require an owner or operator to write such procedures where they do not already exist.

D.7-3 Revert changes to liquid level monitoring requirements

Comment:

Weakening Monitoring for Liquid Levels Will Harm Gas Collection Performance

CARB's proposed change to require operators to monitor for liquid levels at just once a year instead of twice a year makes California's standard much weaker than Michigan's 2023 statute:

"Except as provided in this subsection, the liquid level in each well shall be monitored at least semi-annually. If for 2 consecutive monitoring events the liquid level in a well exceeds 50% but does not exceed 75% of the screened interval length, the owner or

operator shall submit to the department for review a liquids removal evaluation and corrective action report for the well, unless the well has a functional, operated liquid pump. If the liquid level in a well exceeds 75% of the screened interval length during a monitoring event, then the liquid level monitoring frequency for that well shall be increased to quarterly. If the liquid level in a well exceeds 75% of the screened interval length for 2 consecutive monitoring events, the owner or operator of the landfill shall install a liquids pump, unless the department approves an alternative corrective action plan. If the liquid level in a well did not exceed 50% for the immediately preceding 2 consecutive monitoring events, the owner or operator may petition the department for a decreased monitoring frequency. However, decreased monitoring shall be conducted at least annually. For the purposes of the petition, the 2 consecutive monitoring events may include monitoring conducted before the effective date of the amendatory act that added this section."

Waiting a full year to detect elevated liquid levels delays corrective action, increasing methane emissions. Single annual measurements are not representative, and landfills are heterogeneous and dynamic systems, where gas conditions can vary significantly over short distances and time periods.

While California may have lower average rainfall than Michigan, landfill liquid levels are not controlled by precipitation alone. Condensate formation, waste decomposition, and operational practices such as leachate recirculation are major drivers of liquid accumulation. These processes occur regardless of climate. Liquids can rapidly impair gas collection efficiency and increase methane emissions. Therefore, reducing monitoring to once per year would delay detection of elevated liquid levels, increasing the likelihood of prolonged system underperformance and emissions. We urge CARB to refrain from weakening liquid level monitoring. (F_FCF-2)

Agency Response:

No changes were made in response to this comment. As discussed in the 15-Day Notice, staff proposed the changes referenced in the comment in recognition of the fact that performing liquid level monitoring typically requires temporarily disconnecting the well from vacuum and/or removing the wellhead each time a measurement is taken, which may pose safety concerns and result in the release of landfill gas. Performing a single annual measurement in the typical wet season maintains the overall goal of monitoring liquid levels to ensure effective functionality of the collection system, while avoiding an additional monitoring event at wells that have low liquids.

Note that quarterly measurements are required at wells where a liquid level exceedance is measured, and collection system assessments involve checking for watered-in wells (as discussed further in the agency response in section IV.D.5-3). Reporting on liquid level measurements will help CARB staff better understand how liquid levels may change throughout the year and could help inform future policy design.

E. Gas Collection and Control System Installation

1. Design Plans

E.1-1 Create interim concurrence milestones or implementation mechanism

Comment: {CARB staff note: Commenter quoted 15-Day Changes text of section 95464(a)(2).}

Waste Connections supports the realism of the 180 days review period, but requests either interim concurrence milestones or a mechanism for partial/priority implementation while review is pending. (F_WCN-2)

Comment: {CARB staff note: Commenter quoted 15-Day Changes text of section 95464(a)(2).}

The County supports the realism of the 180 days review period, but requests either interim concurrence milestones or a mechanism for partial/priority implementation while review is pending. (F_YoloCo-2)

Agency Response to Combined Comments:

No changes were made in response to these comments. The timeline for an owner or operator to install a GCCS begins upon approval of the design plan. Therefore, extending the review period does not reduce the amount of time that owners or operators have to install the GCCS such that interim milestones or priority implementation would be necessary.

2. Timeline for GGCS Installation

E.2-1 For new systems, 12 months is not enough time to fully install

Comment:

{CARB staff note: Commenters quoted 15-Day Changes text of section 95464(a)(3).}

While we support the extension of the timeframe to install the approved systems, 12 months is still a fairly short timeframe to install a complete system from the beginning. For situations where the approval is for an expansion, or upgrade of an existing system, 12 months seems reasonable. (F_WCN-3) (F_YoloCo-3)

Agency Response to Combined Comments:

No changes were made in response to these comments. A 12-month installation period is achievable and will significantly reduce methane emissions by ensuring that gas collection and control begins as soon as feasible. Operators may request additional time allowance to comply with measures in section 95464 pursuant to section 95468.

Please note that this 12-month timeline applies to initial installation of a gas collection and control system at an uncontrolled landfill, not expansions of existing systems.

E.2-2 Clarify requirements for uncontrolled landfills over the heat input capacity threshold

Comment:

Requirements with Sub-Requirements That Obfuscate Implementation

- 95463(b)(2)(B) – Requires "If the landfill gas heat input capacity is greater than or equal to 3.0 MMBtu/hr recovered that the owner or operator" demonstrate that "after four consecutive quarterly monitoring periods there is no measured concentration of methane of 200 parts per million by volume (ppmv) or greater using the instantaneous surface monitoring procedures specified in sections 95471(c)(1) and 95471(c)(2), including monitoring performed in response to a remotely detected emission plume pursuant to section 95469(b)(3) or during compliance inspections. Based on the monitoring results, the owner or operator shall do one of the following: …"
    - The structure of this requirement's phrasing is unclear to interpret, implement, and/or enforce, since the 95463(b)(2)(B) provision refers to demonstrating "*after* (emphasis included) four consecutive quarterly" with less than 200 ppmv of methane instantaneous surface monitoring (ISM) readings occur. Where 95463(b)(2)(B)1., 2., and 3. are sub-requirements "based on the monitoring results," but it is unclear which "monitoring results" the requirement is referring to, whether it refers to monitoring results conducted during the attempt to demonstrate the four consecutive quarters with less than 200 ppmv of methane ISM, or only "after four consecutive" quarters demonstrating less than 200 ppmv of methane ISM as a follow-up, etc. The language is not clear on which results are subject to 95463(b)(2)(B)1., 2., and 3 sub-requirements and, thus, it is unclear when the requirement threshold is triggered and when it is satisfied. (F_South Coast AQMD-11)

Agency Response:

No changes were made in response to this comment. This comment is out of the scope of the Proposed Amendments because it refers to requirements in the current Regulation that were not proposed to be modified in the 45-Day Notice or 15-Day Notice. For informational purposes, CARB provides the following.

The structure of section 95463(b)(2)(B) provides for the ongoing demonstration that there is no measured concentration of methane greater than 200 ppmv from the surface of an uncontrolled and active landfill that has exceeded the heat input capacity threshold. If the surface demonstration is not successful, the owner or operator must install a GCCS. If the surface demonstration is successful, the owner or operator remains subject to section 95463(b), and therefore must annually recalculate the HIC, perform the surface demonstration, and submit the required annual report. Upon closure, provided that the surface demonstration was successful and all reporting obligations are met, the requirements are fulfilled and the regulation no longer applies.

3. Early Gas Collection in Areas of New Waste Deposition

E.3-1 Reduce gas collector installation period for new waste placement areas

Comment: These … changes significantly weaken the Landfill Methane Regulation's ability to protect people and the planet from fugitive emissions.

1. Extended 180 day and 30 foot timeline for the installation of gas collection system

The initial draft regulation set a strong standard for well installation in areas of new waste placement. In section 95464(a)(5), it stated that horizontal collection wells must be placed in areas of new waste placement for large landfills. These horizontal wells installed right from the start ensure thorough capture of landfill gas as the waste begins undergoing rapidly accelerating anaerobic decomposition.

The Proposed Amendments instead state that any kind of well may be installed, and operators have 180 days to do so. Additionally, gas collection does not need to begin until 30 feet of waste have been added. This allows a significant amount of emissions to escape the working face. Anaerobic decomposition, although not yet at its peak, begins well before these 180 days and can start emitting through the working face. In areas of new waste placement, there is no impenetrable cap to prevent fresh landfill gas' escape to the atmosphere. This amended timeline allows the active face to release significant emissions and should be shortened to 90 days. (F_CAW-2) (F_GAIA-2)

Agency Response to Combined Comments:

No changes were made in response to these comments. The changes referred to in these comments are necessary to ensure operational feasibility at all landfills subject to early gas collection requirements by providing appropriate flexibility for site-specific considerations while still achieving gas collection earlier in areas of new waste placement. The changes help ensure that gas collection begins promptly after anaerobic conditions have been established and sufficient waste is placed to minimize ambient air intrusion.

E.3-2 Adjustments to gas collection requirement in areas of new waste placement do not provide adequate flexibility

Comment:

Gas Collection and Control System Requirements – Working Face

While CARB has made revisions to increase waste depth thresholds and add methane concentration triggers, the provision continues to require installation of specific gas collection infrastructure in active disposal areas. In addition, the interaction between this requirement and provisions governing wells that are temporarily offline creates operational uncertainty, particularly with respect to monitoring expectations at the active working face when wells are down. As previously noted, installation and operation of gas collection infrastructure in active working areas presents ongoing safety risks and operational challenges. (F_Recology-2)

Agency Response:

No changes were made in response to this comment. The modifications in the 15-Day Changes allow any type of active gas collection infrastructure to be installed. By providing a 180-day period after initial waste placement in the area before gas collection infrastructure must be in place, the owner or operator has the flexibility to either use gas collectors that can be safely and effectively operated while disposal is ongoing or move the location where disposal is occurring to allow for gas infrastructure installation in those areas.

There is no uncertainty introduced regarding wells temporarily offline. The gas collectors required to be installed and monitored for this provision are not considered temporarily offline wells if they have not yet been operated. When disposal occurs in an area where gas collectors were previously installed and operated, the wells may be disconnected to perform well raising pursuant to section 95464(e)(4).

F. Gas Collection and Control System Operation

1. Gas Collection and Control System Downtime

F.1-1 Clarify if events are included or excluded from yearly shutdown calculation

Comment: Section 95464 (b)(1)(A)2.

The 15-Day Changes to the LMR specifies that certain events are not subject to enforcement action. It is unclear to RCDWR if this means that these events do not count towards the downtime calendar year hour maximums or if these events should be excluded from such calculations.

RCDWR recommends that this section be modified to clarify whether these events are included or excluded from the yearly shutdown calculation. (F_RCDWR-2)

Agency Response:

No changes were made in response to this comment. The owner or operator is required to take action to minimize GCCS downtime that results from utility power outages and catastrophic events; section 95464(b)(1)(A)2. clarifies that enforcement action will not be taken provided that the occurrence is beyond the control of the owner or operator, and that efforts to resume operation of the gas collection and control system are initiated and completed to minimize downtime. The specific phrasing used is intended to convey that all downtime is initially counted, but downtime during a power outage or downtime due to a catastrophic event would subsequently be excluded from the downtime that counts toward the annual limit for purposes of compliance determination. By stating that those events are not subject to enforcement action, any portion of qualifying downtime effectively does not count toward the downtime hours limit.

F.1-2 Extend gas control system downtime limit to 240 hours for all landfills

Comment: 95464(b)(1)(1)(2): WM appreciates the exclusion of downtime due to catastrophic events beyond the control of landfill operators but urge CARB to raise the calendar year

downtime limit to 240 hours for all landfills no matter the annual GCCS methane collection volume. (F_WM-8)

Agency Response:

No changes were made in response to this comment. Retaining the lower downtime limit of 120 hours for sites with high gas collection quantities is necessary to reflect the significant difference in the magnitude of potential emissions resulting from downtime at sites generating lower quantities of gas compared to sites generating higher quantities of gas (refer to the analysis described in item 16 in the 15-Day Notice "Summary of Proposed Modifications").

F.1-3 Do not relax the 120-hour downtime limit

Comment: Gas Collection System Downtime: Categorical exemptions from downtime requirements undermine the core purpose of this regulation by allowing methane and other pollutants to go unchecked. Exemptions that allow operators to side step collection requirements — even temporarily — create windows of uncontrolled emissions that directly harm surrounding communities. Downtime, even for a few days, can be detrimental to neighboring residents. We must strive for minimal downtime. Chiquita Canyon Landfill notoriously has planned maintenance and downtime of equipment on weekends and holidays, but pollution doesn't adhere to a clock or calendar. Why should facilities that have already demonstrated an inability to operate responsibly be rewarded with more time and fewer consequences? Flexibility provisions must not come at the cost of accountability. (F_GOAL-6)

Comment: Large downtime allowances inconsistent with Federal rules

The Federal regulation for landfill gas emissions, along with accompanying case law, clearly disallow broad downtime allowances, except in the case of uncontrollable circumstances such as natural disasters. Therefore, allowances of 120 and 240 hours for GCCS downtime in section 95464 (b)(1)(A) of the California rule actually set a lower bar than the Federal standard. Other parts of the regulation already allow flexibility where it is reasonable, and the section where these allowances are described already allows for downtime outside of the control of the operator. Adding another 120 hours of downtime allows an unacceptable amount of fugitive emissions to harm communities and the environment. Instead, CARB should allow a case-by-case review for downtime requests beyond the uncontrollable conditions described in section 95464 (b)(1)(A).

Additionally, the threshold for the higher 240 hour limit is based on methane collection mass. This means that landfills that are leaking or combusting methane through a subsurface elevated temperature reaction may actually fall back into a bracket with higher downtime allowances. The presence of a subsurface elevated temperature reaction should be factored into any methane tonnage threshold for enforcement. (F_CAW-5) (F_GAIA-5)

Comment:

CARB impermissibly included provisions for GCCS downtime that are less stringent than federal standards and must revise.

The Clean Air Act, allows states to adopt alternative pollution standards or limitations and may also establish rules more stringent than the federal rules. However, states are not allowed to adopt less stringent standards than the federal requirements.3 Thus, CARB's LMR, which is

the 111(d) Plan they submit to EPA for approval, is subject to the minimum standards of the Clean Air Act, in this instance, the Emission Guidelines in 40 C.F.R. Part 60, Subpart Cf.

2016 revisions to the federal standards to remove startup, shutdown and malfunction provisions

In 2016, EPA revised the Emission Guidelines in Subpart WWW by replacing them with 40 C.F.R. Part 60, Subpart Cf. 40 C.F.R. § 60.763(f) requires that the control system be operated at all times when gas is routed to the system. The previous Subpart WWW requirements allowed MSW landfill operators an allowance of five days (120 hours) and one hour for GCCS downtime events to avoid enforcement action for violations. However, in responding to comments requesting that the five day (120 hour) exemption be retained, EPA responded that they were not reinstating the exemption because “the provision provides an exemption from compliance with the standard during SSM periods, which the EPA does not have the authority to do under the reasoning of the Sierra Club decision.”

The Sierra Club decision referenced is also explained by EPA in response to comments: in 2008, the D.C. Circuit Court held that startup, shutdown and malfunction (SSM) provisions were unlawful. Therefore, because these SSM provisions were vacated, EPA did not include in the 2016 revisions to the Emission Guidelines the five day (120 hour) exemptions for GCCS downtime.

The current status of SSM provisions

Since the 2008 Sierra Club decision, issues related to SSM have been litigated. {Footnote: For example, the D.C. Circuit Court also rejected affirmative defense provisions that EPA intended to shield alleged violators of the Clean Air Act from liability for “certain emissions violations caused by ‘unavoidable’ malfunctions. *United States Sugar Corp. v. Env't Prot. Agency*, 830 F.3d 579, 607 (D.C. Cir.), *on reh'g en banc*, 671 F. App'x 822 (D.C. Cir. 2016), and *on reh'g en banc in part*, 671 F. App'x 824 (D.C. Cir. 2016).} EPA has also put out guidance that has shifted over the past two Presidential Administrations. {Footnote: In 2015, EPA issued a SIP action that set out EPA policy on SSM exemption provisions and affirmative defense SDIP provisions. State Implementation Plans: Response to Petition for Rulemaking; Restatement and Update of EPA's SSM Policy Applicable to SIPs; Findings of Substantial Inadequacy; and SIP Calls To Amend Provisions Applying to Excess Emissions During Periods of Startup, Shutdown and Malfunction, 80 Fed. Reg. 33840 (June 12, 2015). Then in 2020 the EPA issued a Memorandum to replace the 2015 SIP policy statements.} However, the current policy of EPA is that SSM exemptions and affirmative defense State Implementation Plan provisions will generally be viewed as inconsistent with Clean Air Act requirements. Additionally, under the U.S. Sugar decision, the D.C. Circuit affirmed that EPA may also set emission standards that do not factor emissions that occur during periods of malfunction, without disturbing any possible affirmative defenses that operators may have related to malfunction events. Finally, in 2025 the D.C. Circuit Court also held that a complete affirmative defense to liability does not render an emission limitation non-continuous and thus are not impermissible, as EPA argued.

CARB must revise the LMR to remove the unlawful SSM exemption.

In the proposed LMR in Subsection 95464(b)(1) and (2)(a)-(b) CARB appears to retain the requirements that EPA removed in Subpart Cf in the 2016 revisions to the Emission Guidelines. In the Public Notice, CARB explains that:

[S]taff proposes to specify that control system downtime for utility power outages and catastrophic events outside the owner or operator's control are not subject to enforcement action so long as efforts are taken to minimize the downtime, and increase the downtime limit to 240 hours per year for gas collection and control systems that collected less than 12,000 metric tons of methane per year for all of the prior three years. For the GCCS owners or operators subject to the 240-hour limit, staff also proposes to add that no single downtime instance can last longer than 120 consecutive hours[…] The allowances for circumstances beyond the owner or operator's control are necessary because they can cause downtime that is not the result of poor planning, inadequate maintenance, or other issues within the control of the owner or operator. Not excluding these events could mean that owners or operators would need to install backup power to remain compliant in case of a utility outage (such as Public Safety Power Shutoffs or weather-related damage to utility poles, transmission lines, and substations), which was not considered as a compliance response in the analyses in the ISOR.

For the reasons explained by EPA in the 2016 revisions to the Emission Guidelines, allowing a 120 hour exemption in the LMR is an impermissibly weaker standard than in the federal requirements. Therefore, CARB must revise this section to align with the federal standards. Alternatively, if CARB thinks the additional language included in this section somehow addresses this flaw, we urge CARB to explain their reasoning. (F_FCF-3)

Agency Response to Combined Comments:

No changes were made in response to these comments. Though federal rules do not explicitly provide a numerical limit, they do recognize that downtime can occur[44] and include requirements for stopping flow of gas from the collection system to the control system, and in the case of NESHAP keeping the downtime to a minimum. Setting a specific, numerical limit provides better enforceability and will be more effective at reducing downtime than a general requirement to minimize downtime. The rationale and supporting analysis for increasing the limit to 240 hours at landfills with lower annual methane collection was provided as item 16 in the 15-Day Notice "Summary of Proposed Modifications."

Comment F_FCF-3 refers to 40 C.F.R. § 60.763(f), which requires the control system to operate at all times where the collected gas is routed to the system. Under 40 C.F.R. § 60.763(e), if the collection or control system is not operating, the gas mover must be shut down and all valves closed within one hour to prevent venting.[45] Together, these provisions prohibit operating the gas collection system in a way that vents collected gas to the atmosphere rather than directing it to a control device. The Proposed Amendments contain the same requirement to shut down the collection system within one hour of the control system not operating, consistent with the cited federal rule.

The cited startup, shutdown, and malfunction (SSM) cases relate to U.S. EPA action under the federal Clean Air Act, and this is an evolving area of law. LMR, by contrast, is a state regulation authorized under state law to reduce methane, and the requirements are consistent with U.S. EPA's Emission Guidelines as described above. The narrow

[44] 40 C.F.R. § 60.763(e); 40 C.F.R. § 60.34f(e); 40 C.F.R. § 63.1958(e)(1).

[45] The same requirements appear in the Emission Guidelines, 40 CFR § 60.34f(e) and (f).

system downtime provisions address system operation requirements rather than specific emissions standards.

F.1-4 Reduce scope of duration of gas control system downtime limits

Comment: The proposed changes to section 95464(b)(l)(A)(2) introduce a relaxation of the requirement to continuously operate the gas control system by providing for 120 or 240 hours of annual downtime for gas control systems, up to unlimited downtime in the event of a power outage. Even short-term downtime of a gas control system is likely to result in surface emissions. Gas control systems are control devices that need to remain functional regardless of the reliability of utility power. It is common for stationary sources with control devices to be required to operate the control device anytime a process is in operation and make provisions for backup power in the event that a process cannot be shutdown. Additionally, the downtime allowance leaves a loophole for facilities with multiple control devices that should be closed. For example, a facility that collects 1500 cfm gas may have 3 x 500 cfm control devices. Under the proposed amendments operation of at least one control device which would not be effective gas collection, would not count against the 120 (or 240) hour limit because the gas control system is functioning partially, even if not effectively. The District recommends requiring continuous operation of the gas control devices at a facility (based upon the total landfill gas generation capacity), with small hourly downtime allowances for maintenance, repair, and testing of gas control devices. (F_YSAQMD-3)

Agency Response:

No changes were made in response to this comment. The Proposed Amendments do not allow for unlimited control system downtime but instead provide clarity regarding responsibility for situations that are not the result of poor planning, inadequate maintenance, or other issues within the operator's control, as described in the 15-Day Notice.

Operating a GCCS with insufficient capacity to control all collected gas may constitute a failure to comply with section 95464(a)(6) in the current Regulation and section 95464(a)(8) the Proposed Amendments, which specify that the gas collection system must be operated and maintained in accordance with the Design Plan.

F.1-5 Well raising downtime allowance inconsistent with federal rules

Comment: We strongly recommend that the final Regulation on Methane Emissions from Municipal Solid Waste Landfills be aligned and consistent with federal regulations 40 CFR 63 Subpart AAAA and 40 CFR 60 Subpart XXX. This alignment would improve landfill operator clarity and compliance with the requirements, as well as ease of implementation and enforcement by air districts. Examples of areas that are not aligned include:

…

d. 40 CFR 63 Subpart AAAA and 40 CFR 60 Subpart XXX do not have equivalent provision for allowing the gas collection system to be disconnected for well raising as identified in § 95464 (e)(4). (F_SBCAPCD-3)

Agency Response:

No changes were made in response to this comment. Setting a specific, numerical limit improves enforceability and will be more effective at reducing downtime than a general requirement to minimize downtime. Further, because federal rules do not require a collection system to be operated in an area until solid waste has been in place for five years if active, or two years if closed, the Proposed Amendments are more stringent by requiring the collection system to be expanded into areas with new waste much sooner.[46]

F.1-6 Clarify requirements for wells offline simultaneously

Comment: {CARB staff note: The comment below was attached to section 95464(e)(3) of the 15-Day Changes. It refers to the limit on the number of wells offline simultaneously and the comment is specifically referring to the language "[n]o more than 10 wells are offline simultaneously, only counting wells that are offline in excess of 24 hours."}

Consider revising this language, it is confusing. (F_SBCAPCD-12)

Agency Response:

No changes were made in response to this comment. The commenter has not provided an explanation of what they find to be confusing in the cited subsection. Section 95464(e)(3) clearly states that wells that are returned to operation within 24 hours of being removed from operation do not count toward the 10 well limit.

F.1-7 Oppose 24-hour specification in limit on wells offline simultaneously

Comment: In section 95464(e)(3), the amended regulations exempt wells shut down for repair, construction, or catastrophic events from all of the meaningful GCCS requirements, as long as no more than 10 wells are down simultaneously, only counting wells that are down for more than 24 hours, among other requirements.

This appears to open a loophole wherein operators may turn off unlimited amounts of wells for a rolling sub-24 hour window. Half of the collection devices could be shut down for 23 hours, then turned back on as the other half are shut down for the next 23 hours.

This allows too much room for abuse. The additional recording requirements for well disconnection in 95464(e)(5) are a notable check against this weakness, but an effective regulation can not rely on an enforcement officer combing through every line of operational history and choosing to pursue enforcement against an subjective abuse of the rules. (F_CAW-3) (F_GAIA-3)

[46] This outcome is recognized in the "California Regulatory Scenario" published by U.S. EPA to estimate and view landfill management results based on California regulatory requirements. See Exhibit 6-10: *U.S. EPA (2023, December) Documentation for Greenhouse Gas Emission and Energy Factors Used in the Waste Reduction Model (WARM): Management Practices Chapters. EPA-530-R-23-018.*

Comment:

Compliance Flexibility Provisions: Several proposed changes — including provisions allowing operators to reset compliance deadlines and submit required information on extended timelines — function as loopholes that benefit landfill operators at the expense of communities. Chiquita Canyon has shown over and over again that if there is a loophole, they will use it. Section § 95464. Gas Collection and Control System Requirements states, “No more than 10 wells are offline simultaneously, only counting wells that are offline in excess of 24 hours. Wells that are shut down to prevent or extinguish fire and permanently decommissioned wells do not count toward this limit.”

The 24-hour exemption in § 95464 creates a regulatory loophole that undermines the intent of continuous gas collection and community protection. (F_GOAL-5)

Agency Response to Combined Comments:

No changes were made in response to these comments. Specifying that this limit only applies to wells that are offline for more than 24 hours was necessary to allow for shutdowns of less than one day that may be occasionally needed to install, repair, or replace a major collection system component (such as a header that supplies vacuum to multiple wells). It also ensures that staff can evaluate compliance using reported data that only includes shutdowns exceeding 24 hours.

Operators do not have an incentive to operate in the manner suggested in comments F_CAW-3 and F_GAIA-3. First, wells can only be disconnected for an allowable reason set forth in section 95464(e) of the Proposed Amendments. The limit to the number of wells offline simultaneously layers on top of existing limitations to disconnecting wells – it does not create a new allowance for disconnection. Second, the LMR contains multiple provisions that would prevent such a practice, for example, disconnecting wells in this manner would likely lead to excess surface emissions detectable by remote monitoring instruments or in surface emissions monitoring activities, and would likely constitute a failure to maintain and operate the GCCS as designed. Third, it could result in non-compliance with other (non-LMR) regulatory requirements, such as requirements to control subsurface gas migration or protect water quality. And finally, the scenario presented where wells are being connected to vacuum for just one hour a day would likely be more inconvenient for operators than simply operating the wells or disconnecting a lower number of wells.

F.1-8 Limit on wells offline simultaneously is still too restrictive

Comment: Repairs and Temporary Shutdown of Gas Collection System Components

While changes have been made to increase the number of permitted offline wells (from 5 to 10) and broaden certain exemptions, the provision still enforces restrictions that could be impractical during major construction projects, system upgrades, or complicated operational situations. The existing provisions do not adequately address the practical challenges of managing landfill gas systems and might limit essential maintenance and construction work. (F_Recology-3)

Agency Response:

No changes were made in response to this comment. The limit to the number of wells offline simultaneously is necessary to ensure that large areas of the landfill are not left uncontrolled, and major construction projects and other activities described by the commenter can be accomplished through improved planning that takes less of the gas collection system offline at any one time or reconnect wells at the end of the work day. Further, the LMR provides a process to request and evaluate alternative compliance options to address unique circumstances with consideration of site-specific information. Such request must include measures to ensure at least equivalent methane emission control and enforceability.

F.1-9 Support for well raising conditions and offline well limits

Comment: We support the change that collection systems must be “sealed and capped” rather than “sealed or capped” in paragraphs 13 and 40. Additionally, we support paragraph 39, which clarifies offline well limits, in order to better convey the intent that entire landfills will not be relieved of the limit in the case of fire. Changing the wording and clarifying intent here is important not just for strengthening the regulations to prevent methane pollution, but it also makes the regulations more understandable and implementable. (F_IHRC-6)

Agency Response:

No changes were made in response to this comment. CARB appreciates the comment and thanks the commenter.

2. Semi-Continuous Operation and Shutdown of Gas Collection and Control System

F.2-1 Requirements are still too prescriptive and operationally burdensome

Comment:

Semi-Continuous Operation and Permanent Shutdown of the Gas

The requirements for semi-continuous operation and permanent shutdown remain highly prescriptive and operationally burdensome, particularly for closed landfills with declining gas generation. Despite some revisions, the framework continues to require extensive monitoring, prolonged demonstration periods, and detailed technical analyses that may not be feasible or appropriate for all sites. While we appreciate the reduced timelines in certain areas, the overall framework still imposes significant monitoring, demonstration, and operational burdens. (F_Recology-4)

Agency Response:

No changes were made in response to this comment. The Proposed Amendments add clearer criteria for requesting and approving semi-continuous operation and permanent shutdown to improve transparency, support operator planning, and ensure these allowances are granted only when appropriate. The ISOR (pp. 32–36) describes the significant evidence and analysis undertaken to confirm that the standards are

achievable, and the comment does not identify specific aspects of the process that would be infeasible. See also the agency response in section IV.F.7-6.

F.2-2 Certain requirements and provisions are challenging for regulators to approve and enforce

Comment:

Semi-continuous Operation and Permanent Shutdown of the Gas Collection and Control System

Certain requirements and provisions for requesting and approving semi-continuous operation and permanent shutdown of the gas collection and control system at a closed MSW landfill are challenging for regulators to approve and enforce.

South Coast AQMD has concerns about some of requirements of subpart 95467, including 95467(a)(5) which requires that a "professional engineer has certified that there are no available modifications to any control device available onsite that would allow any control device to operate continuously at the methane flow rate and gas composition being collected," and that "there is no adjacent facility with a continuously operating control device that will accept the landfill gas."

- If a professional engineer may certify "that there are no available modifications to any control device available onsite" that would operate continuously, it doesn't mean there are no other kinds of control devices that can be installed and satisfy the LMR. Additionally, if there is an adjacent facility, it does not mean that the facility's control device will be sufficient or appropriate for the landfill's control needs. While evaluating control equipment for regulatory compliance is a common scenario for air district permitting, this requirement puts the determination with a third party with a lack of consideration for potential conflicts of interest.
- Furthermore, regardless of whether a professional engineer certifies the information or not, a South Coast AQMD permit application would be required for engineering evaluation and permit approval. Air districts that are delegated this review and approval likely have other regulatory requirements to satisfy and determinations to be made that are not sufficiently addressed by a professional engineer certifying the information in the request. (F_South Coast AQMD-12)

Agency Response:

No changes were made in response to this comment. The criteria for semi-continuous operation requests specify a measured methane collection threshold, which sets a clear standard for when a new control device is the appropriate action to maintain continuous operation versus when it is appropriate to move to semi-continuous operation. This constrains the ability for semi-continuous operation to be requested by sites where the inability to operate continuously is caused by an oversized control device.

The professional engineer's certification is not required to provide confirmation that no adjacent facilities will accept the landfill gas; this requirement can be satisfied independently by the operator.

The professional engineer's certification must determine that there are no "available modifications." Therefore, if a control device modification is technically possible, but would make the device non-compliant with district rules, this modification would not be "available," as it would put the facility out of compliance with other local, state, or federal requirements.

F.2-3 Clarify if intent is to allow disapproval of a request if it is complete

Comment: The "15-day changes" revised 95467(c) by including "of receiving a complete request". This additional phrasing leads to further obfuscation, as now the requirement reads, "The Executive Officer shall approve or disapprove a request for semi-continuous operation within 180 calendar days of receiving a complete request." It is unclear if the intent is to allow disapproval of a request if it is complete. It is also unclear whether an Executive Officer is allowed to disapprove an incomplete request, since the disapproval is within 180 days of receiving a *complete request* [emphasis included]. It is recommended to clearly identify the criteria for when approval and when disapproval occurs and if that includes disapproval of incomplete requests. This same comment applies to the "15-day changes" of 95467(f) and 95467(f)(2)(B), which also included "of receiving a complete request" to the provision language. (F_South Coast AQMD-13)

Agency Response:

No changes were made in response to this comment. The 180-day Executive Officer review period begins when a complete submission is provided.

A complete request can be disapproved if, in evaluating the request during the 180-day period, the Executive Officer finds that it does not substantiate all the requirements in sections 95467(a)(1)-(6), the operational schedule and adjustment performance indicators proposed do not maximize system operation time, or the request does not provide equivalent levels of enforceability or methane emission control.

The Executive Officer could disapprove an incomplete request on the basis that it does not include all the minimum elements required in section 95467(b), but is not obligated to act within a 180-day timeline. The effect is the same, whether the Executive Officer disapproves and requires resubmission of a complete request, or begins review upon receiving a complete request.

F.2-4 Re-review by the Executive Officer of further semi-continuous operation data

Comment: The regulation allows the Executive Officer to review previously-approved semi-continuous operation requests. The amended regulations add in section 95467 (c) additional data outside of just the application that can be considered in this review, including monitoring, recordkeeping, and reporting data. This is paired with a requirement in section 95470 (b)(3)(G) to report gas collection data at semi-continuous operations. Together, these allow for a more complete review of operations attempting to prove suitability for continued semi-continuous operation. (F_CAW-9) (F_GAIA-9)

Agency Response to Combined Comments:

No changes were made in response to these comments. CARB appreciates the comments and thanks the commenters.

F.2-5 Clarify offsite control device applicability in Control Device Assessment

Comment: {CARB staff note: The comment below was attached to section 95467(a)(5) of the 15-Day Changes. It refers to available modifications to any control device available onsite.}

What about sites that have offsite control devices? (F_SBCAPCD-14)

Agency Response:

No changes were made in response to this comment. This comment is out of scope of the 15-Day Notice because it refers to modifications that were made in the 45-Day Changes. For informational purposes, CARB offers the following.

The usage of "onsite" in section 95467(a)(5) is to distinguish control devices already in use to control the facility's landfill gas from those that are not currently being used to control the facility's landfill gas.

F.2-6 Return to the 5-year zero-exceedance SEM requirement prior to GCCS shutdown

Comment: We also believe paragraph 48 needs more justification for its change from five years to three years of no exceedances of surface methane concentrations prior to landfill closure. Lowering this threshold may shorten the overall landfill closure process, which is vital to ensuring environmental health in surrounding communities. Given the significant risk of climate, public health, and land use impacts from this shortened timeline, we strongly urge CARB to reconsider this amendment and return to the originally proposed five-year timeline. (F_IHRC-3)

Agency Response:

No changes were made in response to this comment. In proposing five years in the 45-Day Changes, staff relied upon explaining that a period of that length would help "demonstrate that the final cover is robust, and provide confidence that exceedances are less likely to occur when the GCCS is shutdown" (p. 37). Part of staff's consideration for reducing this period, as described in item 48 in the 15-Day Notice "Summary of Proposed Modifications," was accounting for the additional eight quarter surface methane concentration demonstration that would bring the total period of no SEM exceedances to at least five years by the time a final permanent shutdown request would be granted.

F.2-7 Clarify if eight quarters must be consecutive in simulated shutdown SEM demonstration

Comment: {CARB staff note: The comment below was attached to section 95467(f)(2)(A) of the 15-Day Changes. It refers to the eight quarter demonstration period for the simulated shutdown SEM demonstration.}

Are these intended to be consecutive? If so, please consider revising throughout the document. (F_SBCAPCD-15)

Agency Response:

No changes were made in response to this comment. Section 95467(f)(2) specifies that the demonstration must be completed for eight consecutive quarters. The subsequent mentions of the eight-quarter period in section 95467(f)(2)(A) do not need to specifically state “consecutive” because they are simply referring back to the period described in the parent item.

F.2-8 Define robust

Comment: The word "robust” is used in section 95467 to describe the final cover. The word robust is not otherwise defined in the regulation, and should be replaced with an actual standard or metric. (F_YSAQMD-6)

Agency Response:

No changes were made in response to this comment. This comment is out of scope of the 15-Day Notice because it refers to modifications made in the 45-Day Changes. However, CARB provides the following for informational purposes.

Section 95467(a) states “…a closed MSW landfill with robust final cover and low methane generation (as demonstrated through the criteria below).” Thus, the determination of “robust” cover is made through the specific criteria provided the subsections nested below section 95467(a). Section 95467(a)(2) specifically identifies that the cover integrity assessment is “[f]or the purpose of demonstrating robust final cover.”

3. Well Decommissioning

F.3-1 Reduce well decommissioning trend provision to one year

Comment: 95464(c)(2): WM appreciates the reduction of the well decommissioning methane trend provision to three years, but continue to urge CARB to reduce this provision to one year to allow for the expeditious removal of low-functioning wells. (F_WM-9)

Agency Response:

No changes were made in response to this comment. A long-term declining trend is necessary to ensure that the low methane content is due to exhausted methane potential, rather than a repairable issue, such as a pinched, plugged, or otherwise compromised component. A decrease occurring over one year is not sufficient to distinguish a repairable issue versus exhausted methane potential.

F.3-2 Return well decommissioning trend provision to 60 months

Comment: The time period for determining eligibility for well closure should not be shortened. Our clinic questions whether the change to 36 months instead of 60 months when determining eligibility for well closure is necessary, as proposed in paragraph 34 of the fifteen-day notice. In this paragraph, the only justification for this change is that the “staff believes 36 months is a

sufficient period." While compromise may be needed to balance the needs of landfill operators against the original time period, a more thoroughly articulated reason for cutting back the requirement so extensively would be justified in this instance, due to the importance of understanding landfill conditions long-term. In light of CARB's obligations to reduce environmental harm, cautiousness about well closure is justified, and a reduction in this caution merits further justification. Accordingly, unless CARB can provide reasoned justification for this change, we respectfully suggest that CARB return to the originally proposed 60 month period. (F_IHRC-2)

Agency Response:

No changes were made in response to this comment. The intention was to provide clarity on what constitutes a long-term trend which is necessary to show that low methane content is due to exhausted methane potential, rather than a repairable issue, such as a pinched, plugged, or otherwise compromised component. Additionally, several commenters in the 45-day comment period identified potential drawbacks to an overly long period (see section IV.F.4-2). As described in the 15-Day Notice "Summary of Proposed Modifications" item 34, the 36-month period "better balances the needs of operators to decommission wells in areas with low gas generation against the goal of establishing a long-term trend." Regardless of the trend period, these wells must have reached below 20% methane by volume to qualify for decommissioning under section 95464(c)(2)(A).

4. Re-tuning Wells after Collection System Pressure Setpoint Change

F.4-1 Provide flexibility for re-tuning wells after a collection system pressure setpoint change

Comment: Section 95469(g)(1): Gas Collection System Pressure Monitoring

This subsection requires establishing an LFG collection system pressure setpoint and mandates retuning all wells within 10 days of any change to the setpoint. While collection system pressure is vital for effective landfill gas management, the Sanitation Districts are concerned about the requirement to re-tune all wells within 10 days of any setpoint change. In practice, LFG systems operate within a defined vacuum setpoint range that is routinely adjusted to respond to changing field conditions and optimize performance. The setpoint range often changes as the wellfield expands and conditions evolve. Therefore, the vacuum setpoint range should serve as an operational tool rather than a regulatory compliance parameter.

Requiring full wellfield re-tuning for any setpoint adjustment, regardless of magnitude, would create unnecessary operational and financial burdens without meaningful environmental benefit, especially at large landfills. Therefore, the Sanitation Districts strongly urge CARB to allow site-specific operational setpoints and to base re-tuning requirements on actual wellhead conditions and system performance rather than triggers tied to setpoint changes. This approach aligns with performance-based operation and 40 CFR Part 63 Subpart AAAA, which emphasizes overall system effectiveness. (F_LACSD-9)

Comment: While the goal behind Section 95464(g) to ensure effective landfill gas (LFG) collection is fully supported, the current single vacuum setpoint framework presents major operational and compliance hurdles. Many facilities use multiple, interacting vacuum sources—

such as redundant blowers, separate pumps for different header zones, or LFG-to-energy units—that often compete when tied into a common header. Gauge pressure measured at a single vacuum-side location therefore fluctuates frequently as equipment cycles, changes speed or adjusts to load demands.

The requirement to re-tune all wells within ten calendar days each time the system pressure setpoint changes is impracticable given normal operational variability. LFG-to-energy engines and redundant blowers commonly cycle on and off for legitimate operational reasons; treating every transient or short-term pressure variation as a setpoint change would impose continual re-tuning obligations that are operationally infeasible and administratively burdensome. The 15-minute gauge recording requirement is useful for detecting excursions at a measurement point, but by itself it cannot reliably distinguish between transient, routine equipment activity and a sustained control change that warrants corrective action.

To achieve the regulation's environmental objectives while allowing for practical, reliable operation, the following clarifications and adjustments are requested for consideration:

- Redefine "setpoint change." Exclude temporary pressure fluctuations caused by routine equipment cycling, engine startup/shutdown, or brief redundancy transitions. A setpoint change should be defined as an adjustment intentionally made by operations staff or as a change that remains in effect for a sustained period (for example, longer than 72 hours).
- Revise the re-tuning timeline. Extend the re-tuning window to a more practicable schedule, such as requiring tuning/adjusting only when a setpoint change is sustained for a defined period (e.g., greater than 72 hours) or providing and extended timeline of 30 days.
- Accept alternative monitoring and data-interpretation methods. Allow the use of multiple measurement points, short-term averaging, trend analysis, or alarm logic that requires sustained deviations (for example, three consecutive 15-minute readings outside the acceptable range or a continuous deviation exceeding one hour) before requiring wellfield tuning/adjustment.

These minor revisions would reduce false-positive alarms, limit unnecessary manual interventions, and enable site-specific engineering solutions, such as hybrid vacuum/flow control, without compromising emission control standards. (F_Tetra Tech-1)

Agency Response to Combined Comments:

No changes were made in response to these comments. This comment is out of scope of the 15-Day Notice because it refers to modifications that were made in the 45-Day Changes. For informational purposes, refer to the agency response in section IV.F.5-1. Further, in line with these comments, note that the Proposed Amendments do "allow site-specific operational setpoints" to be determined by the operator, and do not treat "every transient or short-term pressure variation as a setpoint change." Instead, section 95470(a)(1)(Z) specifies that periods of at least three hours where the pressure deviates (±20%) from the setpoint must be reported. Such deviation (and associated reporting) is distinct from an operator's change to the setpoint (and associated re-tuning).

F.4-2 Create a graduated well re-tuning timelines based on landfill size

Comment: In paragraph 102, we suggest that instead of changing the well re-tuning timeline from one day to 10 days, that CARB create a graduated schedule of time allotted to re-tune based on how many wells a landfill has. This would allow larger landfills to complete the re-tuning process adequately while ensuring greater compliance with 95469(g). (F_IHRC-5)

Agency Response:

No changes were made in response to this comment. The proposed requirement sets an enforceable maximum timeline for re-tuning. The additional complexity of a graduated schedule does not seem to be warranted for this type of action, which essentially acts as a safeguard to confirm that changes to applied system vacuum did not result in positive pressure or over-draw at individual wells.

5. Other

F.5-1 Revise wording for lean burn internal combustion requirement

Comment: {CARB staff note: The comment below was attached to section 95464(b)(3)(A)1. of the 15-Day Changes. It refers to phrasing of the outlet methane concentration requirement for lean burn internal combustion engines.}

Consider revising this sentence. The use of “shall instead” is confusing. (F_SBCAPCD-7)

Agency Response:

No changes were made in response to this comment. “Shall instead” means that if the control device is a lean burn internal combustion engine, it must meet the stated outlet methane concentration standard rather than the 99% methane destruction efficiency. This phrasing is unambiguous that it is mandatory.

F.5-2 Clarify applicability of treatment system requirements

Comment: {CARB staff note: The comment below was attached to section 95464(b)(3)(B) of the 15-Day Changes. It was attached to the phrase “natural gas common carrier pipeline and transportation fuel.”}

Does this also include offsite locations, where gas is not sold, but there is a transfer of goods (e.g., LFG for power)? (F_SBCAPCD-8)

Comment: §95464(b)(3); §95475: The 15-day changes extend LMR applicability to gas treatment and upgrading systems and downstream uses, including engines fueled with treated landfill gas. However, EPA has determined that once landfill gas is treated, it is no longer subject to federal landfill regulations. CARB should clarify that LMR requirements do not apply to engines or equipment using treated landfill gas, consistent with federal applicability. (F_SMAQMD-2)

Agency Response to Combined Comments:

No changes were made in response to these comments. The phrase “including injection to the natural gas common carrier pipeline and transportation fuel” was added in the 15-

Day Changes to clarify the type of system covered in this subsection, as described further in the 15-Day Notice "Summary of Proposed Modifications" item 25. The Proposed Amendments did not expand the applicability of the LMR. Engines combusting landfill gas and upgrading systems are subject to the current Regulation.

Regarding the commenter's example of landfill gas (LFG) for power, section 95464(b)(3)(B) does not apply to landfill gas control systems that combust gas for power generation (subsection (3)(A) applies instead). As discussed in the 15-Day Notice, the minimal gas cleaning steps that commonly occur prior to combustion in a landfill gas engine or turbine do not substantially alter the landfill gas composition and therefore are not required to measure gas at the inlet and outlet. Further, these cleaning steps do not constitute a treatment for subsequent sale (the product of such control system is electricity, not gas).

In response to the commenter's question of transfer versus sale, the requirements of section 95464(b)(3)(B) apply in either case, i.e., without regard to how the gas control system owner/operator "receives" landfill gas (this is clarified by the adjustments to the definitions of "owner" and "operator" in section 95475). However, once the product of the treatment system (e.g., biomethane) leaves the gas control system outlet (e.g., injected into the pipeline where it is comingled with natural gas, transferred to the vehicle fueling station where it will ultimately be destroyed in vehicle engines), the product is no longer subject to requirements in the LMR. The Proposed Amendments do not apply different requirements based on whether a gas control device or system is physically located onsite or offsite, nor based on whether it is owned/operated by the same entity who owns/operates the landfill.

F.5-3 Clarify "shall instead" for engines and turbines without a permitted exhaust temperature range

Comment: {CARB staff note: The comment below was attached to section 95469(d)(4)(A) of the 15-Day Changes. It refers to the phrasing regarding minimum exhaust temperature for engines and turbines without a permitted exhaust temperature range.}

Please consider revising this language. The "shall instead" is confusing. (F_SBCAPCD-16)

Agency Response:

No changes were made in response to this comment. "Shall instead" means that if the permit does not specify an exhaust temperature range, the applicable minimum temperature is then 28 °C (50 °F) below the average exhaust temperature measured during the most recent compliant source test. This phrasing is unambiguous that it is mandatory.

F.5-4 Clarify whether changing to three-year source test schedule requires approval

Comment: {CARB staff note: The comment below was attached to section 95464(b)(4)(A) of the 15-Day Changes. It refers to the allowance to conduct source tests every three years.}

Does the source require written approval prior? Or, can the source do this on their own? (F_SBCAPCD-9)

Agency Response:

No changes were made in response to this comment. This comment is out of scope of the Proposed Amendments because it refers to a section that was not proposed to be modified in this rulemaking. For informational purposes, CARB offers the following.

Converting the source test frequency from annually to triennially does not require prior written approval. The operator can simply convert to the new schedule upon meeting the specified criteria. Associated recordkeeping and reporting allows for compliance oversight.

G. Cover and Collection System Plans and Assessments

1. Cover Integrity Assessment and Corrective Action

G.1-1 Replace "per acre" with "per grid" for cover integrity assessment sampling

Comment: Section 95471(k)(1), (2), and (3): Cover Integrity Assessment

In these subsections, locations per acre are used to describe soil classification, gas profile, and saturated hydraulic conductivity requirements. However, in practice, surface gas emission monitoring typically uses the grid as the standard areal unit, as reflected in most of the proposed 15-day changes. To avoid confusion and maintain consistency with general practices, the Sanitation Districts recommend that CARB replace "per acre" with "per grid" where appropriate. (F_LACSD-10)

Agency Response:

No changes were made in response to this comment. A cover integrity assessment is conducted in specific monitoring grids when it is being performed in response to recurring surface emissions exceedances; however, when this assessment is required by conditions specified in sections 95467 and 95469(e), the assessment is conducted in areas that do not align with monitoring grids. Therefore, defining the sampling rate by surface grids could be confusing for other provisions unrelated to surface emissions. Staff appreciates this idea for the specific context of recurring surface emissions exceedances, but maintained the samples "per acre" to keep the assessments consistent.

G.1-2 Remove prescriptive soil classification and sampling requirements

Comment:

Cover Integrity Assessment and Corrective Action (§ 95471(k)(1)-(5))

The proposed cover integrity assessment provisions introduce prescriptive soil sampling and classification requirements that fall within landfill construction oversight already regulated under Title 27 and administered by Local Enforcement Agencies and CalRecycle.

Methane emissions performance is already directly evaluated through instantaneous surface emissions monitoring, integrated surface emissions monitoring, wellhead monitoring, and gas collection system performance metrics. Soil classification testing does not provide equivalent emissions-performance verification. Daily cover is temporary by design, routinely disturbed as

part of landfill operations, and not intended to function as a methane containment layer. Applying methane-rule integrity-monitoring requirements to daily cover areas imposes documentation burdens unrelated to methane-control performance. In addition to concerns regarding daily cover, the proposed cover integrity assessment requirements as applied to intermediate cover introduce prescriptive expectations that are already comprehensively addressed under California's solid-waste regulatory framework and landfill facility permit conditions administered pursuant to Title 27. Intermediate cover serves multiple purposes within landfill engineering practice, including:

- limiting precipitation infiltration
- maintaining slope stability
- controlling vectors
- supporting operational traffic
- protecting underlying waste mass
- facilitating staged filling operations

Intermediate cover is not designed or regulated as a primary methane containment barrier layer, and its construction specifications are already governed through:

- Title 27 performance standards
- Local Enforcement Agency inspection programs
- CalRecycle oversight
- site-specific landfill permit requirements

Therefore, introducing additional soil classification and sampling requirements under the proposed LMR rule duplicates or may conflict with these existing regulatory controls without improving methane-emissions verification capability.

Impractical Requirements:

- The requirements to obtain any number of samples per acre and to classify the cover soil is unnecessary. The intent should be that whatever cover soil is put in place should be of adequate character and quality to prevent the escape of landfill gas and prevent the infiltration of oxygen into the waste mass. This can be accomplished with a thinner layer of highly impermeable material or a thicker layer of more permeable material. Either way, the end-goal of emissions control remains the same and therefore adding soil testing requirements is unnecessary.
- Landfills often do not have a consistent source of material for cover soil; it can vary from day to day from on and off-site sources based on supply limitations and other practical considerations. Therefore, the testing requirements add an unrealistic expectation and burden. As long as the soil (or other material) that is used for cover accomplishes the goal of preventing landfill gas emissions and oxygen infiltration, the landfill owner should be afforded the ability to make the operational decision on what material to utilize.
- The rule suggests replacing Alternative Daily Cover (ADC) with soil, or daily cover with intermediate cover. At many landfills, replacing ADC with soil is unfeasible due to availability of soil and may create operational issues such as creating permanent barriers in the waste mass to the proper operation of collection wells and the leachate collection system.
- Supply Concerns: There is no guarantee that soil meeting the regulation's specific technical specifications will be available on-site or even locally when needed.

Recommendation: Revise § 95471(k)(1)–(5) to remove prescriptive soil classification and sampling requirements and clarify that cover integrity assessments supports—but does not replace—surface emissions monitoring performance verification. (F_RS-5)

Agency Response:

No changes were made in response to this comment. The role of covers in capturing methane was discussed extensively in the ISOR, including research and implementation experience demonstrating that cover integrity and properties are relevant factors in effective collection of landfill gas. The Proposed Amendments do not set new cover requirements but instead reference cover specifications in existing regulations to avoid duplicative requirements and permitting, while requiring that more is done to monitor, maintain, and repair the cover to meet those existing standards. Deficiencies are specifically defined as conditions that do not meet existing requirements approved for the landfill and specific issues that clearly indicate lack of cover integrity (e.g., cracks, erosion, punctures).

The Proposed Amendments target cover integrity assessments where performance metrics have indicated the need for investigation to ensure effective methane emission control. Soil classification testing (and the other options for characterizing the cover properties) can inform the operator's selection of appropriate corrective actions, reveal deficiencies that develop over time, and is useful for CARB to better understand characteristics of covers in areas with demonstrated performance issues to potentially inform future policy design. The soil classification testing does not require any specific properties pursuant to the Proposed Amendments. The number of samples per acre is necessary to provide clarity and enforceability that sufficient sampling has been done for representative characterization.

The options for repairing deficiencies in section 95471(k)(5) are a menu of options where only those needed to remedy any deficiencies found must be implemented. Additionally, if no deficiencies are found during the cover integrity assessment, there is no requirement to make any repairs or changes to the cover.

G.1-3 Reduce prescriptiveness of cover integrity assessments

Comment: 95471(k): WM urges CARB to be less prescriptive in the LMR as to the multiple options for remedies offered in response to the cover integrity analyses. Operators should be able to prepare alternative remedies for staff review. It is unclear what is required and what is optional. (F_WM-17)

Agency Response:

No changes were made in response to this comment. Regarding cover characterization, section 95471(k) clearly states that the assessment shall include "one of the tests described in subsections (k)(1)-(3)." Regarding correcting deficiencies, section 95471(k)(5) clearly states that "[d]eficiencies are considered corrected if one or more of the following actions are taken, as indicated by the findings of the cover integrity assessment…" Thus, the type of corrective action needed is based on the owner or operator's findings of what deficiencies are present (or if no deficiencies are found, then no correction is needed), and one or more of the actions in section 95471(k)(5)(A) can be used to correct deficiencies in any cover type, while those in sections

95471(k)(5)(B)-(D) are available as additional options for specific cover types. Further, the LMR provides a process to request an alternative compliance option that provides equivalent methane control and enforceability.

2. Cover Integrity Monitoring Plans

G.2-1 Cover integrity monitoring plans are too prescriptive, adding implementation burdens without clear demonstration of benefits

Comment:

Cover Integrity Monitoring Requirements

The newly proposed cover integrity monitoring plan requirements are more prescriptive than those included in the 45-day draft and represent a significant shift in approach. The increased level of prescriptiveness limits operator flexibility and does not adequately account for site-specific conditions, cover types, or operational practices. This change introduces additional complexity and implementation burden without clear demonstration of improved environmental outcomes. This issue represents a departure from the previous draft and raises new concerns regarding feasibility and practicality. (F_Recology-9)

Comment:

Section 95464 (b)(6) – Cover Integrity Monitoring Plan

The 15-day changes propose to now limit the cover integrity monitoring plan and monthly requirements to areas of daily and intermediate cover. Requiring preparation and implementation of a separate cover integrity monitoring plan will be very costly and duplicative of current cover inspections required in the surface gas monitoring program, as well as potentially conflicting with approved cover design and operation requirements in other regulations. Requiring a plan to monitor cover integrity for a cover that only lasts for a day, or a short amount of time before fresh waste is placed against it, does not make sense and is not an effective use of resources. There are existing regulations that more effectively deal with daily cover requirements, and we believe that these are sufficient to achieve the goal of preventing surface emissions.

We also object to a cover integrity monitoring plan for areas with intermediate cover. Surface monitoring requirements contained in the current LMR already require that landfill technicians walk all parts of the landfill and not only measure surface emissions, but observe cover conditions that can lead to these emissions. Intermediate landfill surfaces, especially at larger landfills, can cover large areas, often hundreds of acres at very large landfills. A second layer of monitoring is onerous and unnecessary given the current, and very effective, surface monitoring requirements. (F_SWANA-4)

Agency Response to Combined Comments:

No changes were made in response to these comments. The modifications to the cover integrity monitoring plans reduced the scope of the plans (removing final cover areas from the plan) and better aligned the requirements with other existing regulatory requirements. These changes increased operator flexibility. The requirements set limited constraints regarding the frequency of monitoring (monthly), the types of issues

that it must identify and address, and reference existing regulations for performing repairs and maintenance to avoid any duplication or conflict.

Staff does not agree that the plan is duplicative with SEM, which occurs quarterly, while the cover integrity monitoring plan must include monthly monitoring. While SEM does require monitoring areas of distressed vegetation, cracks, or seeps, it is not designed to comprehensively identify and correct cover integrity problems.

3. Collection System Assessment

G.3-1 Set clear expectations for collection system assessments

Comment: {CARB staff note: Commenter quoted 15-Day Changes text of section 95471(j).}

CARB needs to set clear expectations to ensure consistent implementation across sites and avoid subjective enforcement. (F_WCN-7)

Comment: {CARB staff note: Commenter quoted 15-Day Changes text of section 95471(j).}

CARB should provide quantitative definitions of "unusual changes" (e.g., >20% month-to-month deviation, or greater than 2 standard deviations over the 12 month mean) to ensure consistent implementation across sites and avoid subjective enforcement. (F_YoloCo-7)

Agency Response to Combined Comments:

No changes were made in response to these comments. These comments are out of scope of the 15-Day Notice because they refer to modifications made in the 45-Day Changes. For informational purposes, see the agency response in section IV.G.5-1.

G.3-2 Utilize collection system performance-based criteria, not prescriptive well condition criteria

Comment:

Collection System Assessment (§ 95471(j))

The proposed text states that if “a collection system component is determined to be pinched, broken, or otherwise compromised it shall be repaired or a replacement well shall be installed…” We ask CARB to focus on whether the well is functioning (i.e., producing landfill gas), not on whether the down-hole conditions have changed from when the well was originally installed. A cracked or sheared well, particularly if the well casing is PVC or CPVC, does not necessarily stop providing value just because the pipe is “compromised” particularly if the crack or shear is in the perforated pipe section. The same can be said of other well casing materials, but the explanation is more nuanced.

If a well is still providing gas flow and, coupled with other wells nearby, the focus should be on surface emission prevention. A “compromised” well, could still provide value either in terms of gas collection or liquid removal and a landfill owner/operator should not be forced to abandon the well simply because the well is deemed by one definition or another as “compromised.” Also, the regulation does not provide clarity on the degree to which a well may be considered "pinched, broken, or otherwise compromised" before replacement is required.

Recommendations: Repair or replacement of collection system components should be required only where monitoring results demonstrate that the component is no longer contributing effectively to methane collection or surface emissions control performance. We request that CARB delete the requirement to abandon and replace a well if it is “pinched, broken, or otherwise compromised”, and instead focus on the performance of the system relative to preventing surface emissions of landfill gas. (F_RS-4)

Agency Response:

No changes were made in response to this comment. Corrective action requirements under the collection system assessment are based on the findings of the assessment. If the owner or operator determines and properly supports in their assessment that a well is performing effectively within its normal design specifications, this would support a conclusion that the well is not compromised and therefore does not require replacement. Note that both the existing Regulation and Proposed Amendments similarly require the collection system to be operated and maintained in accordance with the approved Design Plan.

H. Recordkeeping and Reporting

1. Volume of Monitoring, Recordkeeping, and Reporting Data

H.1-1 Inadequate justification of new data collection

Comment: WM remains concerned that issues that were raised during the 45-Day comment period were not resolved in the 15-day rulemaking, and has concerns with some of the new items that have been added.

As a general matter, the voluminous data that the LMR would require be generated and analyzed as a result of the 15-day package will likely require staffing increases at landfills across California and, we imagine, at CARB and the Air Districts who share implementation responsibilities, raising costs for solid waste ratepayers in California. CARB has not yet provided adequate justification for the appropriateness of data collection required. (F_WM-3)

Agency Response:

No changes were made in response to this comment. The 15-Day Changes made several modifications to recordkeeping and reporting, as summarized below:

- Added recordkeeping for remote or inaccessible wellheads and well decommissioning
- Added reporting of GCCS downtime to quarterly reports and summary data for semi-continuously operating GCCSs in annual reports
- Added reporting of higher operating value requests made to other agencies
- Removed reporting of annual hours the GCCS was operating normally
- Simplified quarterly reporting requirements for wellheads with continuous monitoring to just average monthly values
- Limited topographic map reporting to no more than four maps per year
- Provided various clarifications or minor changes
- Extended certain reporting timelines

On the whole, these changes neither increase nor decrease the amount of staffing that would be necessary for recordkeeping and reporting, as they include roughly equivalent changes in both directions (increased and decreased requirements).

For more information about recordkeeping and reporting proposed in the 45-Day Changes, see the agency response in section IV.H.5-1.

2. Scheduled Surface Emissions Monitoring Notification

H.2-1 Do not require a 15-day notice ahead of surface emissions monitoring

Comment: {CARB staff note: Commenter quoted 15-Day Changes text of section 95470(b)(5).}

The County reiterates our previous comment on this section. Section (5) is entirely impractical. Surface emissions monitoring is conducted when wind and precipitation requirements are met. A 15-day notice will almost always have no relation to the conditions needed for monitoring and will not result in any improvement to the monitoring event or the landfill's compliance. (F_YoloCo-6)

Comment: {CARB staff note: Commenter quoted 15-Day Changes text of section 95470(b)(5).}

Waste Connections reiterates previous comments from industry on this section. Section (5) is entirely impractical. Surface emissions monitoring is conducted when wind and precipitation requirements are met. A 15-day notice will almost always have no relation to the conditions needed for monitoring and will not result in any improvement to the monitoring event or the landfill's compliance. (F_WCN-6)

Agency Response to Combined Comments:

No changes were made in response to these comments. These comments are out of scope of the 15-Day Notice because they refer to modifications made in the 45-Day Changes. For informational purposes, refer to the agency response in section IV.H.4-1.

3. Higher Operating Values (HOV) Request Reporting

H.3-1 Support for transparency of landfill HOV approvals to CARB

Comment:

Transparency with CARB about Higher Operating Value waivers

Landfills are regulated by multiple agencies at multiple levels of government. This makes it very difficult for any oversight entity, whether a private citizen or a government agency, to track down exactly how a landfill has been allowed to operate outside of the parameters set in regulation. The Proposed Amendments' requirement for higher operating value requests to be disclosed to CARB centralizes these many data sources into one, relatively transparent place. This is critical for enforcement and public oversight. (F_CAW-7) (F_GAIA-7)

Agency Response to Combined Comments:

No changes were made in response to these comments. CARB appreciates the comments and thanks the commenters.

I. Alternative Compliance Options

1. Equivalency

I.1-1 Utilize lifecycle-based compliance transition

Comment: Section 95468: Lifecycle-Based Compliance Transition

We propose that Section 95468 (Alternative Compliance Options) include a formal "Lifecycle-Based Compliance Transition" for Legacy sites. The "Equivalency Test" in Section 95468(c)(2) should be satisfied by demonstrating that the site is in advanced decay and fugitive emissions are below a stable threshold. This should include: (a) Extended Approval Duration: Alternative Compliance Plans for Legacy sites should be valid for 10 years and (b) Streamlined Passive Transition: A standardized "off-ramp" to transition from active GCCS to passive venting or biofiltration once and landfill methane production drops below efficient extraction levels.

Integrating this definition is essential to prevent the proposed amendments from nullifying the flexibilities offered in Section 95468. Without a clear lifecycle-based transition, the regulation would limit practical access to compliance alternatives for post-closure facilities that have already passed their peak methane generation phase. (F_City of LA-2)

Agency Response:

No changes were made in response to this comment. This comment is out of scope of the 15-Day Notice because CARB staff did not propose changes related to the concept described by the commenter in the 15-Day Changes. The following is provided for informational purposes.

The Proposed Amendments provide a standardized process for closed landfills with declining gas generation to transition to semi-continuous operation and permanent shutdown of the GCCS in section 95467. Transitioning to passive venting or biofiltration involve removal of the gas control system as defined in the LMR and would need to follow the requirements for permanent GCCS shutdown.

The length of time or conditions under which an ACO remains valid is determined by the Executive Officer when issuing the ACO approval and depends on the nature and specific details of the request, and the Executive Officer can revoke an ACO as specified in 95468(d).

2. Existing Alternative Compliance Option (ACO) Reapprovals

I.2-1 Lack of clarity on ACO transition and documentation submittal

Comment:

Alternative Compliance Options

We appreciate CARB's clarification of review timelines and evaluation criteria. However, the requirement to resubmit previously approved Alternative Compliance Options (ACO) remains a significant concern. This provision introduces regulatory uncertainty and administrative burden without clear assurance of continuity for existing approvals. For facilities currently operating under approved ACOs, the lack of clarity regarding transition and reapproval creates potential compliance and planning challenges. (F_Recology-5)

Comment: {CARB staff note: Commenter quoted 15-Day Changes text of section 95468(e).}

It is unclear if prior alternative compliance option approvals that were in effect prior to the future LMR amendment date will be still in effect from future LMR amended date through to December 31, 2027, prior to the January 1, 2028 effective timeline in the rule provision.

- 95468(d) indicates that "The Executive Officer *may* (emphasis added) review a previously approved alternative compliance option or conformance with the standard in section 95468(c)(2) or to determine if it provides alternatives to requirements in sections other than those referenced in section 95468(a) using the criteria in section 95468(b)." This appears to be an option of the Executive Officer, but the landfill owner or operator doesn't appear to have a mechanism to request for previously approved alternative compliance options to be in effect at the start of the LMR amendment. It is not clear if this is CARB's intent. (F_South Coast AQMD-7)

Comment: It is unclear in the second sentence of 95468(e), "If the owner or operator does not submit *any* (emphasis added) documents…", whether the submittal of ***any*** documentation, even an incomplete submittal, would prevent the alternative compliance option from becoming invalid as of January 1, 2028. (F_South Coast AQMD-8)

Agency Response to Combined Comments:

No changes were made in response to these comments. Prior alternative compliance option approvals will remain valid after the amendments become effective. (This is clear in the proposed regulatory language because section 95468(e) specifies that previously approved ACOs for which no documentation is submitted will become invalid as of January 1, 2028, a year after the anticipated effective date of the Proposed Amendments).

As described in the ISOR, the purpose of submitting ACO documentation as described in section 95468(e) is to facilitate accurate compliance determinations and enable the Executive Officer to review those ACOs for potential revocation under section 95468(d). Section 95468(e) does not require Executive Officer action to re-approve ACOs for them to remain valid.

Staff deliberately used the word "any" when referring to documentation submitted that would prevent automatic invalidation, in recognition that a range of documentation (e.g., original requests, supporting documents, design plans, permit conditions, approval letters) may exist and be sufficient to enable the Executive Officer's review for conformance with the standard in section 95468(c)(2) and with the sections referenced in section 95468(a). This serves to set clear expectations and avoid uncertainty on the part of operators—only ACOs that lack any documentation such that CARB is not made aware of the existence of the ACO are automatically invalidated.

J. Regulatory Partners

1. Air District Implementation Resources

J.1-1 Ongoing concern about Air Districts' ability to implement and enforce without more resources risks inconsistent implementation

Comment:

Effective Implementation and Coordination with Local Air Districts

Local air districts play a critical role in implementing and enforcing the LMR. However, there are ongoing concerns regarding their ability to effectively enforce several of the newly proposed provisions. In particular, air districts have expressed concerns regarding staffing, technical capacity, and overall bandwidth to implement the expanded monitoring, recordkeeping, and enforcement requirements included in the 15-day draft.

Absent sufficient resources, training, and clear implementation guidance, there is a significant risk of inconsistent enforcement across jurisdictions. This concern has not been resolved and is heightened by the additional complexity introduced in the 15-day revisions. (F_Recology-8)

Agency Response:

No changes were made in response to this comment. CARB will continue to work closely with air districts to ensure successful implementation and support uniform enforcement across jurisdictions. The updated cost analysis in the 15-Day Notice was revised based on resource estimates provided by air districts, not because of cost increases from modifications in the 15-Day Changes. For more information on the updated cost analysis, see the agency responses in section IV.K.2.

J.1-2 The 15-day changes did not adequately address concerns from local air districts

Comment: On March 9, 2026, the Santa Barbara County Air Pollution Control District (SBCAPCD) provided comments to CARB on the Proposed Regulation on Methane Emissions from Municipal Solid Waste Landfills. After reviewing the 15-Day changes that were released on April 2, 2026, we were disappointed to see that CARB did not incorporate or address those comments, including the discrepancies between CARB's regulation and federal requirements, lack of satellite methane detection notification to local air districts, and the significantly understated local air district workload cost estimates. Therefore, we are again providing SBCAPCD's comments on the proposed revisions for your review. (F_SBCAPCD-1)

Agency Response:

No changes were made in response to this comment. CARB carefully considered all feedback from regulatory partners and made modifications as part of the 15-Day Changes that addressed concerns raised that are within the scope of the regulation. Other concerns raised by the commenter, such as those in sections V.B.1-1, V.D.2-4, and V.F.5-4, of this FSOR, are best addressed through ongoing collaboration and implementation support. Regarding workload and resources for air districts that implement and enforce the LMR through MOUs, see agency responses in section IV.K.

The comments referred to here are responded to elsewhere in this chapter so that they could be organized by topic area and responded to individually.

2. Air District Memoranda of Understanding and Compliance Timing

J.2-1 Delay effective date until air district MOUs are updated

Comment: General LMR Issues Not Addressed in the 15-Day Changes

…

- The revised LMR should not become effective until full delegation and guidance is provided to the local air districts through Memorandums of Understandings (MOUs) or other means. This will also allow time for the regulated landfills to carry out the necessary changes to implement the amended regulation. (F_SWANA-2)

Comment: As with the current LMR, the proposed amendments should be delegated to local air districts for implementation and enforcement. To prevent confusion and allow stakeholders adequate time to adjust, the Sanitation Districts urge CARB to promptly clarify the delegation process to local air districts and specify the relevant procedures, such as a memorandum of understanding or guidance, before the amended LMR takes effect. (F_LACSD-1)

Agency Response to Combined Comments:

No changes were made in response to these comments. These comments are out of scope of the 15-Day Notice because CARB staff did not propose changes related to the timing of the effective date of the Proposed Amendments or current Regulation section 95473 which enables the Executive Officer and districts to enter Memoranda of Understanding (MOU). For informational purposes, see the agency response in section IV.K.3-1.

K. Costs

1. Compliance Costs

K.1-1 Impacts of compliance costs

Comment:

We recognize CARB's efforts to address implementation challenges, particularly through updates to compliance timelines and certain operational requirements.

At the same time, our core concern remain, the proposal continues to impose significant compliance costs on landfill operators, which will likely be reflected in higher solid waste collection rates paid by California residents. While the 15-day changes improve feasibility for operators, they do not address the downstream impacts to households already facing increasing housing and living costs.

C.A.R. respectfully offers the following for consideration:

1. Residential Cost Impacts. The updated cost estimates reinforce the need to better understand how these requirements may affect household solid waste rates. C.A.R.

encourages CARB to further evaluate and clearly communicate potential residential rate impacts prior to final adoption.

2. Coordination with Existing Programs. The proposal expands monitoring and reporting requirements. To avoid potential overlap at the local level, CARB should coordinate with CalRecycle and existing SB 1383 implementation efforts to ensure alignment where feasible.

3. Implementation Approach. While certain timelines have been extended, additional guidance on phased compliance benchmarks would help ensure implementation occurs in a way that limits unnecessary cost increases for local governments and ratepayers.

C.A.R. appreciates CARB's continued work on this rulemaking and its broader efforts to reduce greenhouse gas emissions. We ask that these considerations be addressed to help avoid unintended impacts on housing affordability and household costs. (F_CAR-1)

Comment: Considering the significant number of landfills managed by RCDWR, any changes to the LMR could have significant impacts on the limited resources dedicated to the efficient operation and maintenance of these landfills. Our landfills have long served Riverside County residents by providing a local, affordable and sanitary means of solid waste disposal. We are committed to continuing this service into the future. (F_RCDWR-1)

Agency Response to Combined Comments:

No changes were made in response to these comments. The updated cost analysis for regulated entities reflects higher costs than initially estimated due to an increased estimated labor rate. For more information on the updated cost analysis and consistency with SB 1383, see the agency responses in section IV.L. CARB intends to provide implementation support to ease the transition for both regulated entities and local air districts.

2. Costs to Air Districts

K.2-1 District's workloads and cost estimates are higher than LMR 15-day changes estimates, and need reevaluation

Comment: The proposed additions and changes to the LMR add new requirements, plans, assessments, timelines, and dependent actions triggered under certain conditions. The regulation will be difficult for the regulated community and very tedious for a regulatory agency to monitor real-time or near real-time compliance, especially when monitoring triggers follow-up actions and timelines. If the District intends to enter into a new MOU with CARB to implement the LMR it will require a significant increase in staff time. For our three landfills, plus the two landfill gas control device operators, the District estimates needing a minimum of 0.25 to 0.40 FTE on the compliance side. The incorporation of the new LMR requirements into the local operating permits for these landfills will also require additional evaluation time for permitting engineers. These costs would most likely be passed onto the landfills themselves and the greater regulated community. (F_YSAQMD-7)

Comment:

COMMENT 3: District Workload Remains Despite Implementation Flexibility

We appreciate the additional flexibility and clarity provided in the 15-day changes to §§95464, 95469, and 95470. However, districts will still need to review monitoring plans, evaluate data, track recurring exceedances, and review expanded reporting requirements. Provisions such as enhanced wellhead monitoring, cover integrity monitoring plans, and quarterly reporting continue to require significant staff time. While these updates improve implementation in some areas, they do not reduce the overall workload for air districts. As a result, it remains challenging for the Sac Metro Air District to support LMR implementation under an MOU with CARB without additional funding.

COMMENT 4: CARB Cost Estimates Remain Significantly Below Air District Estimates

We appreciate that CARB acknowledged the original implementation cost estimates were low and requested updated cost information from air districts. Unfortunately, our updated estimates based on the most recent 15-day changes indicate that costs for air districts are going up, not down. For the Sac Metro Air District, the level of new effort would be more than three times higher than resources needed under the original LMR. In addition, CARB should not expect air districts to be responsible for identifying new funding, including from the Legislature, to implement state regulations. Instead, CARB should evaluate and identify the necessary funding mechanisms as part of the rulemaking process to ensure effective implementation by all responsible entities.

Several air districts supplied cost estimates to CARB so that a more accurate assessment of implementation costs could be considered in the rulemaking process. However, we find the LMR still does not reflect accurate costs, exacerbating a significant underestimation of costs for air district implementation. As a result, a large funding gap remains for air districts and no clear mechanism for how to address it.

In closing, based on experience implementing the state's Criteria and Toxics Reporting Regulation and other programs, taking on significant new workload from CARB's rules without new funding is not sensible for the Sac Metro Air District. In addition, many districts, including us, are not in a position to recover these costs through new or increased fees. Thus, we continue to encourage consideration of funding mechanisms, such as grant programs used in other CARB programs, to support local implementation and ensure consistent statewide enforcement. (F_SMAQMD-5)

Comment:

District workload remains despite implementation flexibility

We appreciate that the 15-day changes provide additional flexibility for landfill operators and extend certain implementation timelines (for example §95464, §95469, and §95470). These revisions improve implementation flexibility for operators; however, they do not materially reduce the workload for districts that implement the regulation through Memoranda of Understanding (MOU). As currently written in the proposed amendments to the LMR, District staff would still need to conduct substantial additional work as compared to the existing landfill regulations, including updating permits, reviewing monitoring plans, evaluating monitoring data, investigating exceedances, and reviewing required reports associated with these sections. Furthermore, the 15-day changes will result in more work for air districts associated with requirements that were added/clarified including:

- Added recordkeeping, monitoring, and notification requirements that need to be tracked and reviewed (e.g. gas control system downtime requirements, enhanced well temperature and CO monitoring requirements).
- New cover integrity assessment, low-liquids wells sampling, higher operating value request, and well decommissioning active gas extraction coverage method requirements that need to be reviewed and approved.
- Source violations due to the complexity of the requirements and inconsistency with the federal requirements.

We are concerned that CARB's staff cost estimates for local air districts significantly understate the actual resources and costs required to implement and enforce the regulation, particularly for districts operating under a MOU with CARB. Although the air district resources needed are unclear and challenging to quantify, our rough estimate is that the new LMR requirements will result in additional work per year that equates to over $175,000 in costs, or one full-time equivalent (FTE) staff per year. The workload would be a substantial increase and strain on our air district's limited resources. Furthermore, our air district does not currently have staffing levels to absorb this additional workload, and due to the current economic climate, it is challenging to get Board approval to add staff positions. (F_SBCAPCD-6)

Comment: The South Coast Air Quality Management District (South Coast AQMD) appreciates the changes that have been made that address some of our comments as well as the opportunity to comment on the Revised Proposed Amendments ("15-Day Changes") to the LMR. Attached with this letter are staff's comments for the revised proposal. While the "15-day changes" did incorporate changes in rule text, South Coast AQMD staff's remaining priority concerns mostly focus on the underestimated resource impacts and fiscal analysis. South Coast AQMD's comments and data are based on decades of experience in implementing landfill air quality regulations in densely populated areas. Additionally, South Coast AQMD staff are on the front lines for two on-going Subsurface Elevated Temperature Events at local landfills and have real-world experience with many of the issues that the LMR is intended to address and the resulting resource impacts. Implementation of air quality regulations includes significant engineering analyses, field investigations, and community engagement, which extends beyond the oversimplified administrative review of reports identified in the updated staff report. (F_South Coast AQMD-1)

Comment:

Resource Impacts

It is South Coast AQMD staff's understanding that previous resource impacts provided were not included in CARB's assessment. South Coast AQMD has the most landfills in the state and to not fully consider South Coast AQMD's estimates grossly underestimates the burden of implementing CARB's proposal for the entire state. If CARB staff felt that this estimate or the previous estimate was inadequate, we highly encourage CARB staff to engage with South Coast AQMD and any other air district attempting to collaborate with CARB to obtain accurate data to ensure the regulation can be properly implemented and enforced. South Coast AQMD staff is currently enforcing significant landfill issues impacting communities that this proposal is aimed at addressing and the estimates provided are from our experience handling these issues. Staff appreciates the additional opportunity to provide further cost and resource information and estimates related to the Proposed Amendments to the Regulation on Methane

Emissions from Municipal Solid Waste Landfills (LMR) in addition to our January 9, 2026 email and the information below.

The proposed amendments to the LMR will require additional permitting and more complex and conflicting permitting issues to handle for all applicable landfills, as well as approvals that do not contemplate existing regulatory and permitting timelines. The proposed LMR will require additional training, review, evaluation, as well as information/submittal receipt, handling, and management. There are additional requirements and more stringent requirements (some of which will require real-time response involving satellite data), as well as monitoring, reporting, and recordkeeping, which greatly affects enforcement action resources, among various other aspects. Additionally, many of these landfill compliance issues are not resolved through one submittal and a single review and approval, but rather through on-going internal and external communications, a multitude of requests for information, assessments and verification, and inspections and field response.

South Coast AQMD staff is providing staffing estimates needed for implementing the LMR as well as providing existing examples of regulatory response for some discreet requirements that are proposed for the LMR.

Staffing Resource Estimates

Staff still does not have a clear understanding of which agency will implement the new proposals in the absence of an updated MOU. Our current estimates for implementation and enforcement of the LMR in our jurisdiction would require at least:

- Two additional Senior Office Assistants – Receiving, data entry, classifying, and records handling for incoming reports, notifications, and other compliance submittals
- Eight additional Air Quality Inspector IIs – Review compliance submittals (e.g. surface emission reports), conducting inspections/investigations and reporting, field response to affected community and facility, and issuing compliances notices to facility
- One additional Air Quality Inspector III – Conducts more complex and difficult inspections/investigations, coordination, etc. compared to AQ Inspector II
- One additional Supervising Air Quality Inspector – Coordinates, supervises, and participates in AQ Inspector duties; reviews reports, notices, investigations, requests and other documentation.
- One additional Program Supervisor – Supervises, plans, assigns, reviews, and evaluates staff work. Prepares documentation. Compiles and analyzes data from staff monitoring efforts. Tracks overall program requirements and compliance statistics.
- Four additional Air Quality Engineer IIs – Primary review of LMR submittals responsible for reviewing plans and gathering information. This step typically requires multiple rounds of evaluation and coordination with the facility.
- Four additional Senior Air Quality Engineers – First line review and responsible for the most complex engineering evaluations
- Two additional Supervising Air Quality Engineers – Final reviews of staff evaluations, providing direction in navigating regulatory complexity and coordination

Fully burdened Salary (FY26/27):	Per Position	Total for Positions
Senior Office Assistants	$172,744	$345,488
Air Quality Inspector II	$227,907	$1,823,256
Air Quality Inspector III	$241,717	$241,717
Supervising Air Quality Inspector	$263,660	$263,660
Program Supervisor	$299,333	$299,333
Air Quality Engineer II	$261,414	$1,045,656
Senior Air Quality Engineers	$279,490	$1,117,960
Supervising Air Quality Engineer	$299,333	$598,666
	Overall Total	**$5,735,736**

The proposed amendments to the LMR are estimated to incur millions of dollars annually for staffing alone. Please note that CARB has not requested the fully burdened rate for South Coast AQMD staff, and South Coast AQMD staff did not provide it in previous comment. The fully burdened rates above should be included in the assumed average rate for engineering staff as well as enforcement and clerical staff. These estimates may change depending on the type of changes in any proposed MOU.

CARB's $1.2 million dollar estimate results in an increase of about five Full Time Employees for the entire state, which means many of the 35 air districts are expected to incur the burden of this regulation without additional staffing. It is unclear what resource impact costs CARB will incur for its own efforts as part of this proposal since the focus of the fiscal analysis seems to be on air district impacts. The proposed LMR should also reflect CARB staffing and resource impacts as well to provide a clear understanding of how future LMR MOUs will be crafted considering CARB staff has indicated that they will be handing some of the implementation (e.g. remotely detected plumes and satellite data) and potentially CARB's own enforcement and support functions for air districts. (F_South Coast AQMD-2)

Agency Response to Combined Comments:

No changes were made in response to these comments. CARB staff appreciates the engagement and input from air districts on the costs and resource impacts of the amendments as well as cost information on the overall implementation of the landfill regulations. The labor rate staff used in the air district cost analysis was $125.49/hr (equivalent to approximately $250,000 per year at 2000 hours per year per full time employee) based on fully-burdened labor rates provided by several air districts and is approximately equivalent to the weighted average of the rates provided by F_South Coast AQMD-2.

The air district costs estimate in the economic analysis represent only the additional tasks (not currently being performed) that are necessary to directly implement and enforce the Proposed Amendments. However, staff recognizes that additional costs may be incurred for permitting as discussed in the 15-Day Notice.

For more information about staff's updated costs analysis for air districts, please refer to the agency response in section IV.K.2-1.

K.2-2 Costs to Districts for satellite plume notification responses are vastly underestimated

Comment:

Regulatory Response Resources

While the “Changes to the Fiscal Analysis for Local Air Districts” indicate that the costs “are intended to represent population averages per landfill, not the hours per landfill that trigger any specific action or requirements,” the estimated resource costs already vastly underrepresent the resources needed to respond to near real-time satellite imagery notifications just from this calendar year for landfills in South Coast AQMD’s jurisdiction. In Table 5, “Surface Emission Monitoring and Remote Detected Plumes,” the values only account for administrative functions, not actual response resources. Enforcement staff periodically conduct surface emission monitoring activities in response to satellite data notifications to verify compliance. This typically requires a team of 3 to 4 staff for 10 hours, plus an additional 10 hours for data analysis for one active landfill. South Coast AQMD staff typically conducts two of these events per year, accounting for 100 hours, which is an order of magnitude above what Table 5 estimates for the entire state for surface emission and plume response. South Coast AQMD staff performs these SEM field responses for approximately 13% of the active landfills in South Coast AQMD jurisdiction. 13% of 74 active landfills in the state is 10 landfills, or 1000 hours. Additionally, South Coast AQMD staff requests that CARB provide a full list of affected landfills, as previous LMR rulemaking has done, for transparency to ensure proper assessment and calculation of the resource impacts.

Furthermore, in Q1 2026, there have been 7 landfill notifications for remotely detected plumes in South Coast AQMD. At this rate, there will be 28 notifications per year. South Coast staff responded to one of these notifications with multiple staff to inspect the facility (non-SEM related activities) and that accounted for at least 20 hours total District staff time in Q1 2026. This time is above and beyond the administrative review of reports. Although CARB has verbally indicated they will be responsible for implementing this requirement, this is not yet reflected in an updated MOU, nor is it clear if CARB staff will be responsible for conducting inspections for persistent plumes, such as the events at Chiquita Canyon and El Sobrante. South Coast AQMD staff experience has shown that field response is necessary to ensure timely and proper response by the landfill facilities. To assume that this requirement is strictly an administrative function ignores the massive resources needed to address Subsurface Elevated Temperature (SET) events like the situations at Chiquita Canyon Landfill and El Sobrante Landfill. The equivalent of one full section of a permitting team is dedicated to the SET events at these landfills. This includes one staff level engineer, one Senior Engineer, 1.5 Supervising Engineers, and about 0.25 Senior Manager. Mandatory reviews and approvals to identify and address these situations in the proposed LMR have been incorporated for our resource impacts estimates. (F_South Coast AQMD-3)

Agency Response:

No changes were made in response to this comment. As the commenter notes, CARB has already been sending notifications of remotely detected plumes to landfill operators requesting voluntary action by the operator to investigate and repair the emission source, with air districts copied on these notifications. Some air districts follow up on some of these notifications by performing site inspections.

By requiring operators to perform follow up monitoring and reporting with specific requirements and within specific timelines, the Proposed Amendments will better ensure that owners or operators are taking on the work of performing follow-up monitoring. There is no requirement for air districts to perform onsite inspections in response to plume notifications. CARB recognizes that following up on plume notifications as needed will add workload to implementing air districts and some districts will choose to conduct additional inspections. The revised air district cost analysis in the 15-Day Notice is designed to reflect those additional costs as well as inspections for a subset of the total plume notifications.

The comment describes 100 hours as "an order of magnitude above what Table 5 estimates for the entire state for surface emission and plume response." However, Table 5 of the 15-Day Notice estimated additional staff time for surface emissions monitoring and remotely-detected plumes of 16 hours per active landfill and 1 hour per closed/inactive landfill, resulting in total statewide labor hours of 1,256 hours per year for these tasks.

For more information about staff's updated costs analysis for air districts, please refer to the agency response in section IV.K.2-1.

K.2-3 Amendments pose higher costs for management review and Title V permitting updates

Comment: Additionally, South Coast AQMD staff strongly disagree with the 10% estimate for review and approval time based on current data, workflows, and practices for existing landfill sector approvals. Staff analyses currently show a bottleneck at the review level in the Waste Management team due to the current workload and data has been closely tracked and presented to the South Coast AQMD Permit Streamlining Task Force and the Governing Board. This specifically applies to the Waste Management team as compared to other engineering teams at South Coast AQMD due to the complexity of the operations and the regulations. These landfills are typically federal Title V sources which require additional review stages and incorporation in Title V permits. South Coast AQMD's current review time ranges from 80% to 200% of the estimated staff time. South Coast AQMD has added multiple staff permitting positions in the past three years in our Waste Management team to address this issue and is proposing an additional three positions next fiscal year to continue to address this deficit. An underestimate for CARB's LMR would be another setback for implementation of landfill regulations for local air districts if staffing is insufficient to handle the workload. The cost estimates requiring review and approval in Table 5 should be updated to reflect actual procedures and impacts.

As previously indicated, there are significant resource impacts for permit processing as well as permit processing impacts, especially driven by the federal Title V permitting process. Since many of the landfills are federal Title V sources, the Title V permitting requirements are likely triggered and typically plan approvals are included in the Title V permit. For Title V approvals, South Coast AQMD's process includes a staff level evaluation and multiple levels of review prior to submittal to U.S. EPA for their review. This may include a public noticing process, as well. Additionally, South Coast AQMD has increased rates of inspections for Title V sources, in addition to deviation reporting and compliance certifications. South Coast AQMD has already engaged U.S. EPA Region 9 regarding the proposed LMR, and we encourage CARB to do so

as well, in addition to engaging with the air districts and to better understand the permitting and approval process and the resulting impacts. (F_South Coast AQMD-4)

Agency Response:

No changes were made in response to this comment. The additional 10% time for management review is based on estimates submitted by several air districts that specifically identified a line item for management review time.

Costs associated with the federal permitting process were not included in the quantitative cost estimate because this is not a directed function of implementing the Proposed Amendments. However, staff recognizes the real costs incurred for permitting as discussed in the 15-Day Notice. Refer to the agency response in section IV.K.2-1 for more information. CARB staff will continue working closely with our air district partners throughout implementation.

K.2-4 Preventing SET events saves money and protects communities

Comment: Preventing subsurface exothermic (SET) and elevated temperature landfill (ETLF) events isn't just a safety and environmental win; it's financially smart. CARB's newly adopted Landfill Methane Regulations will prove to save landfill operators millions of dollars. CARB's updated rules reduce the likelihood of and severity of SET/ETLF events - events that are notoriously expensive to manage. Early detection prevents catastrophic failures. Stronger monitoring and shorter repair timelines reduce long-term liabilities. This is a win-win situation for both the waste industry and communities. The cost of compliance is far lower than the cost of an environmental disaster. (F_GOAL-8)

Agency Response:

No changes were made in response to this comment. CARB appreciates the comment and thanks the commenter.

L. Community Impacts

1. Transparency

L.1-1 Create a public dashboard shared in real time

Comment: CARB should continue to promote transparency to achieve this goal by ensuring communities like Avenal that are affected by landfill methane emissions have access to the information regarding emissions and reparative measures in an accessible format and language. To fulfill these obligations, CARB should require all landfills to provide data about the composition and concentrations of landfill gas emissions and establish a public dashboard to share this information in real time. This dashboard should also provide updated information about leaks and corrective actions. (F_IHRC-9)

Agency Response:

No changes were made in response to this comment. CARB shares the goal of increasing public access to information reported under the Proposed Amendments. For more information, see the agency responses in section IV.M.1-1.

L.1-2 Support communities by posting the last five years of LMR reports publicly online

Comment: California communities applaud your leadership in establishing the most stringent landfill methane regulations in the United States. These rules represent a critical commitment to reducing harmful emissions and protecting public health. We urge you to defend them.

We support CARB's commitment to data transparency, which will allow communities to make vital decisions in protecting their own health and safety. Residents can use this data to determine if they should stay indoors or leave the area. Schools can use the data to determine if it's safe for children to play outside during recess or if extra measures should be taken to protect sensitive groups. Knowledge is power, and putting that power into the hands of communities allows us to take proactive and preventative measures. We urge CARB to take this one step further by posting landfill reports from the past five years. Historical data is essential for understanding patterns of compliance and identifying systemic issues. (F_GOAL-1)

Agency Response:

No changes were made in response to this comment. CARB appreciates the comment and thanks the commenter. Making historical reports available is beyond the scope of the rulemaking. However, Resolution 25-14 directs the Executive Officer to make reported information publicly available beginning in 2027. For more information, see the agency response in section IV.M.1-1.

L.1-3 Hold landfills accountable and protect public health

Comment:

When transparency is limited, communities bear the consequences.

As residents made clear at the November Board Hearing, those living near landfills are the most directly affected by regulatory decisions and deserve full visibility into how those decisions are made. Families, schools, and local businesses depend on government agencies like the California Air Resources Board (CARB) to hold landfills accountable and to protect public health. An improperly operating landfill does not merely inconvenience a neighborhood—it can devastate it, as we know all too well from lived experience.

The ongoing crisis at Chiquita Canyon Landfill is a stark warning of the disasters that can occur when regulation fails and oversight is absent. Toxic leachate, uncontrolled subsurface reactions, and displaced residents are not abstractions—they are the lived reality of regulatory breakdown. Communities near Sunshine Canyon, Avenal, Napa Valley, and elsewhere are experiencing similar impacts from mismanaged, underregulated facilities. The updated Landfill Methane Regulation must be designed to prevent another disaster like Chiquita Canyon—not to accommodate the conditions that created it. (F_GOAL-3)

Agency Response:

No changes were made in response to this comment. The Proposed Amendments are designed to further reduce methane emissions, and will also achieve additional reductions of co-pollutants that impact air quality and public health. One of the key goals of the Proposed Amendments was to enhance the enforceability of the regulation.

Accordingly, staff proposed new operational and monitoring requirements with specific quantitative limits, and additional recordkeeping and reporting requirements to facilitate effective oversight and more rapid response to improve CARB and air districts' ability to hold owners or operators responsible for compliance with the requirements. For more information, refer to the agency responses in section IV.M.3.

L.1-4 Support communities by posting HOV waiver requests to the Executive Officer and publicly online

Comment: We also support mandatory reporting of High Operating Value (HOV) requests and decisions to the Executive Officer. This measure will hold landfill operators accountable and provide oversight to prevent unnecessary harm to communities. However, transparency must extend beyond agency walls. The public deserves access to this information. At a minimum, CARB should publicly disclose when an HOV waiver is requested, who submitted the request, the reason for it, and the final decision. Public awareness is the foundation of trust and ensures that regulatory processes serve people, not corporate interests. Transparency matters — not just as a procedural step, but as a safeguard for community health and justice. Making this information accessible will strengthen public trust, empower communities to participate meaningfully in oversight, and ensure that environmental protections are enforced equitably. (F_GOAL-2)

Agency Response:

No changes were made in response to this comment. CARB appreciates the comment and thanks the commenter. As discussed further in the agency response in section IV.M.1-1, staff will make reported information publicly available consistent with Resolution 25-14.

2. 15-Day Changes Process

L.2-1 Hold public meetings going through the 15-day proposed changes to the regulation in plain language, for better understanding

Comment: Bureaucratic Hurdles: Fifteen days is not nearly enough time for the public to meaningfully review complex regulatory changes. The language in these documents is highly technical, and community members need adequate time and support to understand what is being proposed in order to provide informed comments. We respectfully request that, moving forward, CARB staff hold a public meeting to walk through the regulatory changes in plain language and answer questions directly from impacted communities. This is essential for transparency and for ensuring that the public can fully participate in the process. We also request that the public comment period be extended to a minimum of 30 days. Communities deserve a real seat at the table, and our voices must have the opportunity to be heard — especially when these decisions have the power to significantly affect our daily lives, our health, and our future. (F_GOAL-7)

Agency Response:

No changes were made in response to this comment. The 15-day comment period is permitted under the California Administrative Procedure Act, which also establishes time limits on the overall length of the rulemaking process, making extended comment

periods less feasible. CARB staff will continue to engage with communities as requested on the regulatory changes and implementation.

M. Other Comments

1. Scope, Authority, and Applicability

M.1-1 Clarify areas of regulatory overlap

Comment: The LMR will still result in significant overlap with other regulatory programs that control the same issues – be it gas temperature, cover integrity, design plan preparation, or a host of other items. There must be clarity between CARB, US EPA, Air Districts, CalRecycle, Local Enforcement Agencies, and Regional Water Quality Control Boards as to which agency is responsible for enforcement where there are overlapping mandates. CARB cannot solve this issue on its own; however, the LMR should not exacerbate already problematic jurisdictional conflict. The regulatory language itself should make this clear by clearly pointing to regulatory standards referenced by the LMR, rather than relying on memorandums of understanding and enforcement guidance. (F_WM-7)

Agency Response:

No changes were made in response to this comment. CARB coordinates closely with regulatory agency partners who oversee landfill operations and will continue to do so when implementing the Proposed Amendments. The regulatory language is clear regarding requirements on regulated entities, and that is not changed by memoranda of understanding or guidance documents.

M.1-2 Better align the LMR with federal rules

Comment: CARB should ensure that the final Regulation on Methane Emissions from Municipal Solid Waste Landfills be aligned and consistent with federal regulations 40 CFR 63 Subpart AAAA and 40 CFR 60 Subpart XXX, and the portions of 40 CFR 62 Subpart OOO applicable to California landfills. CARS should also strive to have the LMR designated as "fully equivalent" to the Federal Emission Guideline under 40 CFR 60 Subpart Cf. The lack of congruency between this proposed regulation, the federal regulations cited above, and the current LMR, which will still be federally enforceable after the adopting of the proposed LMR, will lead to cumbersome landfill permits, long lead times, and lack of clarity at the facility level. Aligning the proposed LMR with the federal regulations would greatly simplify compliance for landfills and permitting by the Districts, and will help to minimize the additional costs that the LMR amendments place on landfills and Districts. (F_YSAQMD-1)

Comment: 95469 – Throughout: WM urges CARB to consolidate corrective action and re-monitoring requirements into a single deadline to align with NESHAP. (F_WM-11)

Comment:

General LMR Issues Not Addressed in the 15-Day Changes

- The LTF believes it critical that California gain full approval from the U.S. Environmental Protection Agency (EPA) for the LMR to be equivalent to their Emissions Guidance. This approval will ensure consistent implementation of the proposed regulation by local

air districts. CARB needs to provide a timeline for re-submittal of the LMR to EPA for approval. (F_SWANA-1)

Agency Response to Combined Comments:

No changes were made in response to these comments. The Proposed Amendments address gaps in between the current LMR and the Emission Guidelines that resulted in the need for a federal plan. The Proposed Amendments include many of the same test methods and timeframes as federal rules – with more stringent requirements in some areas as needed to achieve improved methane emission control. The requirements of the Proposed Amendments do not conflict with or impede compliance with existing federal requirements as discussed in the ISOR Chapter X.

Comments regarding U.S. EPA approval or designation are out of scope of the rulemaking because they pertain to broader federal-state procedural matters.

2. Definitions and Terminology

M.2-1 Define non-interior wells and clarify that §95464 applies only to wells that are part of the gas collection and control system

Comment: §95475; §95464(c); §95464(d): The addition of "interior well" improves clarity, but non-interior wells remain undefined, and the removal of "perimeter" increases ambiguity. At the same time, requirements in §95464 continue to apply broadly to "each wellhead." Federal regulations distinguish between GCCS wells and other wells. CARB should define non-interior wells and clarify that §95464 applies only to wells that are part of the gas collection and control system. (F_SMAQMD-3)

Comment: We strongly recommend that the final Regulation on Methane Emissions from Municipal Solid Waste Landfills be aligned and consistent with federal regulations 40 CFR 63 Subpart AAAA and 40 CFR 60 Subpart XXX. This alignment would improve landfill operator clarity and compliance with the requirements, as well as ease of implementation and enforcement by air districts. Examples of areas that are not aligned include:

a. Clarify well terminology and applicability of requirements (§95475, §95464(c), §95464(d)). The 15-day changes added a definition for "interior well" in §95475, identifying wells located within the landfill waste footprint. While this clarification is helpful, the regulation does not define wells that are not interior wells. Federal landfill regulations distinguish between wells that are part of the gas collection system and monitoring wells installed for other purposes, such as gas migration monitoring or groundwater protection.

b. Several provisions of the regulation, including the wellhead pressure requirement in §95464(c), apply broadly to "each wellhead," which creates uncertainty about whether these requirements apply only to wells used to control landfill gas or also to exterior wells installed for other regulatory programs.

c. CARB should define non-interior wells (such as perimeter or monitoring wells) and clarify that the operational requirements in §95464 apply only to wells that are part of the landfill gas collection system used to control landfill gas. (F_SBCAPCD-2)

Agency Response to Combined Comments:

No changes were made in response to these comments. Where requirements that apply to wells do not specify "interior" wells, they apply to all wells that are part of the GCCS, and no specific definition is needed for non-interior wells (also, note that the term "non-interior" does not appear in the Proposed Amendments).

The definition of "interior well" in section 95475 of the Proposed Amendments is identical to the definition of "interior well" in federal rules (except for an additional clarification at the end of the definition). The term "perimeter" in the current Regulation was narrowly defined for a specific purpose and the language associated with that definition was moved to the passage where it applies in the 15-Day Changes. "Perimeter wells" is standard terminology that all regulated entities would understand and is used in federal rules without a definition (NSPS, EG, NESHAP).[47]

The requirements of the LMR apply to wells, equipment, and other components that are part of the gas collection and control system. For more information, refer to the agency response in section IV.N.6-5.

M.2-2 Oppose changing "must" to "shall"

Comment: We oppose the wiggle room now spread throughout the rule by changing "will" many times to "shall".

Lawyers were trained that "shall" means a requirement, but courts have given it wiggle room, saying it's ambiguous, and can mean "should," "will," or "may." "Must" is not ambiguous. When CARB explains requirements, it says "must" 38 times, as it did 90 times in September. So putting "shall" in the rule can only be seen as giving violators wiggle room and more issues to litigate. The landfill rules have said "will" and "must" since the rules were adopted in 2010, and CARB cites no examples when they were found ambiguous. Other agencies are shifting to "must".

Regulations need to give sufficient notice of what is required and not required to operators, neighbors and voters. The wording must be clear, specific and unambiguous. After regulations are adopted, the staff Notice which says "This change… does not change the meaning" is not readily available to these audiences, and the rules stand on their own.

If you insist on swimming against the tide by changing to shall, at least do what California Mental Health rules do, and have a definition that "shall" means "must." This might reduce litigation.

- Existing: 9 CCR § 514 "May" is permissive. "Shall" is mandatory. "Should" means desirable.
- Needed: 17 CCR § 95475(a)(38) "Shall" is mandatory.

The California Government code sets standards:

- GOV 11342.580 "Plain English" means language that satisfies the standard of clarity provided in Section 11349

[47] 40 C.F.R. Part 60, Subpart XXX; 40 C.F.R. Part 63, Subpart AAAA; and 40 C.F.R. Part 60, Subpart Cf.

- GOV 11349(c) “Clarity“ means written or displayed so that the meaning of regulations will be easily understood by those persons directly affected by them.

California Prison Industry changed from shall to must in 2021, and gave a thorough explanation.

- CALPIA is replacing the word ”shall” to ”must” in regulations to promote plain language and clarity as shall is not used in common language… shall is used more in legal circles while must is used more often by people generally and in speech…
- shall is one of the most heavily litigated words in statutes and regulations.
- Nearly every jurisdiction has held that the word "shall" is confusing because it can also be interpreted to mean "may, will or must"...
- Until recently, law schools taught attorneys that "shall" means "must." That's why many attorneys and executives think "shall" means "must"...
- The use of shall can take parties down the long and arduous path of litigation.
- Even though shall has been used for generations as a word to create a mandatory obligation, the word actually contains layers of ambiguity. Shall can be interpreted to mean must, may, will or even should.
- many opinions have interpreted shall to mean must, while others have interpreted it to mean may or will. Continuing to use the word shall, especially if it is not clearly defined, will result in unnecessary litigation.
- The obligation to inform the public, person impacted by and beneficiaries of regulations includes the obligation to communicate effectively.

Federal practice:

- The ambiguity of “shall” goes back at least to 1877: *West Wis, Ry, v. Foley*, 94 U.S. 100, 103 (1877)
    - "Shall" ought undoubtedly to be construed as meaning "must," for the purpose of sustaining or enforcing an existing right; but it need not be for creating a new one.
- *Railroad Co. v. Hetch*, 95 U.S. 168, 170 (1877).
    - As against the government, the word "shall," when used in statutes, is to be construed as "may" unless a contrary intention is manifest.
- *Gutierrez de Martinez v. Lamagno*, 515 U.S. 417 (1995) is often cited. Note 9 says:
    - Though "shall" generally means "must," legal writers sometimes use, or misuse, "shall" to mean "should," "will," or even "may." See D. Mellinkoff, Mellinkoff's Dictionary of American Legal Usage 402-403 (1992) ("shall" and "may" are "frequently treated as synonyms" and their meaning depends on context); B. Garner, Dictionary of Modern Legal Usage 939 (2d ed. 1995) ("[C]ourts in virtually every English-speaking jurisdiction have held-by necessity-that *shall* means *may* in some contexts, and vice versa."). For example, certain of the Federal Rules use the word "shall" to authorize, but not to require, judicial action. See, e. g., Fed. Rule Civ. Proc. 16(e) ("The order following a final pretrial conference *shall* be modified only to prevent manifest injustice.") (emphasis added); Fed. Rule Crim. Proc. l1(b) (A *nolo contendere* plea "*shall* be accepted by the court only after due consideration of the views of the parties and the interest of the public in the effective administration of justice.") (emphasis added by Supreme Court).

- Responding to concerns like that, "*shall* has been removed from most sets of federal rules, including Civil, Criminal, Appellate, and Evidence rules."
    - For example, since 2007, rule 1, Note 3 of Federal Rules of Civil Procedure, has said the "*rules replace 'shall' with 'must,' 'may,' or 'should,' depending on which one the context and established interpretation make correct in each rule.*"
- Federal guidance says, "Use 'must' not 'shall' to impose requirements. 'Shall' is ambiguous, and rarely occurs in everyday conversation. There is a strong preference for 'must' as the clearest way to express a requirement or obligation… Many agencies already use the word 'must' to convey obligations."
- The *Federal Register Document Drafting Handbook* says, "We use 'must' to indicate a requirement."

"Black's Law Dictionary reports at least five distinct, and sometimes contradictory, meanings for the word [shall] including has a duty to, should, may, will, and is entitled to. And courts have interpreted shall to mean must, may, will, and is among others. In short, shall is complicated because it is vague." (F_Burke-1)

Agency Response:

No changes were made in response to this comment. CARB respectfully disagrees that use of the word "shall" is vague or creates ambiguity. The statutory and regulatory framework governing California administrative rulemaking does not prohibit use of "shall" in regulations and California regulations commonly employ "shall" to establish mandatory requirements. The cited federal caselaw and guidance is inapplicable to state regulations, and regulatory drafting of another state agency is not controlling. California statutes already define the terms "shall" and "may" so further definitions are not necessary. California Government code section 14 provides that "'Shall' is mandatory and 'may' is permissive." Use of the word "shall" meets the clarity standard because there is no ambiguity – it is mandatory and regulated entities are put on proper notice.

3. Implementation Timeline

M.3-1 Extend timelines for Executive Officer reviews

Comment:

Regulatory Procedures, Timelines, and Deadlines

Air districts have their own approval procedures and regulatory timelines under an existing regulatory structure (e.g., Health & Safety Code, South Coast AQMD rules and regulations). Approval requests for these new proposed requirements may require permit applications and/or compliance plan applications, as well as Title V Facility Permit revisions, as applicable. Title V facilities require additional U.S. EPA 45-day review for permit proposals. Some requests may require a 30-day public notice prior to approval. The proposed LMR imposes regulatory deadlines on CARB and/or delegated air districts to approve or disapprove various requests and plans. Based on South Coast AQMD staff's experience with current applications for landfills, staff may not be able to comply with the proposed timelines with current staffing and resource levels.

It is recommended that CARB work with air districts to understand the timeline challenges faced and add reasonable timelines and/or allowances for extension of timelines in the proposed LMR. It is rare for initial plan or permitting submittals to air districts to be complete, and even when proposed LMR requirements allow for requesting additional information to be submitted, the regulatory deadline imposed on CARB and/or delegated air districts in the regulatory language may not be sufficient. We recommend adding criteria-based extensions and approval process for proposed deadlines. (F_South Coast AQMD-5)

Agency Response:

No changes were made in response to this comment. All timelines for Executive Officer review in the Proposed Amendments are the same or longer than the timelines for those items in the current Regulation (refer to agency response in section IV.N.6-6 for further details), with the exception of alternative corrective plans following a third surface emissions exceedance. In that case, a shorter review timeline is necessary to ensure that action is taken as quickly as possible to repair the exceedance.

In the 15-Day Changes, staff added that certain review timelines begin upon receiving a complete submittal. Additionally, for ACOs, if the Executive Officer needs additional information to evaluate the request, the review period begins after that information is provided.

M.3-2 Renewed comments from previously submitted feedback

Comment: Previously submitted South Coast AQMD comment letters identified various proposed LMR requirements with infeasible and/or unclear implementation of deadlines, which remain unaddressed. The comments below are further renewed as there are specific timeline concerns. (F_South Coast AQMD-6)

Agency Response:

No changes were made in response to this comment. The letter described was submitted outside of the 45-day comment period. Therefore, that letter is not responded to in this FSOR, however, CARB staff did carefully evaluate and consider every change recommended in that letter in the process of developing the 15-Day Changes and met with South Coast AQMD staff to discuss those recommendations. The renewed comments referred to here are responded to elsewhere in this chapter so that they could be organized by topic area and responded to individually.

4. Compliance, Enforcement, and Review

M.4-1 Create a compliance tier for legacy closed landfills

Comment: Recognizing the distinct lifecycle stages of landfills is essential for a regulation that is both effective and equitable. By creating a specific compliance tier for facilities that are 30 years postclosure, CARB can focus its enforcement resources on high-emitting sources while maintaining appropriate oversight and providing for realistic, cost-effective regulations for facilities that no longer pose a significant threat of methane release. (F_City of LA-6)

Comment: The current regulatory framework often applies similar compliance burdens to both active landfills and long-closed facilities. However, there is a fundamental physical distinction

between the two. Active landfills maintain high rates of methanogenesis due to continuous fresh organic input. In contrast, "Legacy Closed Landfills", those that have not accepted waste for 30 years or more, contain waste that has undergone multiple first-order decay cycles. For these facilities, the peak methane generation phase has long passed. The exponential decline in gas production results in significantly lower and continually diminishing emissions, representing a substantially reduced contribution to the State's methane inventory.

Proposed Regulatory Definition: "Legacy Closed Landfill"

LASAN reiterates the need for a formal definition of "Legacy Closed Landfill" within Section 95463. Facilities that have been closed for 30 years or more exhibit a diminishing methane profile that does not warrant the intensified monitoring frequencies proposed in the current amendments. "Legacy Closed Landfill" means a municipal solid waste (MSW) landfill that: (a) has ceased accepting waste for at least 30 years; (b) has an approved closure permit or equivalent documentation from the Local Enforcement Agency (LEA); and (c) demonstrates, through gas generation modeling or historical collection data, that it is in a state of advanced first-order decay with declining methane production. (F_City of LA-1)

Agency Response to Combined Comments:

No changes were made in response to these comments. Closed landfills with diminishing methane generation are already contemplated and addressed in the Proposed Amendments without creating a specific definition or category.

Closed landfills with declining gas generation can request semi-continuous operation or permanent shutdown of the GCCS as provided for in section 95467. The LMR provides a process to request an alternative compliance option to address unique circumstances, provided that the alternative provides equivalent methane control and enforceability. Additionally, the Proposed Amendments retain the ability to relax SEM spacing and frequency at closed landfills (areas closed with final cover) with demonstrated history of no surface exceedances. Finally, these landfills are generally expected to be less impacted by the Proposed Amendments. This is because they are less likely to have emissions issues that the Proposed Amendment target due to lower gas volumes and more robust final cover, such as remotely-detected plumes and recurring surface emissions.

M.4-2 Regulatory flexibilities to review in 2028 update

Comment: When the board approved the LMR in late 2025, it included in the board resolution direction for the Executive Officer to report on Landfill Methane Regulation implementation, including the state of the science on emissions monitoring technologies, in mid-2028. It is imperative that CARB does follow through with a meaningful re-analysis of this rule's progress during 2028. Because California is taking an important leadership role on landfill regulation, some of the specific provisions in the regulation are yet untested. Therefore, it is imperative that we analyze our own rule's impact in the real world, including ways it may have been worked around.

A number of the changes in the Proposed Amendments represent a clear relaxation of the regulation, but their impact is yet unclear. For the below amendments, we suggest that implementation impact of each change is carefully watched over the year and half of

implementation before the 2028 review. If any of these changes do prove to be a significant weakness, they can be thoughtfully updated in 2028.

1. The hour delay to shut down gas mover systems after GCCS shutdown allows offgassing.

The initial draft regulation set a strong protection against offgassing by stating that gas movers had to be immediately shut off when the GCCS system stopped functioning. The amended regulation allows an entire hour of potential dumping of gas and heat before mover shutdown. This should be limited to a timeframe realistic to automated shutoffs — a matter of minutes. Landfill operational data should be analyzed for incidence of significant emissions events from this hour window in 2028.

2. The narrowing of cover integrity testing to only daily and intermediate ignores large areas that have proven problematic at some landfills.

Large areas of landfills sit under final cover for years before the entire landfill enters semi-continuous operation and must do final cover tests under this regulation. Therefore, consistent testing of this cover is crucial to preventing emissions. The amendment in section 95464(b)(6) to limit cover integrity checks to daily and intermediate cover leaves consistent final cover checks out of standard monitoring. The existence of overlapping SWRCB requirements does ease the impact, but those regulations are not tailored towards emissions. The incidence of leaks from final cover on operational landfills should be evaluated in 2028.

3. The increased number of allowed high oxygen readings allows leaks to persist.

The amended language in section 95469 (e)(6) allows half of the monthly monitoring events at a well in a given year to return elevated oxygen levels before enhanced monitoring must begin. This doubles how long a clear sign of an issue can be detected before action is taken. The impact of this leniency should be analyzed in 2028.

4. The temporal constraints for liquid monitoring risk missing the intended rain correlation.

The amendments in section 95469 (f) limit liquid monitoring to one event done between January and April. This is obviously done in order to ensure liquid monitoring was done after rain. Unfortunately, with the increased temporal inconsistency in California’s rain patterns, this change does not guarantee rain will have happened in the months preceding the monitoring event. Instead, the regulation could require that liquid monitoring be done within a certain number of days following a precipitation event of at least a certain magnitude, unless that area does not receive such an event between January and April. The ability of the existing amendment to force representative liquid monitoring events should be evaluated in 2028.

5. The allowance of decreased downwell monitoring solely from decreased CO levels risks pipes melting and temperatures running away.

The amended language in section 95469 (e)(3)(C) dances dangerously close to potential runaway issues within landfills. By allowing downwell temperature monitoring to move to semi-annually when carbon monoxide levels fall—even when downwell temperatures are above 145 degrees Fahrenheit—the regulation allows an already extremely hot section of the landfill to go unmonitored for long periods of time. PVC, often used in collection systems, begins to melt around 145 degrees, so allowing the situation to continue above that threshold risks compounding failures below ground. The US EPA has directed some landfills experiencing problematic subsurface temperatures to conduct downwell temperature monitoring once every

90 days. Using the US EPA's requirements and keeping in mind a continuity of agency requirements for operators, CARB should change the extended 6 month period for downwell temperature monitoring to every 90 days.

Additionally, landfill chemistry is too complicated and poorly understood to determine that all high heat reactions will subside purely based on one chemical's concentration. Carbon monoxide's ability to accurately predict decreasing temperature trends, as well as the 145 degree limit to cease downwell temperature monitoring, should be evaluated in 2028.

This update is an opportunity for California to solidify its leadership on climate action and protection of disadvantaged communities, particularly in a time when many environmental rules have been weakened at the federal level. The initial 45-day amendments make significant progress in improving data rigor, temperature response, and trend monitoring of landfill data, and the 15-day changes show responsiveness to on-the ground implementation challenges.

Our recommendations focus on the few changes that risk undermining the regulation's intended impact on methane emissions and community protection. We truly appreciate staff's diligent, careful work on this regulation and look forward to a stronger final rule that prioritizes both environmental and public health protections. (F_CAW-11) (F_GAIA-11)

Agency Response to Combined Comments:

No changes were made in response to these comments. CARB thanks the commenters for these recommendations for the mid-2028 implementation review.

M.4-3 Clarity needed for implementation, enforcement, and approval process

Comment:

Unclear Regulatory Structure

Modifications to Regulatory Language Needed to Clarify Implementation, Enforcement, and Approval Process.

Interagency procedures to receive/provide access to information and submittals remain unknown. Interagency roles for implementing, enforcing, and approving provisions of the proposed LMR remain unclear. For example, there are implementation and enforcement concerns when there are not clear procedures or requirements to indicate next steps after a given deadline has passed or action has been taken. The proposed LMR does not appear to include language describing further action if a submittal is disapproved, so it is unclear what regulatory language would trigger the need for subsequent submittals that CARB staff had conveyed would be necessary (e.g. disapproval of the Control System Design Plan in 95464(a)(2)). The lack of clear language could be interpreted as a landfill owner or operator having satisfied the requirement from the submittal itself, even though it is not approved or may not be a complete submittal, rather than restarting the timeline. Further clarification is needed to aid implementation and enforcement. (F_South Coast AQMD-10)

Agency Response:

No changes were made in response to this comment. The added language in the 15-Day Changes regarding the timeline for Executive Officer approval or disapproval after a complete submission, and submittal of additional information to complete a

submission, in sections 95467 and 95468(c) respectively, clearly state that those are the conditions that mark the beginning of the Executive Officer review timeline, not that the owner or operator can consider their request approved.

The comment regarding procedures or requirements after a deadline has passed is out of scope because the completeness and approval standards were not proposed to be modified in the 15-Day Notice. For informational purposes, CARB provides the following.

Nothing in the current Regulation or the Proposed Amendments prevents owners or operators from submitting a new request or revised design plan when such submittal is disapproved. Owners or operators must submit required information as set forth in sections 95464(a)(1) and (a)(2) (and elsewhere), and must submit information requested by the Executive Officer as set forth in 95470(a)(3) (and elsewhere).

M.4-4 Use electronic monitoring and account for variant wind movements

Comment: I am concerned with the operational consistency of monitoring the methane gas. Are the operators checking said wells using electronic scanning devices confirming an actual visit to the site or is it just verbal confirmation which cannot be validated. Also, are the air monitoring systems accurate and how far apart do they have to be for variant wind movements to remain so. With the increasing growth of the landfill, I believe this would be pertinent factor to consider. (F_Kilzer-1)

Agency Response:

No changes were made in response to this comment. The Proposed Amendments require several parameters to be continuously monitored and electronically recorded, and raw monitoring data from surface emissions monitoring, component leak monitoring, and wellhead monitoring must be submitted quarterly. Surface emissions monitoring and component leak monitoring rely on handheld hydrocarbon detectors to locate leaks, rather than relying on ambient air monitoring systems, and location coordinates are recorded to enable verification of where these measurements are performed.

5. Organic Waste Diversion/Beneficial Use of Biogas

M.5-1 Expand regulatory perspective to include source reduction and organic waste conversion systems

Comment: While the proposed amendments appropriately strengthen methane monitoring and control requirements (including provisions such as Section 95464 related to surface emissions monitoring), I respectfully recommend that CARB further consider upstream source-reduction approaches as a complementary strategy.

Decentralized, closed-loop organic waste conversion systems can prevent organic waste from entering landfills, eliminate methane generation at the source, and reduce long-term dependence on landfill gas monitoring and control systems. (F_Su-2)

Comment: Recognize Closed-Loop Systems as Complementary Compliance Pathways

CARB may consider exploring pathways to recognize qualified closed-loop waste-to-resource systems as a complementary compliance or mitigation strategy within California's broader methane reduction framework. Such systems can convert organic waste into usable outputs within 24 hours and operate with no wastewater discharge, no odor emissions, and minimal land footprint. (F_Su-3)

Comment: CARB may consider facilitating pilot programs to evaluate localized waste-to-resource conversion systems, integration with existing waste programs, and measurable methane reduction outcomes. (F_Su-4)

Agency Response to Combined Comments:

No changes were made in response to these comments. These comments are out of scope of the rulemaking because they refer to source reduction and closed-loop systems which is beyond the purpose of the LMR.

M.5-2 Pave a path for landfill gas for re-use

Comment: Most of California's large dairies condition their manure methane waste into utility-quality methane for reuse and sale for home consumption. Dairy methane constitutes 26% of California's methane source, while landfill is 41%. Dairy methane has similar contaminants to landfill (O2, CO2, H2S, etc). The legislation should pave a path for treatment of landfill gas for re-use. This is a proven technology and not "complex" as alleged in the legislation. (F_Couch-1)

Agency Response:

No changes were made in response to this comment. This comment is out of scope of the 15-Day Notice because it does not refer to any of the changes proposed or additional analysis or documents provided in that notice.

M.5-3 Align with SB 1383

Comment:

General LMR Issues Not Addressed in the 15-Day Changes

…

- Diverting organics from landfills has been identified by CARB as the most effective and cost-efficient long-term solution for reducing methane emissions from landfills. The landfill industry and wastewater sector have been working with regulators and legislators for years to address a host of issues and needs, such as increased funding for infrastructure, permit and regulatory streamlining, and programs for utilizing biomethane. These challenges have stalled efforts to meet the SB 1383 organic diversion mandates. The Little Hoover Commission in their report entitled "Reducing California's Landfill Methane Emissions: SB 1383 Implementation – June 8, 2023" has urged the State to provide funding, improve coordination among State agencies and better share the responsibility for SB 1383 implementation, and expand market opportunities for recycled organic waste, including biomethane. CARB should align the LMR regulation as well as other programs to be consistent with these recommendations. (F_SWANA-3)

Agency Response:

No changes were made in response to this comment. This comment is out of scope of the 15-Day Notice because it does not refer to any of the changes proposed or additional analysis or documents provided in that notice.

6. Miscellaneous

M.6-1 Clarify whether notifications and requests must be provided in writing

Comment: {CARB staff note: The comment below was attached to section 95464(e)(2) of the 15-Day Changes. It refers to Temporary Component Shutdown Notifications.}

Is this written notification? If so, please consider revising throughout the document. (F_SBCAPCD-11)

Comment: {CARB staff note: The comment below was attached to section 95467(a) of the 15-Day Changes. It refers to submitting a request for semi-continuous operation of the GCCS.}

Same comment as above. If this is a written request, please consider revising to state. (F_SBCAPCD-13)

Agency Response to Combined Comments:

No changes were made in response to these comments. Section 95470(b)(9) of the Proposed Amendments requires that “[a]ll reports, notifications, and requests to the Executive Officer shall be submitted electronically through the Landfill Methane Regulation reporting webpage.” Therefore, these are written notifications and requests.

M.6-2 Plan approvals need specific review and approval/denial mechanism

Comment: The regulation requires a variety of plans, including a component leak monitoring plan and a cover integrity monitoring plan, but there is not a specific review and approval/denial mechanism by the "Executive Officer” for the plans. This should be clarified or remedied. (F_YSAQMD-4)

Agency Response:

No changes were made in response to this comment. The Proposed Amendments do not require component leak monitoring plans and cover integrity monitoring plans to be proactively submitted for review and approval. However, CARB or an implementing air district can request the plan which then must be provided by the owner or operator.

M.6-3 Avoid interagency disputes and unfairly penalizing responsible operators

Comment: The amended LMR will result in unprecedented monitoring, recordkeeping, and reporting of a variety of data generated at landfills across California. CARB will take on a new level of oversight over systems that are also regulated by other agencies, resulting in an urgent need for interagency coordination and streamlining of compliance approaches to ensure operators are not caught in the middle of interagency disputes. Given that, even under the current LMR, operators could be subject to daily penalties for non-compliance, CARB must ensure that responsible operators investing in compliance – striking the difficult balance of

controlling both methane and oxygen – while operating critical public infrastructure safely and efficiently are not unfairly penalized. (F_WM-1)

Agency Response:

No changes were made in response to this comment. CARB coordinates closely with other agencies that regulate landfill operations and will continue to do so in implementing these Proposed Amendments. In cases of non-compliance, civil penalties are assessed based on the facts of the case and consistent with *CARB's Enforcement Policy* and applicable Health and Safety Code provisions. Further discussion on penalties is beyond the scope of this rulemaking.

M.6-4 Support workforce capacity

Comment: Successful implementation depends on workforce capacity. CARB may coordinate with workforce agencies to support training programs, certification pathways, and alignment with circular economy infrastructure deployment. (F_Su-5)

Agency Response:

No changes were made in response to this comment. This comment is out of scope of this rulemaking because it is not specifically directed at the proposed CARB action or the procedures followed by CARB in proposing or adopting the action.

M.6-5 Use Carbon-14 testing method to determine the biogenic content of landfill methane

Comment: Our recommendation is that the Regulation on Methane Emissions from MSW Landfills should require routine biogenic content testing requirements following the ASTM D6866 Method B standard (or similar equivalent standards) for any landfill methane emitted, directly combusted or upgraded to biomethane fuels. Routine direct biogenic testing requirements are the only reliable method of incentivizing the use of landfill gases and emissions reduction targets. Routine biogenic testing requirements currently play a critical role in prominent programs with similar goals.

In Section 95471 on Test Methods and Procedures, 95471(j) on Open Flares states that "the analysis shall identify any unusual changes (outside the range of each well typical historical month-to-month variation) in gas flow rate, gas composition and gauge pressure and determine the reasons for any changes." Based on this requirement, routine biogenic content measurements should be required as a tool to reveal if any biogeochemical reactions are responsible for changes in gas composition as opposed to physical piping aspects of the landfill flares. This is important to consider because renewable emissions provide a net neutral impact, and are not penalized under the California Cap-and-Trade and the EPA Greenhouse Gas Reporting Program (GHGRP).

Our recommendation is to define the renewable portion of methane emissions from MSW landfills as the biogenic carbon content measured by ASTM D6866 test results. Routine direct testing is the only way to accurately determine the biogenic portion of waste and landfill gas and is an important tool for regulators to incentivize only the renewable portion of subsequent fuels and emissions. Testing requirements currently play an important role in prominent clean fuel standard and greenhouse gas reporting programs regulating landfill gas, MSW and

subsequent fuels and emissions. Two internationally prominent programs with quarterly biogenic testing requirements for biogas/RNG fuels produced from landfill gas, and for biofuels produced from MSW include (please see specific rules hyperlinked):

- The US RFS currently requires quarterly routine direct testing following ASTM D6866 for fuels produced from co-processing, municipal solid waste (MSW), biogas and renewable natural gas (RNG).

- The EU's RED requires quarterly routine direct testing for any fuels produced from co-processing or biogas and renewable natural gas (RNG).

Biogenic testing also plays a critical role in emissions reporting regulations that address direct combustion of landfill gas and waste-to-energy facilities because direct measurement is the only way to quantify the renewable portion of these emissions, and therefore the reductions provided by the facility.

For reference, current requirements of quarterly biogenic testing for MSW combustion under similar prominent programs include (please see specific rules hyperlinked):

- The US Greenhouse Gas Reporting Program (GHGRP) currently requires quarterly routine direct testing following ASTM D6866 for biogenic emissions from co-firing and municipal solid waste (MSW) combustion.

- California's Cap-and-Trade Program requires quarterly routine direct testing following ASTM D6866 for biogenic emissions from co-firing and MSW combustion.

- Canada's Greenhouse Gas Reporting Program (GHGRP) requires quarterly routine direct testing following ASTM D6866 for biogenic emissions from any renewable or biogenic fuels derived from biomass including landfill gas and biogas, as well as for any fuels or fuel mixtures containing an unknown biogenic component.

- The EU's Emissions Trading System (ETS) requires quarterly routine direct testing for biogenic portions of obligated materials, fuels and emissions.

Another important methodology in the waste sector that we recommend the DCCEEW team review is the UNFCCC ACM0022 protocol on "Alternative waste treatment processes" (pages 41-42). This protocol requires biogenic testing following ASTM D6866 to determine the biogenic and fossil fractions of MSW for any cases where the biogenic content of waste cannot be classified or is unknown, which is critical to quantifying the sustainability of landfill gas combustion.

Radiocarbon testing can also play a role in separating carbon sources within the system and, when combined with total carbon content, can help determine the rate of atmospheric carbon removal and establish a baseline scenario for GHG removals. Furthermore, a study by Kerfoot and all., Methane gas in landfills also gives insight into the Carbon-14 testing application to identify the source of hydrocarbons, especially in cases of carbon leakage.8 It is important to consider the risks of leakage during CO2 transportation. The study aimed to evaluate the environmental tracers at a site where soil gas source and migration evaluation is complicated by the presence of multiple methane sources and a complex geological setting.

The study collected data in the studied areas using gas probes. Since the decomposition of organic matter produces methane and carbon dioxide, the relative concentrations and stable and radiogenic isotope composition can help track methane migration and detect changes in

the gas composition and the source of methane. The study found dramatic differences in gas composition only in the transect. The study concluded that 37% of the methane measured was sourced from the landfill biogas, highlighting how dramatically the radiocarbon value of methane can vary at a single site for both concentration and the biogenic portion. This study highlights the need for constant monitoring, especially for projects close to oil/gas pipelines, and/or other sources of contamination, and during the transportation of CO2 to detect potential leaks and to accurately determine the biogenic portion of carbon dioxide removed from the atmosphere.

In conclusion we recommend that CARB use direct biogenic testing to determine the eligible organic carbon content of landfill-generated methane under this regulation. Only direct measurements can enable the agency to incentivize the renewable portion of landfill-generated methane, without incentivizing their fossil methane emissions. Including biogenic testing following ASTM D6866 as one of the test methods required to monitor potential changes in gas composition would enable CARB to more effectively regulate methane emissions from MSW landfills. (F_Beta Analytic-1)

Agency Response:

No changes were made in response to this comment. This comment is out of scope of the rulemaking because it refers to determining the biogenic content of landfill gas, which does not play a role in the requirements of the LMR.

VI. Peer Review

Health and Safety Code section 57004 sets forth requirements for peer review of identified portions of rulemakings proposed by entities within the California Environmental Protection Agency, including CARB. Specifically, the scientific basis or scientific portion of a proposed rule may be subject to this peer review process. Here, CARB determined that the rulemaking did not contain a scientific basis or scientific portion subject to peer review, and thus no peer review as set forth in section 57004 was or needed to be performed.