California Environmental Protection Agency
AIR RESOURCES BOARD

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

PUBLIC HEARING TO CONSIDER THE ADOPTION OF A REGULATION TO REDUCE METHANE EMISSIONS FROM MUNICIPAL SOLID WASTE LANDFILLS

Public Hearing Date: June 25, 2009
Agenda Item No.: 09-6-3

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I. GENERAL

In this rulemaking, the Air Resources Board (ARB or Board) adopted a new regulation to reduce methane emissions from municipal solid waste (MSW) landfills. This regulation is a discrete early action greenhouse gas (GHG) emission reduction measure, as described in the California Global Warming Solutions Act of 2006 (Assembly Bill 32, Núñez, Ch. 486, Stats. 2006), that helps reduce GHG emissions from MSW landfills by requiring owners and operators of certain smaller and other uncontrolled landfills to install gas collection and control systems. The regulation also includes requirements to ensure that existing and newly installed gas collection and control systems are operating optimally.

On May 8, 2009, ARB published a notice for a June 25, 2009, public hearing to consider the regulatory action. The Initial Statement of Reasons for the Regulation to Reduce Methane Emissions from Municipal Solid Waste Landfills (Staff Report) was also made available for public review and comment beginning May 8, 2009, and provides the rationale for the regulation. The text of the regulation to be added to new subarticle 6, title 17, California Code of Regulations (CCR), subchapter 10, article 4, Methane Emissions from Municipal Solid Waste Landfills, sections 95460 to 95476 was included as Appendix A to the Staff Report. These documents were also posted on the ARB's Internet website for the rulemaking at: http://www.arb.ca.gov/regact/2009/landfills09/landfills09.htm. The Staff Report is incorporated by reference herein.

On June 25, 2009, the Board conducted a public hearing and received oral and written comments. At the conclusion of the hearing, the Board adopted Resolution 09-38, in which it approved the regulation originally proposed in the Staff Report and staff's recommended modifications in response to comments received since the Staff Report was published. In accordance with section 11346.8 of the Government Code, the Resolution directed the Executive Officer to adopt the regulation and approved new sections, as modified, and to make such modifications available for a supplemental

comment period of at least 15 days. Resolution 09-38 is available at ARB's internet web page for this rulemaking: http://www.arb.ca.gov/regact/2009/landfills09/landfills09.htm.

Several modifications to the originally proposed regulation were made to address comments received during the 45-day public comment period and at the hearing to clarify the regulatory language and to provide landfill operators additional flexibility to comply with the regulation. These modifications include: clarifying the status of inert waste as exempt; clarifying the administrative process for amended Design Plans; clarifying that the regulation is a regulatory floor; and incorporating several additional minor modifications intended to improve the clarity and readability of the regulation. As directed by the Board, staff also modified the originally proposed regulation to provide additional flexibility for certain sources to qualify for the regulation's compliance incentives and to allow the exclusion from or modification of certain monitoring procedures based on site-specific conditions (e.g., monitoring in areas that present a safety risk) to be part of a source's alternative compliance request.

The text of all the modifications to the originally proposed regulation was made available for a supplemental 15-day comment period by issuance of a Notice of Public Availability of Modified Text and Availability of Additional Documents and Information (or "First 15-Day Notice"). Attachment 1 to the First 15-Day Notice contained the text of all proposed modifications made to CCR, title 17, sections 95462 through 95475. The First 15-Day Notice and Attachment 1 was released on October 5, 2009, to all stakeholders, interested parties, and to other persons generally interested in the ARB's rulemaking concerning requirements applicable to reducing methane emissions from MSW landfills. The First 15-Day Notice listed the ARB Internet website from which interested parties could obtain the complete text of the modifications to the original proposal, with all of the modifications clearly indicated. These documents were also published on ARB's internet web page for this rule making http://www.arb.ca.gov/regact/2009/landfills09/landfills09.htm on October 5, 2009. Two comment letters were received during the first 15-day comment period.

A Second Notice of Public Availability of Modified Text and Availability of Additional Documents and Information for the Regulation to Reduce Methane Emissions from Municipal Solid Waste Landfills (or "Second 15-Day Notice"), which is incorporated by reference herein, was released for public comment on April 19, 2010, and remained open through the close of business on May 4, 2010. Attachment 1 to the Second 15-Day Notice contained the text of all proposed modifications made to CCR, title 17, sections 95462 through 95475. These documents were also published on ARB's internet web page for this rule making http://www.arb.ca.gov/regact/2009/landfills09/landfills09.htm on April 19, 2010. No written comments were received during the second 15-day comment period.

After considering the comments received during the 15-day comment periods, the Officer issued Executive Order R-10-007, adopting subarticle 6, title 17, California Code

of Regulations (CCR), subchapter 10, article 4, Methane Emissions from Municipal Solid Waste Landfills, sections 95460 to 95476.

This Final Statement of Reasons (FSOR) updates the Staff Report by identifying and providing the rationale for the modifications made to the originally proposed regulatory text, including non-substantial modifications and clarifications made after the close of the 15-day comment periods. This FSOR also contains a summary of the comments received by the Board on the regulation and the modifications and ARB's responses to those comments.

Fiscal Impacts. The Board has determined that this regulatory action will not result in a mandate to any local agency or school district the costs of which are reimbursable by the state pursuant to Part 7 (commencing with section 17500), Division 4, Title 2 of the Government Code.[1] A small number (less than six) of affected landfills are owned and/or operated by school districts or universities, based on landfill registration data. Thus, no significant impacts to school districts or universities are expected. The cost of the regulation does not constitute a reimbursable mandate because the regulation applies to all entities owning or operating the affected landfills and does not impose unique requirements on local agencies. Further discussion of the economic impacts of the regulation can be found in Chapter VII of the Staff Report.

Consideration of Alternatives. The regulatory language proposed in this rulemaking was the subject of discussions involving ARB staff and representatives from the solid waste industry, local air districts, local enforcement agencies, the California Integrated Waste Management Board (CIWMB), the United States Environmental Protection Agency (U.S. EPA), environmental organizations, and other interested parties. A discussion of alternatives to the regulatory proposal is found in Chapter V of the Staff Report. These included a "no action" alternative; establishing an instantaneous surface methane standard of 200 ppmv (compared to the 500 parts per million by volume (ppmv) in federal and local air district rules); phase-in of a 25 ppmv integrated surface sampling standard; a standard wellhead methane concentration; and extended time to install gas collection and control systems at closed and inactive MSW landfills.

For the reasons set forth in the Staff Report, in staff's comments and responses at the hearing, and in this FSOR, the Board has determined that none of the alternatives considered by ARB staff, or otherwise identified and brought to the attention of ARB staff, would be more effective in carrying out the purpose for which the regulatory action

[1] Section 11346.9(a)(2) of the Government Code (APA) provides that the FSOR shall contain a "determination as to whether adoption, amendment, or repeal of the regulation imposes a mandate on local agencies or school districts. If the determination is that adoption, amendment, or repeal of the regulation would impose a local mandate, ARB staff shall state whether the mandate is reimbursable pursuant to Part 7(commencing with Section 17500) of Division 4. If ARB staff finds that the mandate is not reimbursable, it shall state the reasons for that finding".

was proposed or would be as effective and less burdensome to affected private persons than the action taken by the Board.[2]

II. MODIFICATIONS TO THE ORIGINAL PROPOSAL

As previously discussed, the Board approved the adoption of the regulation. Subsequent to the hearing, staff proposed modifications to the original proposal to address comments received during the 45-day public comment period and at the hearing. These modifications were explained in detail in the first notice that was issued for a 15-day public comment period that began on October 5, 2009, and ended on October 21, 2009. These modifications and clarifications are summarized below:

A. Substantial Modifications to Title 17, California Code of Regulations, Sections 95462 through 95475

1. Section 95471(c)(1)(B)2. was modified to qualify owners and operators for the increased surface monitoring walking pattern spacing of 100 feet if they could demonstrate compliance in the past three years prior to the effective date of the regulation with only the 500 ppmv instantaneous surface emission limit specified in section 95465(a)(1). This change will reduce the need for extra field staff and other resources to comply with the monitoring requirements. However, landfill owners and operators of closed and inactive landfills must still demonstrate one year's worth of compliance with both surface methane limits in order to qualify for the decreased monitoring frequency from quarterly to annually.

2. The sentences, "Portions of slopes that are 30 degrees and greater, wet or icy surfaces, construction areas, and other dangerous areas may be excluded from landfill surface inspection," and "Paved roads that do not have any cracks, pot holes, or other penetrations may also be excluded," have been deleted in section 95471(c)(1)(C) and moved to section 95468. This change was in response to comments that all exclusions in the regulation, such as alternative walking patterns, should be handled under section 95468 (Alternative Compliance Options) to require the landfill owner or operator to affirmatively provide information up front to the Executive Officer to justify and document the exclusion, rather than assuming the exclusions apply.

3. To clarify that inert waste such as construction and demolition (C&D) waste may contain minor amounts of decomposable waste, such as wood and other decomposable material, the term "Inert Waste" was added to section 95475 and has the same meaning as "Inert Waste" in Title 27, California Code of Regulations, Division 2, Subdivision 1, Chapter 3, Subchapter 2, Article 2,

[2] Section 11346.9(a)(4) of the Government Code (APA) provides that the FSOR shall contain a "determination with supporting information that no alternative considered by the agency would be more effective in carrying out the purpose for which the regulation is proposed or would be as effective and less burdensome to affected private persons than the adopted regulation".

Section 20230(a). Furthermore, the definition for "Non-decomposable Solid Waste" was modified to better characterize waste types that are unlikely to produce methane.

4. For clarification, section 95464(a)(1)(H) was deleted, and section 95464(a)(5) has been added to require landfill owners or operators to submit the amended Design Plan to the Executive Officer within 90 days of any event that requires a change to the existing Design Plan.

5. Section 95473 was modified to indicate that implementation and enforcement of other federal, State, or local laws cannot result in a standard, requirement, or prohibition less stringent than provided in the regulation, as determined by the Executive Officer. This modification conforms with other State law establishing the supremacy of state air pollution control requirements over District rules in cases of conflict, and the inability of Districts to grant variances from ARB rules (see Health and Safety Code Sections 39002, 41508, and 42350).

B. Minor Modifications to Title 17, California Code of Regulations, Sections 95462 through 95475, and Additional Documents Added To the Record

Staff also made various minor modifications to the regulatory text to remove typographical errors and to improve clarity. These modifications and additional documents are described in the First 15-Day Notice.

C. Non-substantial or Solely Grammatical Modifications Made After the Close of the 15-Day Comment Period

In addition to the modifications described above, the following non-substantial or solely grammatical corrections were made after the close of the first 15-day comment period to five references in the Staff Report:

- ARB, 2008a. The date "February 13, 2008," was corrected to reflect the actual date of the reference that was relied upon "September 13, 2007."

- ATSDR, 2001. "Page 6" was changed to "Page 58."

- USDL, 2009a. The date "March 22, 2009," was corrected to reflect the actual date of the reference that was relied upon "April 28, 2009."

- U.S. EPA, 1991. The document number "EPA-450/3-90-011" was corrected to "EPA-450/3-90-011a."

- Walker, 2007. The year "2007" was corrected to "2006."

D. Second 15-Day Modifications to the Regulation

In the Second 15-Day Notice, ARB proposed the following modifications to the regulatory text as set forth in Appendix A to the Staff Report: Initial Statement of Reasons, released on May 8, 2009:

- Section 95471(f)(1) was modified by inserting the corresponding starting page numbers in the Federal Register for each test method to improve clarity.

- The regulation as originally adopted cited 40 Code of Federal Regulations (CFR) § 60.18 incorrectly in sections 95464(b)(2)(B), 95470(a)(2)(E), and 95471(f)(2) as: "last amended 65 Fed.Reg. 61752, October 17, 2000." Sections 95464(b)(2)(B), 95470(a)(2)(E), and 95471(f)(2) were modified to correct the citation by replacing the erroneous citation with the following: 73 Fed.Reg. 78209, December 22, 2008.

E. Additional Document Added to the Record

In the interest of completeness, staff has also included to the rulemaking record the following document as part of the Second 15-Day Notice, which is referenced in the approved regulation:

- 73 Fed. Reg, 78209, December 22, 2008.

III. SUMMARY OF COMMENTS AND AGENCY RESPONSE[3]

The ARB received written comments during the 45-day comment period in response to the June 25, 2009 public hearing notice. Written comments were also received during the first 15-day comment period in response to the Notice. No comments were received during the second 15-day comment period. Listed below are persons and organizations that submitted comments.

During the 45-day comment period, the Board received written comments from:

[3] Section 11346.9(a)(3) of the Government Code (APA) provides that the FSOR shall contain a "summary of each objection or recommendation made regarding the specific adoption, amendment, or repeal proposed, together with an explanation of how the proposed action has been changed to accommodate each objection or recommendation, or the reasons for making no change. This requirement applies only to objections or recommendations specifically directed at the agency's proposed action or to the procedures followed by the agency in proposing or adopting the action. The agency may aggregate and summarize repetitive or irrelevant comments as a group, and may respond to repetitive comments or summarily dismiss irrelevant comments as a group. For the purpose of this paragraph, a comment is "irrelevant" if it is not specifically directed at the agency's proposed action or to the procedures followed by the agency in proposing or adopting the action".

	Name and Affiliation	Written Comment Date Submitted
1	Mark Hunt, Riverside County Waste Management Department (RCWMD)	May 13, 2009 June 24, 2009
2	Frank Caponi, Los Angeles County Sanitation Districts (LACSD)	May 22, 2009
3	Michael Black (Black)	June 8, 2009
4	Lenore Lamb, Robert Smith, Pala Band of Mission Indians (PBMI)	June 12, 2009 June 22, 2009
5	Marvin Rose, City of Sunnyvale Dept Public Works (CSDPW)	June 16, 2009
6	Nina Danza, Santa Barbara County Resource Recovery and Waste Management Division (SBRRWMD)	June 19, 2009
7	Frank Caponi, Solid Waste Industry for Climate Solutions (SWICS)	June 22, 2009
8	Renee A. Voyt, Montauk Energy Capital (MEC)	June 24, 2009
9	Vicky Gallagher, San Diego County Department of Public Works (SDDPW)	June 24, 2009

At the June 25, 2009, Board Hearing, the ARB received the following written or oral comments:

	Name and Affiliation	Written Comment Date Submitted
1	Charles Helget, TTI Campus Commons, Republic Services Representative (Republic)	June 30, 2009
2	Rachel Oster, Recology (Recology)	June 30, 2009
3	Chuck White, Waste Management (WM)	June 30, 2009
4	Frank Caponi (LACSD)	June 22, 2009
5	Tim Reed, Kern County Waste Management Division (KCWMD)	June 24, 2009
6	Nick Lapis, Californians Against Waste (CAW)	June 24, 2009
7	Larry Sweetser, Rural Counties Environmental Services Joint Powers Authority (RCESJPA)	June 30, 2009
8	Jill Whynot (SCAQMD)	June 23, 2009
9	Justin Malan, Price Consulting (PC)	June 30, 2009

During the first 15-day comment period, the ARB received the following written comments:

	Name and Affiliation	Written Comment Date Submitted
1	Dale Solheim, EBA Engineering (EBA)	October 20, 2009
2	Frank Caponi, Solid Waste Industry for Climate Solutions (SWICS)	October 21, 2009

Set forth below is a summary of each comment made regarding the specific regulatory action proposed, together with an explanation of how the proposed action was changed

to accommodate each comment, or the reasons for making no change. The comments have been grouped by topic whenever possible. Comments not specifically related toward the rulemaking or to the procedures followed by the ARB in this rulemaking are not included.

A. Responses to Comments Received During the 45-Day Public Comment Period and Board Hearing

Exemptions

1. **Comment**: Under section 95462(b) "construction and demolition wastes" and "non-decomposable wastes" are essentially exempt from provisions of the regulation. However, even for construction and demolition (C&D) sites, minor decomposable waste may be introduced to the site by contamination of the waste load, which may disqualify the site for the exemption. (SWICS)

Response: ARB staff agrees with this comment. To clarify that inert waste such as C&D may contain minor amounts of decomposable waste, such as wood and other decomposable material, the term "Inert Waste" was added to section 95475 and has the same meaning as "Inert Waste" in Title 27, California Code of Regulations, Division 2, Subdivision 1, Chapter 3, Subchapter 2, Article 2, Section 20230(a). Furthermore, the definition for "Non-decomposable Solid Waste" was modified to better characterize waste types that are unlikely to produce methane.

Gas Collection and Control System

2. **Comment**: The regulation does not address design and operation of newly built or proposed landfills. Additionally, the standard for newly-constructed landfills should be zero allowable GHG emissions through complete recapture of methane gases through the lifetime of the landfill and closed periods. (PBMI)

Response: No change was made in response to this comment. The regulation requires the installation and proper operation of gas collection and control systems at active, inactive, and closed landfills, including "new" landfills. Once an MSW landfill reaches the size threshold of 450,000 tons of waste-in-place and landfill gas heat input capacity of ≥3.0 MMBtu/hr cutoff, the landfill owner or operator is required to submit a Design Plan within one year and install and operate the gas collection and control system within 18 months, if the landfill is active. The threshold of 450,000 tons of waste-in-place was selected because landfills with less waste-in-place are not expected to generate enough landfill gas to operate a gas collection and control system without supplemental fuel.

ARB staff shares the concerns of PBMI in preventing landfills from becoming major emitters of GHGs but disagrees with the recommended zero allowable GHG level. Although it is unlikely that a landfill gas collection system will have a

collection efficiency of 100 percent, the approved regulation strives to optimize the operation and efficiency of existing and newly installed gas collections by establishing stringent surface methane emission standards and monitoring requirements. In the future, we plan to work with CIWMB staff to investigate what regulatory actions can be taken to further reduce methane emissions in support of the approved regulation. Such actions may include: specific requirements for gas collection system design, construction, timing, and operation; landfill unit and cell design and construction; waste placement methods; daily and intermediate cover materials and practices; use of compost or other biologically active materials in cover soils; and organic materials management.

3. **Comment:** The timelines for Design Plans in section 95466(b) do not coincide with the compliance deadlines in section 95465(a). (SWICS)

Response: ARB staff agrees with this comment and has modified the regulation to address this recommendation.

4. **Comment:** We recommend that section 95464 be modified to require source testing every three years with the exception if a gas control device fails within the first year, it will trigger annual source testing until the device demonstrates three consecutive years of source test compliance. (SDDPW)

Response: No change was made in response to this comment. In an effort to reduce compliance costs, the regulation provides owners and operators the opportunity to decrease their source testing frequency from annual to every three years if they can demonstrate that the gas control device remains in compliance after three consecutive annual source tests. Staff believes this is a sufficient time period to demonstrate that the control device is being properly and consistently maintained.

5. **Comment:** We recommend that the wording in section 95463(c)(2)(B)(1) be revised to include provisions for false positive readings as is shown in section 95465(a)(1). (KCWMD)

Response: No change was made in response to this comment.
Section 95471(c)(2)(A) of the regulation already contains a provision to address false positives when conducting instantaneous surface emission monitoring.

6. **Comment:** KCWMD's interpretation is that a landfill that meets the requirements of section 95463(c)(2)(B) would not be required to perform the integrated monitoring required in section 95469. If so, language should be inserted in section 95463(c)(2)(B) to reflect this. (KCWMD)

Response: No change was made in response to this comment. Integrated surface monitoring would not be required for a landfill that meets the

requirements of section 95463(c)(2)(B). Section 95463(c)(2)(B)2. states that if there is no measured concentration of methane of 200 ppmv or greater from the surface of an active MSW landfill, the owner or operator must comply with section 95463(b) and recalculate the landfill gas heat input capacity annually as required in section 95463(b) until such time a gas collection and control system is required to be installed pursuant to section 95463(c)(2)(B)1., or the landfill becomes inactive or is closed and meets the requirements of section 95463(c)(2)(B)3.

7. **Comment:** The requirements for source testing in sections 95464(b)(4) and 95471(f) should state that they are not applicable to open flares. (KCWMD)

Response: No change was made in response to this comment. ARB staff believes that section 95464(b)(4) clearly states that the annual source test requirement is required for only enclosed flares (section 95464(b)(2)(A)) and control devices other than flares (section 95464(b)(3)(A)).

8. **Comment:** In section 95464, the Executive Officer should have the discretion to allow the continued operation of an open flare past the January 1, 2018, cut-off date if methane concentrations are close to the point where combustion will no longer be practical by any other means. (KCWMD)

Response: No change was made in response to this comment. ARB staff believes that section 95464(2)(B)2. already gives the Executive Officer the discretion to allow the continued operation of an open flare past the January 1, 2018 cut-off date if methane concentrations are close to the point where combustion will no longer be practical by any other means.

9. **Comment:** There is no administrative process in the regulation for amending current Design Plans. (Recology)

Response: ARB staff has addressed this issue by deleting section 95464(a)(1)(H) and adding section 95464(a)(5) to require landfill owners or operators to submit the amended Design Plan to the Executive Officer within 90 days of any event that requires a change to the existing Design Plan.

Alternative Compliance Options

10. **Comment:** Section 95468(b) currently states, “Criteria that the Executive Officer may use to evaluate alternative compliance options requests include but are not limited to…” RCWMD requests that this language be changed as follows to be more affirmative, “Criteria that the Executive Officer *will* use to evaluate alternative compliance options requests include but are not limited to…” (RCWMD).

Response: No change was made in response to this comment. ARB staff believes that the use of the word "may" in section 95468(b) permits the Executive Officer the necessary flexibility using the criteria as specified in section 94568 in evaluating alternative compliance options.

11. **Comment:** We encourage ARB to promulgate regulations which allow regulatory staff to be flexible on a case-by-case basis while still protecting public health and the environment. (SDDPW)

Response: No change was made in response to this comment. Landfills are dynamic sources and there are a number of site-specific factors involved in the design and operation of gas collection and control systems. Accordingly, there may be some very limited cases where alternatives to test methods, monitoring requirements, and operational requirements may warrant consideration. Therefore, the regulation contains a provision that allows owners and operators to request such alternatives, subject to approval of the Executive Officer. In addition, the regulation provides flexibility in the areas of source testing, surface emissions monitoring, and selecting the type of control device to be used to control methane emissions. Given the lack of specificity in the comment, the adopted flexibility provisions suffice to address the commenter's concern.

Monitoring

12. **Comment:** The costs to comply with the regulation's monitoring and reporting requirements will be expensive for most landfills in the state. In addition, the regulation inadequately addresses landfills that have extensive historical data documenting compliance and a provision should be made that would allow historical data to be used in lieu of the 25-foot grid spacing or 25 ppmv integrated surface emissions monitoring requirement. Furthermore, a walking pattern of no more than a 25-foot spacing interval as required in section 95471(c)(1)(B) may be appropriate in very arid climates, but for other areas of California it is excessively tight, and seems to be an unproductive use of time and money. Rather than setting up and traversing 50,000 square foot grids of the landfill surface, with 25-foot spacing as required in section 95471(c)(3)(A), we feel that time, efforts, and money could be more effectively spent monitoring and adjusting the gas collection system itself and performing any repairs or improvements deemed appropriate based on that monitoring. (Republic; CSDPW; RCWMD; WM; LACSD; RCESJPA; SDDPW)

Response: ARB staff has addressed this issue as directed by the Board. The regulation has been modified to provide an incentive for establishing a history of compliance with the surface emission standards. If the landfill owner or operator has no exceedances of the surface methane emission standards after four consecutive quarterly monitoring periods, the monitoring procedures provide an incentive which allows the walking pattern spacing to be increased from 25-foot to 100-foot intervals. The increased spacing interval can continue to be used as

long as the landfill remains in compliance with the surface methane emission standards.

13. **Comment:** We recommend that sections 95469(a)(B) and 95469(2)(B) be revised by reducing the 120-day period allowed for installing a new well to a 45-day period which is currently required in SCAQMD Rule 1150.1. (SCAQMD)

Response: The current federal National Environmental Standards for Hazardous Air Pollutants (NESHAP) asbestos regulations (40 CFR 61 Subpart M) requires a 45-day written notification prior to disrupting any area which may contain asbestos materials. As a result, the period for installing a new well was set at 120 days to eliminate potential conflict with the federal requirements and allow sufficient time for planning and obtaining the necessary permits from local agencies.

Recordkeeping and Reporting

14. **Comment**: Section 95470(b)(1) "Closure Notification" should be stricken from the regulation. Closure notification is already reported to the California Integrated Waste Management Board (CIWMB), Regional Water Quality Control Board (RWQCB) and South Coast Air Quality Management District (SCAQMD). (RCWMD).

Response: No change was made in response to this comment. The purpose of the Closure Notification is to document that solid waste will no longer be accepted or disposed of in the landfill. This documentation is necessary before allowing the permanent shutdown and removal of the gas collection and control system so that the landfills methane-generating potential can be properly assessed. The same Closure Notification that is submitted by landfill owners and operators to other agencies may also be submitted to ARB.

15. **Comment:** ARB staff should consider timing the annual reporting requirement in section 95470(b)(3) to that of the U.S. EPA's Title V reporting interval so as to prevent a duplication of effort, presentation, analysis, and to have less of an impact on the resources of landfill owners and operators. (CSDPW)

Response: No change was made in response to this comment. ARB does try to harmonize to the extent possible; however precise harmonization with all rules is not always feasible. In this case, if existing documents contain the information required in section 95470(b)(3), and the location of that information is clearly marked and identified in the document, copies of these reports may be submitted to satisfy the requirements of section 95470(b)(3).

Test Methods and Procedures

16. **Comment:** Section 95471(b) was not clear on how to measure landfill gas heat input capacity where an existing control device is in place, such as flares. In

addition, RCWMD recommends adding the sentence, “Site-specific data can be substituted when available,” at the end of section 95471(e) concerning the determination of the expected gas generation flow rate. (RCWMD).

Response: No change was made in response to this comment. Determination of the landfill gas heat input capacity as required in section 95471(b) does not apply to landfills having existing gas collection and control systems.

17. **Comment:** We recommend that ARB work with the BAAQMD and other agencies to agree on one gross heating value for methane that will be acceptable for all enforcement agencies. (CSDPW)

Response: No change was made in response to this comment. During implementation of the regulation, we will work with other agencies to harmonize such values to the extent feasible.

18. **Comment:** In section 95471(1)(A), we recommend changing “within 3 inches of the landfill surface” to “approximately 3 inches from the landfill surface,” to promote uniformity of the distance of measurement from the landfill surface. (CSDPW)

Response: No change was made in response to this comment. ARB staff believes that the word “within” is clear and more enforceable. It also captures ARB staff’s intent to limit measurements to no more than 3 inches from the landfill surface while recognizing the challenges that a technician will face while attempting to maintain a constant measurement height when walking the surface of the landfill. Using the word “approximately” would allow measurements to be taken at heights greater than 3 inches. It should be noted that any surface methane measurements that exceed the limits specified in section 95465 that are taken within 3 inches (i.e., less than 3 inches) of the landfill surface and are non-repeatable or momentary, would not constitute a violation.

19. **Comment:** We recommend that ARB staff revise the regulation to exclude slopes that are steeper than a 25 percent, rather than using the 30 percent slope criteria. (CSDPW)

Response: ARB staff has addressed this issue by modifying section 95468 to include alternative walking patterns to address potential safety and other issues, such as steep or slippery slopes, monitoring instrument obstructions, and physical obstructions. In addition, the sentences, “Portions of slopes that are 30 degrees and greater, wet or icy surfaces, construction areas, and other dangerous areas may be excluded from landfill surface inspection,” and “Paved roads that do not have any cracks, pot holes, or other penetrations may also be excluded,” have been deleted in section 95471(c)(1)(C) and moved to section 95468.

20. **Comment:** Section 95471(c)(1)(D) should specify the procedure and timing for making a request for alternative wind speed surface testing termination criteria for MSW landfills. (CSDPW)

Response: No change was made in response to this comment. The site-specific nature of the criteria are not amenable to standardized regulatory language. Instead, the Board has directed ARB staff to work with local air districts to develop a guidance document to assist MSW landfill owners and operators in complying with the requirements of the regulation. Procedures and timing for making requests for alternative wind speed surface testing termination criteria for MSW landfills will be addressed in the guidance document.

21. **Comment:** We believe that all exclusions, including section 95471(c)(1)(C) for surface monitoring, should be handled under the alternative compliance options section of the regulation. (SCAQMD)

Response: See response for Comment 19.

Definitions

22. **Comment:** We recommend that the definition of "component" in section 95476(a)(3) conform with that of BAAQMD Regulation 8, Rule 34 (8-34 Regulation), specifically 8-34-228. In addition, more than 10 days (i.e., more likely 20 days) should be allowed for component leak repairs during the rainy season. (CSDPW)

Response: ARB staff did not include vaults under the definition of "component" because stakeholders did not recognize them as being an actual part of the gas collection equipment since they only contain the gas piping. They also expressed concern that inspectors may conduct component leak inspections directly from within the enclosed space of the vaults (resulting in possible higher methane concentration readings and increased violations) as opposed to measuring leaks from above the surface of the vault which is exposed to the atmosphere. ARB staff addressed this issue in section 95475(a)(2).

The regulation allows more time for owners and operators to make component leak repairs in comparison to the BAAQMD Rule 8-34 which allows only seven days for repairs. If additional time is needed for making component leak repairs due to inclement weather, this may be requested under the regulation's alternative compliance options provision (section 95468).

23. **Comment:** We recommend that the definition for "Closed MSW Landfill" be modified by adding the phrase, "or can document that the landfill is no longer receiving solid waste" at the end of section 95476(a)(5). (CSDPW)

Response: ARB staff believes that CSDPW is actually referring to section 95475(a)(6) as published in the Staff Report. For clarity, this section was modified by deleting the phrase, "or can document that the landfill is no longer receiving solid waste" and inserting it at the end of the definition for "Inactive MSW Landfill," section 95476(a)(17).

24. **Comment:** In section 95476(a)(10) there appears to be a grammatical error/typo within the first two lines of the definition. (CSDPW)

Response: ARB staff agrees believes that CSDPW is actually referring to section 95475(a)(11) and otherwise agrees with this comment. In response, section 95475(a)(11) was modified by inserting the word "that" after "measurements."

25. **Comment:** In section 95476, the definitions for "Closed MSW Landfill" and "Inactive MSW Landfill" should include individual waste management units within the landfill facility boundary. These units should not require the same monitoring frequency required as an active portion of the landfill. (KCWMD)

Response: No change was made in response to this comment. ARB staff believes that the definitions for a "Closed MSW Landfill" and "Inactive MSW Landfill" (which actually occur in section 95475) are sufficient as written. Waste management units that meet the definition of a "Closed or Inactive MSW Landfill" must be monitored in accordance with the requirements of sections 95469(a)(1)(C) and 95469(a)(2)(C). These requirements allow for annual monitoring (instead of quarterly) for inactive areas of active landfills if there are no exceedances of the surface emission standards after four consecutive quarterly monitoring periods.

Safety

26. **Comment:** We recommend that section 95471(c)(1)(C) be replaced with the following language to fulfill the regulation's objectives while also maintaining long-term safe work practices:

"Areas that that possess the following characteristics: slopes greater than 30 degrees; wet or icy surfaces; construction areas; natural living hazards such as rodents or snakes; wind speeds of 5 mph or greater; and physical obstructions such as cracks, pot holes, or other penetrations which would distort measurements." (SBRRWMD)

Response: ARB staff has addressed this issue by modifying section 95468 to include alternative walking patterns to address potential safety and other issues, such as steep or slippery slopes, monitoring instrument obstructions, and physical obstructions. In addition, the sentences, "Portions of slopes that are 30 degrees and greater, wet or icy surfaces, construction areas, and other

dangerous areas may be excluded from landfill surface inspection," and "Paved roads that do not have any cracks, pot holes, or other penetrations may also be excluded," have been deleted in section 95471(c)(1)(C) and moved to section 95468.

Modeling Study and Collection Efficiency

27. **Comment:** To date, AERMOD is not being fully utilized because of the lack of validated meteorological data used to run the air dispersion model, so ISCST3 continues to be used in air basins such as the SCAQMD, and in important state programs. (LACSD)

Response: ARB staff does not agree with this comment (and it is not directed at a specific recommended change to the regulation). Industrial Source Complex Short Term 3 (ISCST3) was phased out by U.S. EPA approximately three years ago. AERMOD is currently U.S. EPA's preferred air dispersion model, and has been widely used in California and nationwide. It should be noted that ARB staff did not attempt to evaluate the ISCST3 work done by LACSD because ISCST3 has been phased out. At the time LACSD did its modeling study (2006), ISCST3 was the appropriate model to use. ARB staff recommends that LACSD consult with SCAQMD and U.S. EPA on this issue for any future modeling work.

28. **Comment:** The meteorological data used in ARB staff's study are not consistent in time with the actual surface gas measurements. (LACSD)

Response: ARB staff had requested the actual meteorological data for the Palos Verdes landfill from the LACSD. However, LACSD was not able to provide this data to ARB staff. Therefore, ARB staff selected meteorological data from the meteorological station located at the Los Angeles International Airport (LAX), which is closest to the landfill site (about two miles away). ARB staff was unable to obtain LAX met data for 2002, so 2003 met data was used. ARB staff conducted a sensitivity study to compare wind speed and wind direction at the LAX station for different years (2003-2005) and found that the variations from 2003 to 2005 were small. Note that AERMOD requires much more intensive meteorological parameters than ISCST3 does (LACSD used ISCST3 in their modeling work at Palos Verdes). The parameters such as relative humidity, cloud cover, surface pressures, vertical potential, temperature gradients, sensible heat flux, surface friction velocity, heights of PBL and SBL, Monin-Obuktov length, Bowen ratio, albedo, and surface roughness length are needed when using AERMOD but not for ISCST3. To run AERMOD, it is necessary to use these parameters from nearby stations such as LAX. To merge two or more different met data sets from different stations into the onsite met data sets is not an appropriate air dispersion modeling practice. ARB staff therefore believes that using the met data from the nearby LAX station is consistent with established modeling practices and appropriate given that the onsite met data set with adequate parameters was not available.

29. **Comment:** Some of the measured surface methane levels in the Palos Verdes landfill study were below the background level; therefore, are considered negative net emissions. (LACSD)

Response: ARB staff is not convinced that the actual methane concentration can be less than the background concentration. LACSD staff used a reference citation as justification for the methane being less than background due to the landfill cover soils. ARB staff understands that decomposition or oxidation of methane by the cover soils is usually very slow, while each measurement took only four seconds. ARB staff believes that the negative concentrations were most likely caused by instrument error, especially for measuring low methane concentrations. Therefore, excluding the negative concentrations for the gas collection efficiency calculation is appropriate.

30. **Comment:** In the atmosphere, the air is generally more mixed and dispersive in urban settings, due to enhanced boundary layer turbulence and buoyancy effects, than in rural settings. As a result, the urban mode of the air dispersion modeling would result in lower model-predicted surface concentration reductions due to gas collection, which in the Palos Verdes landfill study also results in lower collection efficiency when compared to that of the rural mode. It is unclear why the results presented in Table 1 of Appendix D of the Staff Report are contrary (i.e., the collection efficiency for urban mode is actually higher than that of the rural model). This should be clarified. (LACSD)

Response: ISCST3 requires modelers to specify urban or rural mode for calculating dispersion coefficients. AERMOD does not have this requirement. The latter estimates composite dispersion coefficients using onsite land use and land cover data. If the urban dispersion option is selected in AERMOD, a modeler only needs to input population information for including the effects of surface heating from urban areas on pollutant dispersion. Many sensitivity studies have shown that the effects are usually small. In fact, our testing of both dispersion modes for this site produced almost identical results.

31. **Comment:** The LACSD Palos Verdes landfill gas collection efficiency study was performed in 2006 using actual surface gas measurement and onsite meteorological data from 2001 and 2002, and resulted in 93 percent to 96 percent collection efficiency, for urban and rural modes, respectively. Another study was conducted in 2007 to validate the integrated surface monitoring (ISM) and ISC methodology using the same approach in 2006, but with actual field measurements using surface flux chambers. The ISM/ISC analysis, using 2006 data, estimated collection efficiencies of 99 percent or higher under both urban and rural modes. (LACSD)

Response: As stated above, ARB staff did not attempt to evaluate LACSD modeling and monitoring work. ARB staff conducted an independent modeling scenario using AERMOD coupled with LACSD's monitoring data for estimating

gas collection efficiency for landfills on a statewide basis. This is a different exercise than specifically attempting to characterize the Palos Verdes landfill, which was the focus of the LACSD studies at this landfill.

32. **Comment:** We have very serious concerns that the methodology used to estimate the expected emissions reductions from the regulation is inaccurate, arbitrary, and would result in a significant barrier to diverting methane-generating materials from landfills. We have fundamental concerns with the methodology for the following reasons:

- There is no reasonable basis to assume that emissions from a closed landfill (i.e., Palos Verdes) represent emissions from all of California's landfills (active and closed) because active landfills have uncontrolled open working faces and areas under daily or intermediate cover;

- Using the AERMOD emissions model to estimate emissions from the Palos Verdes landfill has not been sufficiently vetted for this application by U.S. EPA;

- The baseline estimate of 75 percent collection efficiency is statistically insignificant and no stakeholders have faith in the accuracy of this number; and

- Making the unsubstantiated claim in the Staff Report that California's landfills will have a collection efficiency of at least 85 percent will jeopardize the accuracy of carbon accounting in upcoming offset protocols and Low Carbon Fuel Standard, as well as local and statewide GHG inventories. (CAW; PC)

Response: ARB staff disagrees the emission reduction methodology used will be a barrier to diverting methane-generating materials from landfills or have an impact on the accuracy of carbon accounting. Since site-specific data was not available for most of the 367 landfills in the inventory, ARB staff used a Mathematically Exact First-Order Decay model from the 2006 Intergovernmental Panel on Climate Change (IPCC) Guidelines, and assumptions consistent with the guidelines, to account for the amount of methane captured by gas collection systems, estimate fugitive methane emissions, and estimate statewide reductions resulting from compliance with the approved regulation. The IPCC emissions model was used by ARB staff because it is the most recent model available for estimating emissions from landfills and is currently being used in several countries.

Staff selected the Palos Verdes Landfill as a surrogate for estimating statewide emission reductions at landfills due to the approved rule because integrated surface methane concentration data (required by SCAQMD Rule 1150.1, not available for non-South Coast landfills) was available and the landfill was

required to meet similar standards as those in the approved regulation. Staff's analysis used surface methane emissions data in concert with an AERMOD air quality modeling analysis to estimate the overall methane collection efficiency of the Palos Verdes landfill. Using the actual surface methane measurements and the computer modeling analysis, staff estimated the methane collected and released from the landfill. Using this technique, staff estimated a methane collection efficiency of about 85 percent. Based on this, staff concluded that landfills meeting the requirements of the approved regulation would, on average, be able to achieve 85 percent collection efficiency during periods of active control of the landfill. The 85 percent value was used to estimate the potential emission reductions from implementation of the regulation.

ARB staff acknowledges that there are uncertainties in any landfill methane collection efficiency estimates. U.S. EPA's *Compilation of Air Pollutant Emission Factors* (AP-42) assumes a methane collection efficiency range from 60 to 85 percent, with 75 percent as "typical" for sites having a well-designed active collection control system in place. ARB staff used the 75 percent default value to initially estimate methane emissions from MSW landfills. However, some stakeholders expressed concerns that the actual capture efficiencies are significantly lower than the default value because gas generation starts before control systems are in place, although such generation may be relatively low. Other stakeholders argued that actual capture efficiencies are significantly higher especially for landfills in California because of the relatively arid conditions and because very stringent emissions control standards have been in place since 1990.

ARB Staff used the approach discussed above to try to come up with a better estimate of landfill methane collection efficiency resulting from the approved regulation. Since the approach relies on surface methane measurements, sources of uncertainty include the accuracy of the measurement equipment, the potential for operator error, and the adequacy of a gridded measurement technique to accurately measure fugitive emissions for the entire landfill surface. Since the approach also relied on air dispersion modeling, sources of uncertainty further include the appropriateness of meteorological data used in the modeling and the accuracy of the modeling algorithms for this application. Staff concludes that while uncertainties exist, the approach provides the best estimate of methane collection efficiency currently available.

ARB staff also acknowledges that a statewide collection efficiency estimate of 85 percent for estimating emission reductions from the regulation may not be representative of any specific landfill. In fact, the regulation does not contain a specific control efficiency requirement, but rather employs design requirements, monitoring, recordkeeping, and reporting requirements that taken together will result in the increased collection of methane. The actual collection efficiency for any particular landfill may be less than or greater than 85 percent.

The 85 percent collection efficiency estimate is not intended to represent the current operating collection efficiency for every landfill in the state. Rather, it was used to provide an overall estimate of statewide methane emission reductions due to full compliance with the requirements of the approved rule. Further, the estimate of collection efficiency applies only to the area of the landfill under the influence of a gas collection and control system. It does not apply to areas such as the working face, or other areas that are not under the influence of a gas collection and control system.

ARB staff supports the need to improve understanding of landfill emissions and gas collection efficiencies. Ongoing and developing studies (e.g., CEC's study to provide for robust data for California landfills and more advanced techniques using remote sensing) are expected to help in this effort and will continue to monitor current and future research and the impact that research has on collection efficiency estimates. However, most of these techniques are either in the development stage or currently provide only screening level information. Nonetheless, these and other studies will be closely followed by staff. Furthermore, the recordkeeping and reporting requirements in the regulation will provide valuable site-specific information about landfills that can be used to help in further understanding landfill emissions.

ARB staff is fully supportive of efforts to reduce GHG emissions and to divert organics to other alternatives, such as anaerobic digesters and composting. It is certainly not ARB staff's intent for the collection efficiency estimate to be used to discourage other programs or technologies that could further reduce GHG emissions.

33. **Comment:** We recommend that ARB staff focus on analyzing the differential gas collection rates between landfills that are under SCAQMD jurisdiction and those located elsewhere in the state. (CAW)

Response: As suggested by CAW, ARB staff evaluated an alternative method for estimating the emission reduction benefits of the approved regulation by comparing existing site-specific methane collection rates for South Coast landfills, which are subject to requirements similar to the approved rule, with non-South Coast landfills. Staff used the methane volumetric flow rate before the destruction/control device as the measurement of the methane generation rate. Certain minimum site-specific data was needed for this approach including: landfill size, age, methane collection rates, amount of waste-in-place, and the presence of gas control systems. In most cased staff did not have site-specific data for moisture content or waste composition, so a 50 percent moisture content was assumed for all landfills.

Of the 367 municipal solid waste (MSW) landfills in ARB's inventory, site-specific data was available for 47 landfills. Of the 47 landfills, 34 landfills had waste-in-place data. A landfill size threshold of 450,000 tons of waste-in-place and waste acceptance date of after January 1, 1977, were used to be consistent

with the applicability criteria in the regulation. This left 20 landfills, 11 of which were South Coast landfills and 9 of which were non-South Coast landfills, for analysis. Figure 1 shows the relationship between methane collection rates and waste-in-place.

Figure 1. Comparison of SCAQMD Landfills with non-SCAQMD Landfills

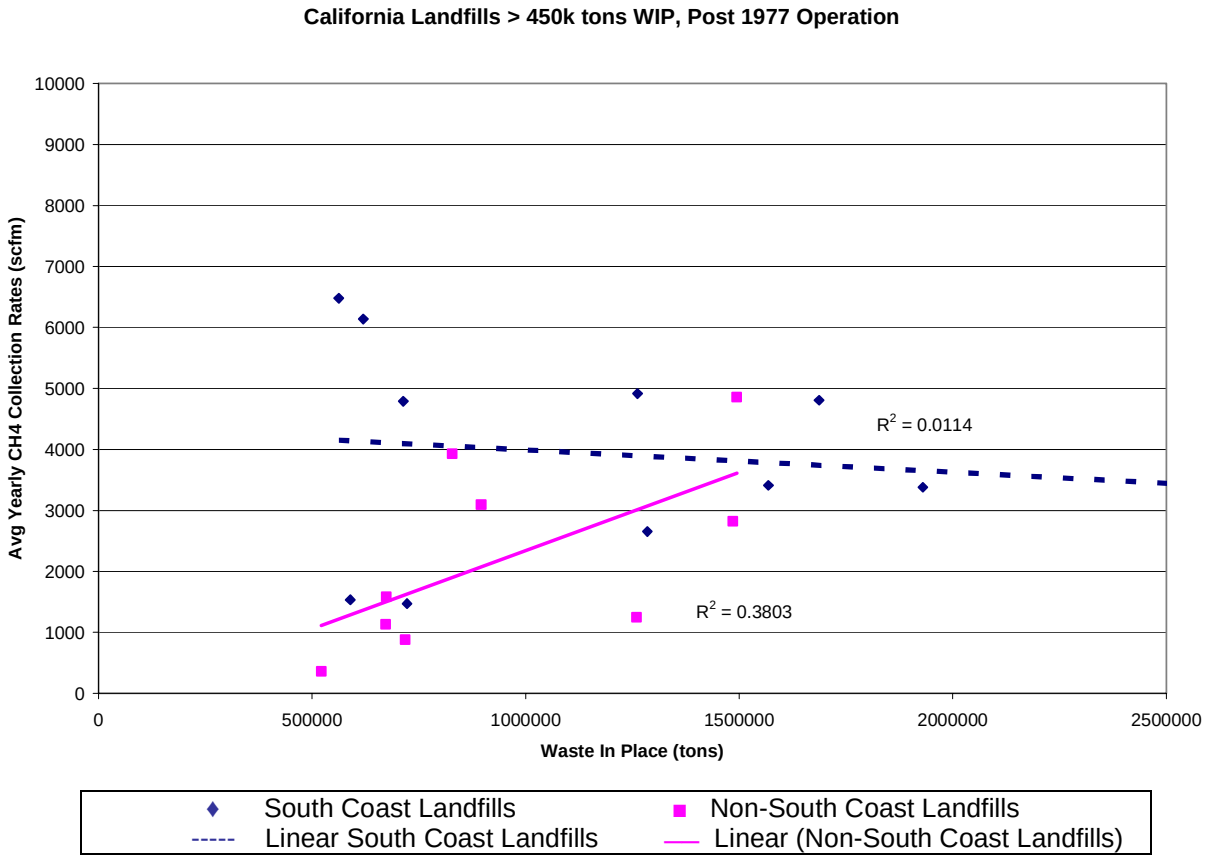

Figure 1 shows that there is little correlation between waste-in-place and collection rate as shown by the low regression values of 0.0114 and 0.3803 for South Coast and non-South Coast landfills, respectively. The lack of correlation between waste-in-place and the collection rates raises concerns about using the small sample of gas collection rates to estimate the emission reductions from the adopted rule and the impact on collection efficiency.

Staff was hopeful to plot the relationship of methane collection rates to other landfill characteristics, however, was not able to do this because a comprehensive set of site-specific data for the other characteristics was not available. Continuing with the alternative method, Table 1 shows the difference

of the average annual methane collection rates for South Coast versus non-South Coast landfills.

Table 1. Landfills With 450,000 tons of Waste-in-Place or Greater and Operating After January 1, 1977

	Average Annual Methane Collection Rates (scfm)	
	500,000 to 1 Million Tons of Waste-in-Place	1 to 2 Million Tons of Waste-in-Place
South Coast Landfills	4,082	3,833
Non-South Coast Landfills	1,829	2,976
Methane Collection Rate Difference	2,253	857

The data suggests that, for landfills in the 500,000 to 1 million tons of waste in place range, enhanced monitoring, similar to the adopted rule, would more than double methane capture. However, in the 1 to 2 million tons of waste in place range, enhanced monitoring, similar to the adopted rule, would provide few additional benefits. This clearly suggest that an approach using only the difference between gas collection rates for landfills in the South Coast and those outside the South Coast cannot be used to reliably estimate the overall collection efficiency of the rule.

Also necessary is site-specific data indicating what is lost as fugitive emissions through the landfill surface (e.g. surface emission measurements) and the landfill methane generation rate. These data are not universally available and the alternative method does not account for their absence. In addition, the higher average collection rates from South Coast landfills do not indicate if the generation rates are higher than non-South Coast landfills due to landfill size or waste composition, which would skew the amount of collected gas to larger values regardless of efficiency of the collection system. Finally, the alternative method does not account for the uncontrolled landfills in the state, which are required by the regulation to install gas control systems.

These shortcomings show that this alternative method, which is based on the single metric “methane collection rate,” cannot be used to estimate statewide emission reductions. In order to use this alternative method, a full range of site-specific data is needed. Unfortunately, the necessary site-specific data are not currently available and is unlikely to become available within the next few years. Accordingly, in absence of the necessary site-specific data, the modeling approach outlined in Chapter IV of the Staff Report to estimate statewide emission reductions is both reasonable and appropriate.

As previously mentioned in the response to Comment 32, since site-specific data was not available for all 367 landfills in the inventory, ARB staff used a Mathematically Exact First-Order Decay model from the 2006 Intergovernmental Panel on Climate Change (IPCC) Guidelines and assumptions, consistent with the guidelines, to account for the amount of methane captured by gas collection systems, estimate fugitive methane emissions, and estimate statewide reductions. The Palos Verdes landfill case study presented in the Staff Report represented a landfill that operated under similar requirements as those in the approved regulation and was used as a reasonable approach to estimate statewide emission reductions. The analysis used surface methane emission data in concert with an AERMOD air quality modeling analysis to estimate the overall methane collection efficiency of the Palos Verdes landfill. Surface methane emission data such as that required by SCAQMD Rule 1150.1 for the Palos Verdes landfill would not be available for the non-South Coast landfills.

34. **Comment:** We feel that the collection efficiency value used in the analysis to estimate the statewide emission reduction benefits of the regulation has been underestimated. (LACSD)

Response: See response to Comment 32.

35. **Comment:** U.S. EPA does not recommend using AERMOD for measuring fugitive emissions from landfills and instead recommends the use of Tunable Diode Lasers (as described in Other Test Method 10). Also, none of the data that was used in the AERMOD analysis has been made public and the staff has not provided any sort of uncertainty analysis. (CAW)

Response: AERMOD is an air dispersion model is not used for measuring fugitive emissions from the surface of a landfill. As discussed in the response to Comment 32, ARB staff used AERMOD as part of an air quality analysis to estimate the overall collection efficiency of the Palos Verdes landfill. The input data used in the modeling analysis was included as reference to the Staff Report. Due to its size it is only available by request. To date, no requests for this data have been received.

Optical Remote Sensing (ORS), which uses tunable diode lasers, is an emerging measurement technique still at the developmental stage. It is currently under evaluation by U.S. EPA and the landfill industry with respect to its use for estimating fugitive emissions from a landfill. ARB staff is monitoring the development efforts of this technology and understands that it is currently limited to flat topographies, low wind speeds, and is weather sensitive. ARB staff also understands that ORS requires significant capital investment and on-going operational costs. Given its developmental state, it is inappropriate to use data from ORS as a basis for the regulation.

Economic Impacts

36. **Comment:** In the Staff Report, ARB staff wrongly assumes that the only costs that will be borne by controlled landfills are from on-going monitoring activities and completely ignores the significant cost from remediation of areas that have exceeded either of the surface methane emission standards. (SWICS)

Response: ARB staff has acknowledged and included an average estimated cost ($50 per acre per quarter) for landfill surface cover repair work in non-SCAQMD landfills. In meeting the requirements of the SCAQMD Rule 1150.1, landfills in this District are already maintaining landfill cover at a level basically equivalent to what is required in the regulation.

37. **Comment:** An estimate for small closed landfills previously not required to collect landfill gas, but now subject to this regulation, shows that the installation of a new landfill gas collection system can result in a 10-year cost of $2.3 million, or a cost effectiveness of $203 per metric ton of CO_2 equivalent ($MTCO_2E$), not ARB staff's estimate of $9 per $MTCO_2E$. (SWICS)

Response: Gas collection and control system installation at small, closed landfills typically present some of the highest per-acre costs which would result in the cost-effectiveness being biased high. It is a typical practice to estimate collection efficiency on an overall basis and it is also possible that some sources may have higher (or lower) costs than others. Therefore, staff's estimate includes all affected landfills, including those that will achieve significant emission reductions at minimal additional cost.

38. **Comment:** SWICS believes that presenting a single number in the Staff Report to reflect every landfill in the state given the differences in sites and level of effort to bring those sites into compliance with the regulation is extremely misleading. We suggest that a range of cost-effectiveness values be presented. (SWICS)

Response: In the Economic Impacts discussion in the Staff Report, ARB staff acknowledged the complexity, site-specific nature, and variability inherent in assessing the cost impact of the regulation to affected landfills. The single cost-effectiveness figure of $9 per $MTCO_2E$ represents an average cost-effectiveness range of approximately $5 to $12 per $MTCO_2E$, as discussed in Appendix F of the Staff Report.

Emissions

39. **Comment:** Page ES-2 of the Staff Report indicates that GHG emissions from landfills are projected to increase to 7.7 $MMTCO_2E$ by 2020. SWICS disagrees with this conclusion and believes that the assumed increase in emissions does not recognize several factors affecting the solid waste industry that will lead to lower rather than higher emissions. (SWICS)

Response: ARB staff acknowledges the solid waste industry's commitment to reduce landfill gas emissions. However, due to population growth and increased waste disposal, GHG emissions are still forecasted to increase. This underscores the need for the regulation. Factors that may affect this projection include the implementation of CIWMB's best management practices, increased waste diversion, and commercial recycling.

40. **Comment:** We recommend that ARB staff remove the last sentence of the "Composting" paragraph on Page II-4 of the Staff Report since it conflicts with a statement a few sentences earlier that CIWMB is conducting a life-cycle assessment of organic diversion alternatives. (SWICS)

Response: ARB staff disagrees and sees no conflict with the statement a few sentences earlier that CIWMB is conducting a life-cycle assessment of organic diversion alternatives.

41. **Comment:** The biggest uncertainty in ARB's estimates is the complete lack of supporting data and the highly speculative estimates for actual methane reductions. Lacking is the percentage of instantaneous and integrated readings that will be out of compliance with the surface methane emission standards given the new spacing requirements for monitoring. Also lacking is the percentage of integrated readings that will be out of compliance as a result of lowering the threshold from 50 ppmv to 25 ppmv. (SWICS)

Response: ARB staff is not aware of (nor did industry provide) any broadly accepted methodology to determine how many landfills will be out of compliance with the surface methane emission standards given the new spacing requirements for monitoring and is also not aware of (nor did industry provide) any broadly accepted methodology for determining the percentage of integrated readings that will be out of compliance as a result of lowering the threshold from 50 ppmv to 25 ppmv. The integrated standard is modeled after SCAQMD Rule 1150.1. South Coast landfills have been subject to the 50 ppmv integrated standard since 1982. Although the SCAQMD rule requires an integrated surface standard of 50 ppmv (for non-methane organic compounds), ARB staff reviewed historical compliance data dating back to 2001 which indicated that very few landfills would not be able to meet a 25 ppmv integrated surface methane standard using current operating practices.

General Comments

42. **Comment:** The regulation may be in conflict with existing federal and some of the existing local air district regulations that are currently in place. SWICS recommends that ARB staff establish an implementation workgroup that would define the role local air districts in implementing and enforcing the approved regulation; identify where there is an overlap of requirements between the agencies, and work to minimize the duplication of efforts on the parts of landfill

owners and operators, and within the local, State, and federal government; and work through various issues related to the approved regulation. (SWICS; LACSD; SCAQMD; CSDPW; WM)

Response: At the June 25, 2009, pubic hearing, the Board directed ARB staff to: (1) develop a guidance document to assist MSW landfill owners and operators in complying with the requirements of the regulation, (2) develop and consider agreements with local air districts to implement and enforce the regulation, and (3) establish an implementation workgroup that meets periodically to discuss implementation issues and promote statewide consistency regarding the implementation and enforcement of the regulation. ARB staff believes that this direction sufficiently addresses the comment. Furthermore, the commenter neither provided nor are we aware of any specific conflicts with federal law

43. **Comment:** The regulation is ridiculous. (Black)

Response: ARB staff disagrees with this comment. The regulation is an important part of California's GHG reduction efforts and will reduce methane emissions from certain smaller and uncontrolled MSW landfills. Methane is a major contributor to GHG emissions, having a global warming potential of about 21 times that of carbon dioxide, the most common GHG. The regulation also includes requirements to ensure that existing and newly installed gas collection and control systems are operating optimally.

44. **Comment:** MEC believes that the proposed 25 ppmv methane limit has the potential to increase the oxygen content of recovered gas and lower the heating value and gas quality which would limit the methane quantities available for renewable energy projects. In addition, applying a higher vacuum near the surface to meet the more stringent emission standards may result in an increase of subsurface fires. MEC recommends that ARB staff phase-in the more stringent surface standard. (Republic; MEC)

Response: No change was made in response to this comment. The regulation establishes a 25 ppmv integrated surface monitoring standard to ensure that the gas collection system is adequately controlling emissions. Integrated surface monitoring is a good indicator of how well the gas collection system is operating overall. Any difficulties in meeting an integrated surface standard would be an indicator of problems with the collection system.

The integrated surface standard is modeled after SCAQMD Rule 1150.1. Although the SCAQMD rule requires an integrated surface standard of 50 ppmv (for non-methane organic compounds), ARB staff reviewed historical compliance data which indicated that very few landfills would not be able to meet a 25 ppmv integrated surface methane standard using current operating practices. Additionally, ARB staff is unaware of any landfill fires that have occurred as a result of this requirement being in place.

Given that that these standards will be new for many California landfills and more stringent for some, the regulation begins implementation on January 1, 2011. ARB staff believes this effective date allows sufficient time for landfill owners and operators to make the necessary system adjustments and improvements, establish monitoring protocols and procedures, purchase monitoring equipment, train staff, and develop recordkeeping and reporting systems.

45. **Comment:** We request that ARB staff consider providing grant assistance in the form of annual grants to help public agencies comply with the new regulations. (SDDPW)

Response: Currently, there are no grants available to assist public agencies in complying with the regulation. However, there is loan financing available from the California Pollution Control Finance Agency (part of Department of Finance). They make loans to private entities.

46. **Comment:** We have consistently argued against the weakening of the regulation and even suggested less restrictive incentive-based strategies for reducing emissions, but our recommendations were not reflected in the final regulation. (CAW)

Response: ARB staff had initially proposed establishing an instantaneous surface methane standard of 200 ppmv (compared to the 500 ppmv standard in federal and local air district rules). However, stakeholders expressed the concern that a 200 ppmv surface methane emission limit may cause landfill fires and decrease the ability to meet federal wellhead monitoring limits for oxygen and nitrogen. Additionally, CIWMB's landfill fire expert also expressed a concern about potential landfill fires. This potential exists as it is possible for landfill operators to potentially "overdraw" their gas collection and control systems thereby introducing excess amounts of oxygen into the landfill.

Given that current federal and local air district rules only require reporting of exceedances above a 500 ppmv instantaneous surface standard, no data was available to ascertain at what level a landfill fire would result. Therefore, given the catastrophic nature of a landfill fire, the instantaneous surface limit was set at 500 ppmv. However, the regulation requires reporting of instantaneous readings of 200 ppmv and greater in an effort to collect additional data to help staff understand at what level landfill fires may become a concern.

During the rulemaking process, stakeholders submitted proposals to ARB staff recommending "options" for surface monitoring. CAW's recommendation was to maintain surface levels at 200 ppmv by instantaneous monitoring. If the surface methane limit was exceeded, corrective action would have to be taken to remediate the surface leak. If the surface leak could not be remediated within a specified time period, the landfill owner or operator would be required to explain why surface levels can not be maintained and request an alternative compliance

option. ARB staff chose not to take this approach due to concerns expressed by CIWMB's fire expert regarding the 200 ppmv surface emission limit, as previously mentioned. ARB staff believes the more prudent course of action is to improve our understanding of landfill behavior, and the potential for fires and other issues, with respect to a 200 ppm surface emission limit prior to including a regulatory requirement which could have disastrous results.

47. **Comment:** We offer general support for the discrete early action measure to reduce methane emissions from MSW landfills with the recommended changes that have been submitted to the Board. (Republic; LACSD; SCAQMD)

Response: At a public hearing on June 25, 2009, the Board adopted Resolution 09-38, in which it approved the regulation originally proposed in the Staff Report released on May 8, 2009, along with modifications proposed by ARB staff to address concerns expressed during the hearing and 45-day comment period. The regulation will require the installation of a gas collection and control system at certain MSW landfills and contains performance standards for the gas collection and control system, and specifies monitoring requirements to ensure that that the system is being maintained and operated in a manner to minimize methane emissions. All modifications made to the original proposal were published in a Notice of Public Availability of Modified Text and Availability of Additional Documents and Information (October 5, 2009) for a 15-day public comment period.

48. **Comment:** We appreciate working with ARB staff during the rulemaking process and their efforts in the development of the regulation. (LACSD; Republic; Recology; KCWMD; RCESJPA)

Response: See response for Comment 47.

49. **Comment:** In general, we believe the rule is very positive, but we do have a number of concerns, most specifically we are concerned that the regulation may have some unintended consequences on the organics diversion policies of the State. (PC; CAW)

Response: See response for Comment 32.

B. Responses to Comments Received During the First 15-Day Public Comment Period

General Comments

1. **Comment:** Appendix F of the new regulations incorrectly indicates that the Clover Flat landfill located in Napa County does not have an active landfill gas system in place. A landfill gas extraction system was installed at the landfill in 2004. (EBA)

Agency Response: ARB staff thanks EBA for this comment and will verify the information and update our inventory as appropriate

2. **Comment:** In the past, SWICS has commented on the lack of involvement of local air districts in the working group process and how many of the provisions of the regulation may be "up to interpretation." The 15-day changes have certainly cleared up many of the uncertainties in rule language; however, implementation of this regulation will still be a challenge to many operators. (SWICS)

Agency Response: See response to Comment 40 in Section III.A (Responses to Comments Received During the 45-Day Public Comment Period and Board Hearing).

3. **Comment:** SWICS believes that there have been some inaccurate comments that were made at the June 25, 2009, public hearing to adopt this regulation which should be cleared up. First, a speaker portrayed the regulation as "not particularly ambitious in terms of reducing emissions from landfills." SWICS believes that the regulation will level the playing field for all affected landfills in the state and is likely to be the most "ambitious" effort in the world to control methane from landfills. Second, the speaker brought up an issue that surrounds the Agency's effort to establish a landfill gas collection efficiency estimate for use in determining the effectiveness of the regulation. The speaker believed that the use of the LACSD Palos Verdes study was not valid, and urged staff to "reanalyze the emission reductions associated with the regulation." SWICS believes that the 85 percent landfill gas collection efficiency estimated by the Agency staff is a more realistic estimate of collection efficiency than 75 percent, which is the default value used by the U.S. EPA and for the Agency's emission's inventory. (SWICS)

Agency Response: The regulation contains the most stringent requirements for methane collection and control, and component leak testing, and surface emissions monitoring in the nation. The regulation applies to both smaller and larger MSW landfills. See also the response to Comment 32 in Section III.A (Responses to Comments Received During the 45-Day Public Comment Period and Board Hearing).

4. **Comment:** We appreciate working with ARB staff during the rulemaking process and their efforts in the development of the regulation. (SWICS)

Response: See response for Comment 47.

C. Responses to Comments Received During the Second 15-Day Public Comment Period

No comments were received during the second 15-day public comment period.