

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

Resolution 25-14

November 20, 2025

Agenda Item No.: 25-8-1

Whereas, sections 39600 and 39601 of the Health and Safety Code authorize the California Air Resources Board (CARB or Board) to adopt standards, rules, and regulations and to do such acts as may be necessary for the proper execution of the powers and duties granted to and imposed upon the Board by law;

Whereas, the Legislature has enacted the California Global Warming Solutions Act of 2006 (Assembly Bill (AB) 32, Núñez, Stats. 2006, ch. 488),¹ which declares that global warming poses a serious threat to the economic well-being, public health, natural resources, and the environment of California;

Whereas, AB 32 added Division 25.5 to the Health and Safety Code, including section 38501, which expresses the Legislature's finding that global warming poses a serious threat and the Legislature's intent that the Board coordinate with State agencies and consult with the environmental justice community, industry sectors, business groups, academic institutions, environmental organizations, and other stakeholders in implementing AB 32; and design emissions reduction measures to meet the statewide emissions limits for greenhouse gases (GHG) in a manner that minimizes costs and maximizes benefits for California's economy, maximizes additional environmental and economic co-benefits for California, and complements the State's efforts to improve air quality;

Whereas, California experiences a wider range of the effects of climate change and suffers these effects to a greater degree than other states in the nation, including extreme and prolonged drought, dwindling supplies of fresh water from loss of snowpack, more extensive and severe wildfires, and rising storm surges and sea levels;²

¹ Health & Saf. Code § 38500 et seq.

² See, e.g., discussion of evidence in 78 Fed. Reg. 2,112, 2,129 (Jan. 9, 2013); State of California Governor's Office of Planning and Research, California Energy Commission, California Natural Resources Agency, California's Fourth Climate Change Assessment Statewide Summary Report (hereinafter "Fourth Climate Change Assessment Statewide Summary"), Report # SUM-CCCA4-2018-013, August 27, 2018, available at: https://www.energy.ca.gov/sites/default/files/2019-11/Statewide_Reports-SUM-CCCA4-2018-013_Statewide_Summary_Report_ADA.pdf.

Whereas, the increase in the size and severity of California wildfires is directly responsible for adding to the air thousands of tons of the criteria air pollutants designated under the federal Clean Air Act,³ including particulate matter (PM), oxides of nitrogen (NOx), and volatile organic compounds, which threaten public health well beyond California's borders;⁴

Whereas, as the United States Environmental Protection Agency (U.S. EPA) has recognized, the effects of climate change and rising temperatures from GHG emissions make it more difficult to reduce ozone air pollution that threatens public health;⁵

Whereas, methane is a GHG with a global warming potential at least 25 times greater than that of carbon dioxide on a 100-year timescale and scientists estimate that increasing methane concentrations in the atmosphere is responsible for approximately 25% of climate warming;

Whereas, short-lived climate pollutants, including methane, pose an especially potent threat to the stability of the global climate, are emitted in large quantities from certain sources in California, and, if controlled, offer significant opportunities to protect public health and slow the pace of climate change;

Whereas, landfills are California's second largest source of human-caused methane emissions;

Whereas, landfill gas consists of mostly methane and carbon dioxide, with trace amounts of other compounds including volatile organic compounds, toxic air contaminants, and odorous compounds;

Whereas, strategies to control methane emissions also effectively reduce emissions of other pollutants including volatile organic compounds, toxic air contaminants, and odorous compounds;

Whereas, it has been estimated that 2 million people live within one mile of a landfill in the United States,⁶ reducing emissions of co-pollutants from landfills supports equity and environmental justice, and CARB staff has estimated that the Proposed Amendments would reduce volatile organic compound emissions by approximately 730 metric tons per year;

Whereas, CARB and California have greatly improved air quality in the State over the past half century. Smog alerts, which peaked at one almost every other day during the 1960s, have been eliminated, while during this time the State has grown its economy while becoming a world leader in environmental policies and clean technologies;

Whereas, despite California's great progress reducing air pollution, more than half (21 million out of nearly 40 million) of all Californians live in urban and rural downwind areas that exceed the most stringent National Ambient Air Quality Standard for ozone of 70 ppb and California has the only two areas in the nation that are designated in extreme nonattainment of this standard;

Whereas, despite the significant public health improvements produced by CARB's air quality programs, California's disadvantaged communities, low-income communities, and

³ 42 U.S.C. § 7401, et seq.

⁴ See Fourth Climate Change Assessment Statewide Summary.

⁵ See 74 Fed. Reg. 32,744, 32,763 (July 8, 2009).

⁶ Environmental Defense Fund, America's Hidden Landfill Emissions, webpage accessed September 16, 2025, available at: <https://landfills.edf.org/>.

communities of color continue to experience disproportionate impacts from air pollutants and GHGs, among other inequities that increase residents' health vulnerabilities;

Whereas, the Legislature enacted AB 197 (E. Garcia, Stats. 2016, ch. 250),⁷ which declares that continuing to reduce GHG emissions is critical for protecting all areas of the State, but especially for the State's most disadvantaged communities, as those communities are affected first and most frequently by adverse impacts of climate change, including increased frequency of extreme weather events such as drought, heat waves, and flooding;

Whereas, AB 32 added section 38565 to the Health and Safety Code, directing CARB to ensure, where applicable and to the extent feasible, that CARB's GHG emissions reduction regulations and programs direct public and private investment toward the most disadvantaged communities in California and provide an opportunity for community institutions to benefit from statewide efforts to reduce GHG emissions;

Whereas, CARB recognizes the imperative to meaningfully integrate equity and environmental justice considerations into programs and policies in partnership with affected communities;

Whereas, CARB remains committed to transparency, including by making emissions and other reported data available to the public as consistent with legal requirements;

Whereas, CARB will share reported data with federal, state, and local agencies to support interagency coordination on regulation and oversight of landfills;

Whereas, higher priority must be placed on identifying all feasible actions CARB can take as soon as possible, regulatory and otherwise, and promoting environmental justice and equity in each action, consistent with statute;

Whereas, in recognition of the devastating impacts of climate-changing emissions on California, Governor Arnold Schwarzenegger issued Executive Order S-3-05 in 2005 to establish the following targets to reduce GHG emissions: by 2010, reduce GHG emissions to 2000 levels; by 2020, reduce GHG emissions to 1990 levels; and by 2050, reduce GHG emissions to 80% below 1990 levels;

Whereas, Governor Brown issued Executive Order B-30-15 in 2015, which establishes an interim GHG emissions reduction target of 40% below 1990 levels by 2030 to ensure California achieves meaningful early emissions reductions on a trajectory to meet the 2050 targets, which was subsequently adopted by the Legislature in Senate Bill 32 (SB 32, Pavley, Stats. 2016, ch. 249);⁸

Whereas, section 38505 of the Health and Safety Code defines GHGs as including carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride;

Whereas, section 38510 of the Health and Safety Code designates CARB as the State agency charged with monitoring and regulating sources of GHG emissions in order to reduce these emissions;

Whereas, sections 38560, 38562, and 38566 of the Health and Safety Code direct the Board to adopt regulations in an open public process to achieve the maximum technologically

⁷ Gov. Code, Article 7.6 (commencing with §,9147.10) to Chapter 1.5 of Part 1 of Division 2 of Title 2 and to amend Health & Saf. Code §§ 39510 and 39607 and add 38506, 38531, 38562.5, and 38562.7.

⁸ Health & Saf. Code § 38566.

feasible and cost-effective reductions in GHG emissions in furtherance of achieving the statewide limit and, to the extent feasible and in furtherance of achieving the statewide GHG emissions limit, to design its GHG regulations in a manner that is equitable, seeks to minimize costs and maximize the total benefits to California, and encourages early action to reduce GHG emissions;

Whereas, section 38580 of the Health and Safety Code charges CARB with monitoring compliance and enforcing its regulations under AB 32;

Whereas, section 39730 of the Health and Safety Code requires CARB to complete a comprehensive strategy to reduce emissions of short-lived climate pollutants in the state;

Whereas, section 39730.5 of the Health and Safety Code directs CARB to approve and begin implementing the comprehensive short-lived climate pollutant strategy developed pursuant to section 39730 to achieve a reduction in the statewide emissions of methane by 40%, hydrofluorocarbon gases by 40%, and anthropogenic black carbon by 50% below 2013 levels by 2030;

Whereas, on March 23, 2017, through Resolution 17-9, the Board approved the Short-Lived Climate Pollutant Reduction Strategy;

Whereas, section 38562.2 of the Health and Safety Code establishes the policy of the State to achieve carbon neutrality as soon as possible, but no later than 2045, and to maintain net negative GHG emissions thereafter; and to ensure anthropogenic GHG emissions are reduced at least 85% below 1990 emissions levels by 2045;

Whereas, section 38560.5 of the Health and Safety Code requires the Board to publish and make available a list of discrete early action GHG emissions reduction measures by June 30, 2007;

Whereas, section 38560.5 of the Health and Safety Code directs the Board to adopt regulations to implement the discrete early action measures identified on the list, and specifies that the regulations shall be enforceable no later than January 1, 2010;

Whereas, on June 21, 2007, the Board approved the reduction of methane emissions from municipal solid waste (MSW) landfills as a discrete early action measure and directed staff to develop it into a regulation;

Whereas, on June 25, 2009, through Resolution 09-38, the Board adopted the Regulation to Reduce Methane Emissions from Municipal Solid Waste Landfills (Landfill Methane Regulation), published at sections 95460-95476 and Appendix I of title 17, California Code of Regulations, and directed the CARB Executive Officer to adopt the regulation with modifications identified in the resolution and additional conforming modifications and technical amendments made available for a public comment period of 15 days;

Whereas, on May 5, 2010, through Executive Order R-10-007, the CARB Executive Officer adopted modifications to the Landfill Methane Regulation, which became effective on June 17, 2010;

Whereas, the purpose of the Landfill Methane Regulation is to reduce methane emissions to support the State's climate goals;

Whereas, the Landfill Methane Regulation requires owners and operators of certain MSW landfills to install and optimally operate landfill gas collection and control systems (GCCS) to minimize emissions, monitor surface methane concentration and other performance

parameters, repair emission exceedances and other performance issues, conduct source testing of combustion devices used to destroy methane, keep records of these actions and data, and report compliance information to CARB and local air districts;

Whereas, the Landfill Methane Regulation, with limited exceptions, requires MSW landfills with a heat input capacity equal to or greater than 3.0 million British thermal units per hour to operate a gas collection and control system in accordance with the requirements of sections 95464–95476 of the Landfill Methane Regulation and over 95% of California’s disposed waste has been deposited in controlled landfills;

Whereas, local air districts may voluntarily partner with CARB through memoranda of understanding (MOU) to implement and enforce the Landfill Methane Regulation; currently, 22 local air districts have entered into such MOUs;

Whereas, on May 25, 2017, though Resolution 17-16, the Board approved California’s state plan submission pursuant to the federal Emission Guidelines and Compliance Times for Municipal Solid Waste Landfills (40 C.F.R., Part 60, Subpart Cf) (Emission Guidelines);

Whereas, the California state plan demonstrated that Landfill Methane Regulation is procedurally equal to and substantively more stringent than the federal Guidelines, not only achieving but exceeding the reductions specified in the Emission Guidelines, and CARB committed to submit annual reports to satisfy the state’s obligations to implement the federal Emission Guidelines;

Whereas, the Landfill Methane Regulation applies to more landfills, including older and smaller landfills, requires annual source testing to demonstrate that gas control devices achieve greater than 99% methane destruction efficiency, requires collection systems to be expanded based on surface methane standards, requires leak detection and repair of components containing landfill gas, requires surface emissions monitoring to be conducted quarterly with no less than 25-foot spacing intervals and at all cover penetrations, cracks, and other areas with indicators of potential emissions, and contains other provisions more stringent than required under the federal Emission Guidelines;

Whereas, on January 9, 2020, U.S. EPA partially approved and partially disapproved of California’s State Plan.⁹ On May 21, 2021, the U.S. EPA finalized a partial federal plan¹⁰ to partially implement the Emission Guidelines which, in California, fills limited gaps between the requirements in the Landfill Methane Regulation and the federal Emission Guidelines related to wellhead monitoring;

Whereas, in recent years, several other states have adopted landfill methane regulations that strongly resemble the core requirements in California’s Landfill Methane Regulation, including Oregon, Washington, and Maryland;

Whereas, landfills in California are subject to various rules, regulations, standards, and permitting requirements at the local, state, and federal levels, including from U.S. EPA, departments under the California Environmental Protection Agency, and local air districts;

⁹ 85 Fed. Reg. 1,121 (Jan. 9, 2020).

¹⁰ 86 Fed. Reg. 27,756 (May 21, 2021).

Whereas, section 38561 of the Health and Safety Code directs the Board to prepare a scoping plan for achieving the maximum technologically feasible and cost-effective reductions in GHG emissions at least once every five years;

Whereas, on December 15, 2022, the Board adopted, in Resolution 22-21, the 2022 Climate Change Scoping Plan for Achieving Carbon Neutrality, which highlights the importance of reducing organic waste disposal in landfills for long-term methane reduction and emphasizes the need to address emissions from existing landfill waste to deliver immediate climate benefits;

Whereas, since the adoption of the Landfill Methane Regulation, new technologies and monitoring capabilities have been developed for detecting methane emissions sources;

Whereas, over the past decade, CARB has conducted and funded innovative research to better understand sources of methane emissions and advance the deployment of new technologies for emissions detection, which, together with other research, has revealed new opportunities to reduce methane emissions from landfills;

Whereas, research has shown that alerting operators of remotely detected emission plumes enables the rapid mitigation of large emissions sources; a substantial portion of emissions escape from the working face where trash is deposited and compacted daily, which could be captured by installing gas collectors while filling operations are ongoing; downtime of the gas collection and control system appears to be a major cause of plumes found by methane remote sensing; and surface cover quality is a major factor that affects the flux of methane through the landfill surface;

Whereas, a \$100 million investment by the Legislature has made methane plume imagery available to CARB through a commercial satellite vendor;

Whereas, remote monitoring data alone may not reveal exactly what component or piece of equipment is emitting and why those emissions occurred; however, follow-up investigations by owners or operators are expected to provide that information, which is instrumental to better understand the types of equipment and activities that tend to produce large methane plumes;

Whereas, CARB staff has gained experience implementing the Landfill Methane Regulation since 2010 and has, along with local air districts, regulated parties, and other stakeholders, identified areas in the Landfill Methane Regulation to improve clarity, enhance enforceability, update data, improve administrative processes, and increase the effectiveness of methane emissions reduction strategies;

Whereas, between 2022 and 2025, CARB staff conducted four public meetings to summarize the current state of landfill methane emissions science, present concepts for potential regulatory changes, and hear the perspectives of community members that live near landfills; at each public meeting, staff received informal feedback verbally during the event, and in written form after the event;

Whereas, CARB staff held individual meetings with a wide range of interested parties, including landfill operators, technology providers, regulatory partners, academic researchers, environmental advocacy groups, and community groups, to gather input on the scope of the Proposed Amendments and feedback on the technical specifics of concepts put forth by staff;

Whereas, community and environmental justice groups have emphasized the importance of data transparency for building accountability and protecting community health and safety;

Whereas, staff has proposed amendments to the Landfill Methane Regulation (Proposed Amendments), as set forth in Appendix A-1 to the Initial Statement of Reasons (ISOR) released to the public on September 23, 2025;

Whereas, Health and Safety Code sections 39515 and 39516 provide that any power, duty, purpose, function, or jurisdiction of the Board may be delegated to the CARB Executive Officer as the Board deems appropriate, and is presumed delegated unless it has been specifically reserved;

Whereas, CARB's regulatory program that involves the adoption, approval, amendment, or repeal of standards, rules, regulations, or plans has been certified by the Secretary for Natural Resources under Public Resources Code section 21080.5 of the California Environmental Quality Act (CEQA; Cal. Code Regs., tit. 14, §15251, subd. (d)), and CARB conducts its CEQA review according to this certified program (Cal. Code Regs., tit. 17, §§ 60000-60007);

Whereas, CARB, as the lead agency for the Proposed Amendments, has concluded that this action is categorically exempt from the CEQA under the "Class 1" exemption (Cal. Code Regs., tit. 14, § 15301) for modifications to existing facilities, "Class 2" exemption (Cal. Code Regs., tit. 14, § 15302) for replacement or reconstruction of existing structures or facilities, "Class 3" exemption (Cal. Code Regs., tit. 14, § 15303) for new construction or conversion of small structures, "Class 4" exemption (Cal. Code Regs., tit. 14, § 15304) for minor alterations to land, and "Class 8" exemption (Cal. Code Regs., tit. 14, § 15308) for actions taken by regulatory agencies for the protection of the environment. CARB's explanation of the basis for reaching this conclusion is included in Chapter VI of the ISOR;

Whereas, written comments were received during the 45-day comment period that purported to raise concerns with the environmental analysis associated with the proposed amendments. While no response to such comments is necessary because responses to comments are not required for exemption type determinations, for informational purposes staff prepared written responses to those comments that purported to raise concerns with the environmental analysis associated with the proposed amendments, and the Board has reviewed and considered the written responses along with the environmental analysis included in the Staff Report;

Whereas, a public hearing and other administrative proceedings have been held according to the provisions of Chapter 3.5 (commencing with §11340), part 1, division 3, title 2 of the Government Code;

Whereas, in consideration of the Notice of Proposed Rulemaking for these regulations, ISOR, the documents and evidence referenced and incorporated in these documents, and written comments and public testimony on the Proposed Amendments, the Board finds that:

Methane is a GHG that contributes substantially to climate change, emissions of which must be reduced to meet climate targets;

Landfills are a substantial source of methane emissions in California;

Implementation of the Proposed Amendments will reduce methane emissions from MSW landfills, and will reduce emissions of co-pollutants in landfill gas including toxic compounds and compounds that affect air quality;

The Proposed Amendments will provide greater clarity, improved regulatory oversight ability, and leverage available satellite-based methane monitoring data and other technological advances, allowing for more efficient and effective leak detection;

The Proposed Amendments will continue California's leadership in regulating methane emissions from landfills and serve as a potential model for other jurisdictions;

The Proposed Amendments achieve the maximum technologically feasible and cost-effective reductions in GHG emissions, as required by sections 38562 and 38566 of the Health and Safety Code;

The Proposed Amendments were developed in an open public process, in consultation with affected parties, through numerous public workshops, individual meetings, and other outreach efforts, and these efforts are expected to continue;

CARB considered alternatives to the Proposed Amendments. No reasonable alternatives to the Proposed Amendments considered to date, or that have otherwise been identified and brought to the attention of CARB, would be more effective at carrying out the purpose for which the regulation is proposed or would be as effective and less burdensome to affected entities than the proposed regulation.

The Proposed Amendments are consistent with CARB's environmental justice policies and do not disproportionately impact people of any race, culture, income, or national origin; and

There is substantial evidence in the record to support a finding by CARB, as the lead agency under CEQA, that the Proposed Amendments are exempt from the California Environmental Quality Act. The Proposed Amendments qualify for exemption under several categorical exemptions identified in the CEQA Guidelines, including section 15301 (Class 1 – Existing Facilities), section 15302 (Class 2 – Replacement or Reconstruction), section 15303 (Class 3 – New Construction or Conversion of Small Structures), section 15304 (Class – 4 Minor Alterations to Land), and section 15308 (Class 8 – Environmental Protection). The administrative record generally reflects that the Proposed Amendments comply with each exemption independently and separately, and the ISOR provides a sufficient basis for CEQA compliance. Accordingly, it is reasonable for CARB to conclude that the Proposed Amendments are exempt from CEQA, and that no further environmental review is required.

Now, therefore, be it resolved that the Board hereby approves for adoption amendments to sections 95462, 95463, 95464, 95465, 95467, 95468, 95469, 95470, 95471, 95475, and Appendix I, and the repeal and reservation of section 95466, title 17, California Code of Regulations, as set forth in Appendix A-1 of the ISOR released to the public on September 23, 2025.

Be it further resolved that the Board directs the Executive Officer to make reported information publicly available on a website, with updates as new information is submitted.

Be it further resolved that the Board directs the Executive Officer to share reported data with state and local agencies, as needed, to protect public health.

Be it further resolved that the Board directs the Executive Officer to work with air districts that implement the Landfill Methane Regulation through MOUs to coordinate on implementation of the new amendments and identify any new resource needs.

Be it further resolved that the Board directs the Executive Officer to report on Landfill Methane Regulation implementation by mid-2028. The report would include evaluation of monitoring technologies as well as the feasibility of other alternative technologies for methane detection.

Be it further resolved that the Board directs the Executive Officer to continue to evaluate the state of the science on emissions monitoring technologies and support use of those technologies as alternative procedures for surface emission monitoring for the entire landfill surface. Within 24 months of determining that these technologies can be scaled and cost-effectively integrated into monitoring of the entire landfill surface, the Executive Officer shall propose amendments requiring use of such technologies.

Be it further resolved that if there is a possibility that any modifications to the regulation made available for one or more 15-day public comment periods may affect the conclusion of the environmental analysis, the Executive Officer shall prepare and circulate any additional environmental analysis to the extent required by CARB's regulations at title 17, California Code of Regulations, section 60004.

Be it further resolved that the Board directs the Executive Officer to determine if additional conforming modifications to the regulation are appropriate. If no additional modifications are appropriate, the Executive Officer shall take final action to adopt the regulation, as set forth in Appendix A-1 of the ISOR released to the public on September 23, 2025. If the Executive Officer determines that additional conforming modifications are appropriate, the modified regulatory language shall be made available for public comment, with any additional supporting documents and information. The Executive Officer shall consider written comments submitted during the public review period and make any further modifications that are appropriate available for public comment for at least 15 days. The Executive Officer may present the regulation to the Board for further consideration if warranted, and if not, the Executive Officer shall take final action to adopt the regulation after addressing all appropriate conforming modifications.

I hereby certify that the above is a true and correct copy of Resolution 25-14, as adopted by the Air Resources Board.

Catalina French 2025-12-03

Catalina French, Clerk of the Board