

**TITLE 17. CALIFORNIA AIR RESOURCES BOARD****NOTICE OF PUBLIC HEARING TO CONSIDER THE ADOPTION OF A PROPOSED REGULATION TO REDUCE METHANE EMISSIONS FROM MUNICIPAL SOLID WASTE LANDFILLS**

The Air Resources Board (ARB or the Board) will conduct a public hearing at the time and place noted below to consider adopting a regulation to reduce emissions of methane, a greenhouse gas (GHG), from municipal solid waste (MSW) landfills.

DATE: June 25-26, 2009

TIME: 9:00 a.m.

PLACE: California Environmental Protection Agency  
Air Resources Board  
Byron Sher Auditorium  
1001 I Street  
Sacramento, California 95814

This item will be considered at a two-day meeting of the Board, which will commence at 9:00 a.m., June 25, 2009, and may continue at 8:30 a.m., June 26, 2009. This item may not be considered until June 26, 2009. Please consult the agenda for the meeting, which will be available at least 10 days before June 25, 2009, to determine the day on which this item will be considered.

If you require special accommodations or language needs, please contact the Clerk of the Board at (916) 322-5594 or by fax at (916) 322-3928 as soon as possible, but no later than 10 business days before the scheduled Board hearing. TTY/TDD/Speech to Speech users may dial 711 for the California Relay Service.

**INFORMATIVE DIGEST OF PROPOSED ACTION AND POLICY STATEMENT OVERVIEW**

**Sections Affected:** Proposed adoption of California Code of Regulations, title 17, subchapter 10, article 4, subarticle 6. Methane Emissions from Municipal Solid Waste Landfills, sections 95460, 95461, 95462, 95463, 95464, 95465, 95466, 95467, 95468, 95469, 95470, 95471, 95472, 95473, 95474, 95475, and 95476.

**Background:** In 2006, the Legislature passed, and Governor Schwarzenegger signed, the California Global Warming Solutions Act of 2006 (Assembly Bill 32; Stats. 2006, chapter 488). In Assembly Bill (AB) 32, the Legislature declared that global warming poses a serious threat to the economic well-being, public health, natural resources, and the environment of California. The Legislature further declared that global warming will have detrimental effects on some of California's largest industries, including agriculture and tourism, and will increase the strain on electricity supplies. While national and

international actions are necessary to fully address the issue of global warming, the Legislature recognized that action taken by California to reduce GHG emissions will have far-reaching effects by encouraging other states, the federal government, and other countries to act. AB 32 creates a comprehensive, multi-year program to reduce GHG emissions in California, with the overall goal of restoring emissions to 1990 levels by the year 2020. AB 32 requires ARB to take actions that include:

- Establishing a statewide GHG emissions cap for 2020, based on 1990 emissions;
- Adopting a Scoping Plan by January 1, 2009, indicating how emission reductions will be achieved from significant GHG sources via regulations, market mechanisms, and other actions;
- Adopting a list of Discrete Early Action GHG emission reduction measures by June 30, 2007, which can be implemented and enforced no later than January 1, 2010; and
- Adopting regulations by January 1, 2010, to implement the measures identified on the list of Discrete Early Action Measures.

In June 2007, the Board identified a measure to reduce methane emissions from MSW landfills as a discrete early action measure.

Methane is a major contributor to climate change, having a global warming potential of 21 times that of carbon dioxide. It has a relatively short atmospheric lifetime of about ten years. Changes in a methane source's emissions level can affect atmospheric concentrations in a relatively short time scale.

In California, MSW landfills are the second largest anthropogenic source of methane. The organic portion of solid waste disposed in MSW landfills decomposes to form landfill gas; methane typically accounts for about 50 percent of the total landfill gas composition. Approximately 1.2 billion tons of solid waste has accumulated in the State's landfills, with an additional 40 million tons being added each year. In 1990, GHG emissions from MSW landfills were estimated to be about 6.3 million metric tons of carbon dioxide equivalents (MMT $\text{CO}_2\text{E}$ ). These emissions are forecasted to increase to approximately 7.7 MMT $\text{CO}_2\text{E}$  in 2020. Emissions from MSW landfills represent about one percent of the statewide GHG inventory. If not captured, combusted, or treated in control systems, landfill gas can either be released into the atmosphere as fugitive emissions or migrate underground to cause groundwater contamination.

In the 1990s, many local air districts adopted regulations to reduce emissions of volatile organic compounds, an ozone precursor, from landfills. These regulations resulted in landfill gas collection and control systems being installed at most large landfills. About 93 percent of the total statewide waste-in-place (the amount of waste in a landfill) is contained in landfills with gas collection and control systems.

**Description of the Proposed Regulatory Action:** The proposed regulation applies to active, inactive, and closed MSW landfills that received solid waste after January 1, 1977, and have at least 450,000 tons of waste-in-place. Currently uncontrolled landfills that meet these criteria will be required to install gas collection and control systems. All affected landfills will be required to maintain landfill gas collection and control systems to specified standards. Currently uncontrolled landfills that meet these criteria. Installation and proper operation of these systems will significantly reduce the emissions of methane and other volatile organic compounds produced as organic materials decompose in landfills. The proposed regulation contains performance standards for the gas collection and control system, and specifies monitoring requirements to ensure that the system is being maintained and operated in a manner to minimize methane emissions.

ARB staff estimates that there are 14 uncontrolled landfills with at least 450,000 tons of waste-in-place that may generate sufficient gas to support the installation of a gas collection and control system. Based on ARB staff's 2020 forecast of landfill emissions, if all 14 of those landfills were to install emission controls for methane, there would be a reduction of about 0.4 MMTCO<sub>2</sub>E in 2020. The implementation and enforcement of the monitoring and performance requirements of the proposed regulation for the remaining estimated 298 affected MSW landfills with gas collections systems already installed is expected to result in an additional estimated emission reduction of 1.1 MMTCO<sub>2</sub>E.

### **Surface Emission Standards**

The proposed regulation includes monitoring requirements to ensure that gas collection and control systems are operating optimally and that fugitive emissions are minimized. Staff is proposing an instantaneous surface monitoring standard of 500 parts per million by volume (ppmv) and an integrated surface sampling standard of 25 ppmv to ensure that the gas collection system is adequately controlling emissions. Instantaneous surface monitoring is used to monitor integrity of the landfill surface and to identify point sources where methane may be escaping into the atmosphere (e.g., around cover penetrations, areas of distressed vegetation, cracks, or seeps in the landfill cover system). Integrated surface sampling accumulates and averages the instantaneous surface monitoring readings and provides a more direct means of revealing clusters of emissions that would indicate possible gas collection system problems. Landfill owners and operators are given the opportunity to repair leaks or make the appropriate adjustments to their gas collection and control systems before an exceedance of the standard is considered a violation.

### **Compliance Dates**

The proposed regulation requires uncontrolled landfills with at least 450,000 tons of waste-in-place to submit a Design Plan prepared by a registered professional engineer. The Design Plan must provide for the control of the collected landfill gas through the use of a gas collection and control system and be designed to collect gas at a sufficient extraction rate to maintain negative pressure at all wellheads (except under specified

conditions). Within 18 months after approval of the Design Plan, active landfills must demonstrate installation of an active gas collection and control system. This compliance schedule should provide sufficient time for the operator to obtain the necessary local agency permits and for installation of the system. Closed and inactive landfills must also demonstrate installation of a gas collection and control system but have up to 30 months after approval of the Design Plan to comply. This compliance schedule provides an extra year for closed or inactive landfills to secure the necessary funds to comply.

Beginning January 1, 2011, owners and operators that are required to install a gas collection and control system, or are already operating a gas collection and control system, must monitor the surface of their landfills to ensure compliance with the surface methane emissions standards. This compliance schedule allows landfill owners or operators time to adjust their current practices to the surface standards and monitoring requirements.

### **Recordkeeping and Reporting**

Under the proposed regulation, municipal solid waste landfill owners and operators will be subject to recordkeeping and reporting requirements. These requirements include maintaining records of the landfill's annual waste acceptance rate and current amount of waste-in-place, monitored operating parameters of the gas collection and control system, equipment downtime, and records of all component leak testing and surface emissions monitoring. These records, necessary to monitor methane emissions and track AB 32 performance objectives, must be submitted to ARB.

## **COMPARABLE FEDERAL REGULATIONS**

### **Federal New Source Performance Standards and Emission Guidelines for Municipal Solid Waste Landfills**

MSW landfills are regulated under local air district rules that implement the requirements of the New Source Performance Standards (NSPS) and Emission Guidelines (EG) (40 CFR Part 60 Subparts WWW and Cc) for MSW landfills. The NSPS applies to "new" MSW landfills that commenced construction, modification, or reconstruction on or after May 30, 1991. The EG applies to "existing" MSW landfills that commenced construction, modification, or reconstruction before May 30, 1991, and that have accepted waste at any time since November 8, 1987, or have additional capacity for future waste deposition. The NSPS and EG require the installation of a landfill gas collection and control system when a MSW landfill reaches a design capacity of 2.75 million tons or greater and has a non-methane organic compound emission rate of 55 tons per year, or greater.

ARB and the local air districts were required to develop and submit a "State Plan" to the United States Environmental Protection Agency (U.S. EPA) for implementing and enforcing the requirements of the EG. Local air districts that elected not to adopt rules

to implement the EG were placed under a Federal Plan, which is directly enforced by U.S. EPA. In general, the larger California air districts adopted rules whereas several smaller districts are subject to the Federal Plan. U.S. EPA promulgated the NSPS and EG on March 12, 1996.

### **National Emission Standards for Hazardous Air Pollutants - Municipal Solid Waste Landfills**

U.S. EPA promulgated the National Emissions Standards for Hazardous Air Pollutants (NESHAP) for MSW landfills (40 CFR Part 63 Subpart AAAA) on January 16, 2003. The NESHAP has the same requirements as the NSPS, but also contains provisions for start-up, shut-down, and additional recordkeeping and reporting requirements. The proposed regulation differs from federal NSPS and NESHAP requirements in that it applies to smaller landfills (450,000 versus 2,750,000 tons of waste-in-place) and has more stringent requirements for methane collection and control, component leak testing and surface emissions monitoring, and compliance schedules. The more stringent requirements in the proposed regulation are needed to maximize GHG emission reductions. Since the requirements of the proposed regulation are more stringent, they do not conflict with or impede compliance with the existing federal requirements.

### **AVAILABILITY OF DOCUMENTS AND AGENCY CONTACT PERSONS**

ARB staff has prepared a staff report for the proposed regulatory action, which includes a summary of the economic and environmental impacts of the proposal. The report is entitled: Staff Report: Initial Statement of Reasons (ISOR) for the Proposed Regulation to Reduce Methane Emissions from Municipal Solid Waste Landfills, April 2009.

Copies of the ISOR and the full text of the proposed regulatory language may be accessed on ARB's website listed below, or may be obtained from the Public Information Office, Air Resources Board, 1001 I Street, Visitors and Environmental Services Center, First Floor, Sacramento, California, 95814, (916) 322-2990, at least 45 days prior to the scheduled hearing on June 25, 2009.

Upon its completion, the Final Statement of Reasons (FSOR) will be available and copies may be requested from the agency contact persons in this notice, or may be accessed on ARB's website listed below.

Inquiries concerning the substance of the proposed regulation may be directed to the designated agency contact persons, Mr. Richard Boyd, Manager, Process Evaluation Section, at (916) 322-8285, or Mr. Renaldo Crooks, Air Pollution Specialist, at (916) 327-5618.

Further, the agency representative and designated back-up contact persons, to whom nonsubstantive inquiries concerning the proposed administrative action may be directed, are Ms. Lori Andreoni, Manager, Board Administration & Regulatory Coordination Unit, (916) 322-4011, or Ms. Trini Balcazar, Regulations Coordinator,

(916) 445-9564. The Board has compiled a record for this rulemaking action, which includes all the information upon which the proposal is based. This material is available for inspection upon request to the contact persons.

This notice, the ISOR, and all subsequent regulatory documents, including the FSOR, when completed, are available on ARB's website for this rulemaking at [www.arb.ca.gov/regact/2009/landfills09/landfills09.htm](http://www.arb.ca.gov/regact/2009/landfills09/landfills09.htm).

### **COSTS TO PUBLIC AGENCIES AND TO BUSINESSES AND PERSONS AFFECTED**

The determinations of the Board's Executive Officer concerning the costs or savings necessarily incurred by public agencies and private persons and businesses in reasonable compliance with the proposed regulation are presented below.

Pursuant to Government Code section 11346.5(a)(5), the Executive Officer has determined that the proposed regulation would possibly impose a mandate on local agencies or school districts, which is not reimbursable under the Government Code because the proposed regulation applies to all entities that own or operate landfills and does not impose unique requirements. The Executive Officer has further determined pursuant to Government Code section 11346.5(a)(6) that the proposed regulation would result in some additional costs to ARB and other State agencies. In addition, the Executive Officer has also determined pursuant to Government Code Section 11346.5(a)(6) that the proposed regulatory action would possibly create a cost to any local agency or school district that is not required to be reimbursed under part 7 (commencing with section 17500) of division 4 of the Government Code, or may impose other nondiscretionary costs or savings on local agencies. The Executive Officer further determined that the proposed regulation would not result in costs or savings in federal funding to the State.

The proposed regulatory action may create costs to local air pollution control and air quality management districts (Districts). However, these costs are recoverable by fees that are within the Districts' authority to assess (see Health and Safety Code section 42311) and are also specifically provided for in the proposed regulation.

In developing this regulatory proposal, ARB staff evaluated the potential economic impacts that representative private persons or businesses might incur in reasonable compliance with the proposed regulation. The Executive Officer has initially assessed that there will be a potential cost impact on private persons or businesses directly affected as a result of the proposed regulatory action.

The cost to affected public agencies and to affected persons and businesses would be approximately \$27 million dollars in initial capital costs with about \$6 million to \$14 million dollars in annual recurring costs (in 2008 dollars). Over the 23-year life of the regulation, this corresponds to a total cost of approximately \$340 million dollars. The cost-effectiveness is estimated to be approximately \$9 per metric ton of carbon

dioxide equivalent reduced. Affected persons and businesses may also incur an additional cost for any fees Districts assess.

The Executive Officer has made an initial determination that the proposed regulatory action would not have a significant statewide adverse economic impact directly affecting businesses, including the ability of California businesses to compete with businesses in other states, or on representative private persons.

In accordance with Government Code sections 11346.3 and 11346.5(a)(10), the Executive Officer has determined that the proposed regulatory action may lead to creation of some businesses. Due to the longer compliance lead-time for closed landfills, as well as the opportunity to delay control system installation through improved landfill surface maintenance, and multiple available funding mechanisms, ARB staff believes that landfill owners and operators will be able to meet the compliance costs. Businesses that may be created or expanded include those that design, furnish, install, monitor, and maintain landfill gas collection and control systems, as well as those that provide alternative compliance strategies (including waste-to-energy technologies). Existing businesses that provide the aforementioned scope of services and products are likely to see an increase in business due to the requirements of the proposed regulation. Additionally, the proposed regulation may lead to the creation or expansion of jobs in those sectors assisting facilities with compliance. The proposed regulation is not expected to result in the elimination of any jobs or businesses.

The Executive Officer has also determined, pursuant to California Code of Regulations, title 1, section 4, that the proposed regulatory action would not have an affect on small businesses. The businesses affected by the proposed regulation do not meet the definition of small business in Government Code section 11342.610.

In accordance with Government Code sections 11346.3(c) and 11346.5(a)(11), the Executive Officer has found that the reporting requirements of the regulation which apply to businesses are necessary for the health, safety, and welfare of the people of the State of California.

A detailed assessment of the economic impacts of the proposed regulation can be found in the ISOR.

Before taking final action on the proposed regulatory action, the Board must determine that no reasonable alternative considered by the Board or that has otherwise been identified and brought to the attention of the Board would be more effective in carrying out the purpose for which the action is proposed or would be as effective and less burdensome to affected private persons than the proposed action.

## **SUBMITTAL OF COMMENTS**

The public may present comments relating to this matter orally or in writing at the hearing, and in writing or by email before the hearing. To be considered by the Board, written submissions not physically submitted at the hearing must be received **no later than 12:00 noon (Pacific Standard Time), June 24, 2009**, and addressed to the following:

Postal mail is to be sent to:

Clerk of the Board  
Air Resources Board  
1001 I Street  
Sacramento, California 95814

Electronic submittal: <http://www.arb.ca.gov/lispub/comm/bclist.php>

Facsimile submittal: (916) 322-3928

Please note that under the California Public Records Act (Gov. Code § 6250 et seq.), your written and oral comments, attachments, and associated contact information (e.g., your address, phone, email, etc.) become part of the public record and can be released to the public upon request. Additionally, this information may become available via Google, Yahoo, and other search engines.

The Board requests, but does not require, that 30 copies of any written statement be submitted and that all written statements be filed at least 10 days prior to the hearing so that ARB staff and Board members have time to fully consider each comment. The Board encourages members of the public to bring to the attention of staff, in advance of the hearing, any suggestions for modification of the proposed regulatory action.

## **STATUTORY AUTHORITY AND REFERENCES**

This regulatory action is proposed under the authority granted to ARB under Health and Safety Code sections 38501, 38510, 38560, 38560.5, 38580, 39600, and 39601. This action is proposed to implement, interpret, or make specific Health and Safety Code sections 38501, 38505, 38510, 38550, 38551, 38560, 38560.5, 38561, 38563, 38580, 39003, 39500, 39600, 39601, and 41511.

## **HEARING PROCEDURES**

The public hearing will be conducted in accordance with the California Administrative Procedure Act, Government Code, title 2, division 3, part 1, chapter 3.5 (commencing with section 11340).



Following the public hearing, the Board may adopt the regulatory language as originally proposed, or with non-substantial or grammatical modifications. The Board may also adopt the proposed regulatory language with other modifications if the text as modified is sufficiently related to the originally proposed text that the public was adequately placed on notice that the regulatory language as modified could result from the proposed regulatory action; in such event the full regulatory text, with the modifications clearly indicated, will be made available to the public, for written comment, at least 15 days before it is adopted.

The public may request a copy of the modified regulatory text from ARB's Public Information Office, Air Resources Board, 1001 I Street, Visitors and Environmental Services Center, First Floor, Sacramento, California, 95814, (916) 322-2990.

CALIFORNIA AIR RESOURCES BOARD

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James N. Goldstene  
Executive Officer

Date: April 28, 2009

The energy challenge facing California is real. Every Californian needs to take immediate action to reduce energy consumption. For a list of simple ways you can reduce demand and cut your energy costs, see our website at [www.arb.ca.gov](http://www.arb.ca.gov).



## **Appendix A**

### **Proposed Regulation to Reduce Methane Emissions from Municipal Solid Waste Landfills**



## PROPOSED REGULATION ORDER

Adopt new Article 4, Subarticle 6, Methane Emissions from Municipal Solid Waste Landfills, sections 95460 to 95476, title 17, California Code of Regulations, to read as follows:

Note: The entire text below is new language proposed to be added to the California Code of Regulations (CCR).

### Subchapter 10: Climate Change

#### Article 4: Regulations to Achieve Greenhouse Gas Emission Reductions

#### Subarticle 6. Methane Emissions from Municipal Solid Waste Landfills

#### Methane Emissions from Municipal Solid Waste Landfills

##### § 95460. Purpose

The purpose of this subarticle is to reduce methane emissions from municipal solid waste (MSW) landfills pursuant to the California Global Warming Solutions Act of 2006 (Health & Safety Code, Sections 38500 et. seq.).

Note: Authority cited: Sections 38501, 38510, 38560, 38560.5, 38580, 39600, and 39601, Health and Safety Code. Reference: Sections 38501, 38505, 38510, 38550, 38551, 38560, 38560.5, 39003, 39500, 39600, and 39601, Health and Safety Code.

##### § 95461. Applicability

This subarticle applies to all MSW landfills that received solid waste after January 1, 1977.

Note: Authority cited: Sections 38501, 38510, 38560, 38560.5, 38580, 39600, and 39601, Health and Safety Code. Reference: Sections 38501, 38505, 38510, 38550, 38551, 38560, 38560.5, 39003, 39500, 39600, and 39601, Health and Safety Code.

##### § 95462. Exemptions

- (a) This subarticle does not apply to landfills that receive only hazardous waste, or are currently regulated under the Comprehensive Environmental Response, Compensation and Liability Act 42 U.S.C, Chapter 103 (*Promulgated 12/11/80; Amended 10/17/86*).
- (b) This subarticle does not apply to landfills that receive only construction and demolition wastes or non-decomposable wastes.

Note: Authority cited: Sections 38501, 38510, 38560, 38560.5, 38580, 39600, and 39601, Health and Safety Code. Reference: Sections 38501, 38505, 38510, 38550, 38551, 38560, 38560.5, 39003, 39500, 39600, and 39601, Health and Safety Code.

**§ 95463. Determination for Installing a Gas Collection and Control System**

- (a) *Active MSW Landfills Less Than 450,000 Tons of Waste-in-Place:* Each owner or operator of an active MSW landfill having less than 450,000 tons of waste-in-place must submit a Waste-in-Place Report to the Executive Officer pursuant to section 95470(b)(4), within 90 days of the effective date of this subarticle.
- (1) The Waste-in-Place report must be prepared for the period of January 1 through December 31 of each year. The report must be submitted to the Executive Officer by March 15 of the following year.
  - (2) The Waste-in-Place report must be submitted annually until either:
    - (A) The MSW landfill reaches a size greater than or equal to 450,000 tons of waste-in-place; or
    - (B) The owner or operator submits a Closure Notification pursuant to section 95470(b)(1).
- (b) *MSW Landfills Greater Than or Equal to 450,000 Tons of Waste-in-Place:* Within 90 days of the effective date of this subarticle or upon reaching 450,000 tons of waste-in-place, each owner or operator of an MSW landfill having greater than or equal to 450,000 tons of waste-in-place must calculate the landfill gas heat input capacity pursuant to section 95471(b) and must submit a Landfill Gas Heat Input Capacity Report to the Executive Officer.
- (1) If the calculated landfill gas heat input capacity is less than 3.0 million British thermal units per hour (MMBtu/hr) recovered, the owner or operator must:
    - (A) Recalculate the landfill gas heat input capacity annually using the procedures specified in section 95471(b).
    - (B) Submit an annual Landfill Gas Heat Input Capacity Report to the Executive Officer until either of the following conditions is met:
      1. The calculated landfill gas heat input capacity is greater than or equal to 3.0 MMBtu/hr recovered, or
      2. If the MSW landfill is active, the owner or operator submits a Closure Notification pursuant to section 95470(b)(1).

Submitting the Closure Notification fulfills the requirements of this subarticle. If the MSW landfill is *closed or inactive*, submittal of the Closure Notification is not required to fulfill the requirements of the subarticle.

- (2) If the landfill gas heat input capacity is greater than or equal to 3.0 MMBtu/hr recovered the owner or operator must either:
- (A) Comply with the requirements of sections 95464 through 95476, or
  - (B) Demonstrate to the satisfaction of the Executive Officer that after four consecutive quarterly monitoring periods there is no measured concentration of methane of 200 parts per million by volume (ppmv) or greater using the instantaneous surface monitoring procedures specified in sections 95471(c)(1) and 95471(c)(2). Based on the monitoring results, the owner or operator must do one of the following:
    - 1. If there is any measured concentration of methane of 200 ppmv or greater from the surface of an active, inactive, or closed MSW landfill, comply with sections 95464 through 95476;
    - 2. If there is no measured concentration of methane of 200 ppmv or greater from the surface of an active MSW landfill, comply with section 95463(b) and recalculate the landfill gas heat input capacity annually as required in section 95463(b) until such time the owner or operator submits a Closure Notification pursuant to section 95470(b)(1); or
    - 3. If there is no measured concentration of methane of 200 ppmv or greater from the surface of a closed or inactive MSW landfill, the requirements of sections 95464 through 95470 no longer apply provided that the following information is submitted to and approved by the Executive Officer within 90 days:
      - a. A Waste-in-Place Report pursuant to section 95470(b)(4);
      - b. All instantaneous surface monitoring records.

Note: Authority cited: Sections 38501, 38510, 38560, 38560.5, 38580, 39600, and 39601, Health and Safety Code. Reference: Sections 38501, 38505, 38510, 38550, 38551, 38560, 38560.5, 39003, 39500, 39600, and 39601, Health and Safety Code.

**§ 95464. Gas Collection and Control System Requirements**

(a) *Design Plan and Installation.*

- (1) *Design Plan:* If a gas collection and control system which meets the requirements of either sections 95464(b)(1), 95464(b)(2) or 95464(b)(3) has not been installed, the owner or operator of a MSW landfill must submit a Design Plan to the Executive Officer within one year after the effective date of this subarticle, or within one year of detecting any leak on the landfill surface exceeding a methane concentration of 200 ppmv pursuant to section 95463(b)(2)(B). The Executive Officer must review and either approve or disapprove the Design Plan within 120 days. The Executive Officer may request that additional information be submitted as part of the review of the Design Plan. At a minimum, the Design Plan must meet the following requirements:
- (A) The Design Plan must be prepared and certified by a professional engineer.
  - (B) The Design Plan must provide for the control of the collected gas through the use of a gas collection and control system meeting the requirements of either sections 95464(b)(1), 95464(b)(2) or 95464(b)(3).
  - (D) The Design Plan must include any proposed alternatives to the requirements, test methods, procedures, compliance measures, monitoring, and recordkeeping or reporting requirements pursuant to section 95468.
  - (E) A description of potential mitigation measures to be used to prevent the release of methane or other pollutants into the atmosphere during the installation or preparation of wells, piping, or other equipment; during repairs or the temporary shutdown of gas collection system components; or, when solid waste is to be excavated and moved.
  - (F) For active MSW landfills, the design plan must identify areas of the landfill that are closed or inactive.
  - (G) Design the gas collection and control system to handle the expected gas generation flow rate from the entire area of the MSW landfill and to collect gas at an extraction rate to comply with the surface methane emission limits in section 95465 and component leak standard in section 95464(b)(1)(B). The expected gas generation flow rate from the MSW landfill must be calculated pursuant to section 95471(e).



1. Any areas of the landfill that contain asbestos-containing waste or non-decomposable solid waste may be excluded from collection provided that the owner or operator submits documentation to the Executive Officer containing the nature, date of deposition, location and amount of asbestos or non-decomposable solid waste deposited in the area. This documentation may be included as part of the Design Plan.
- (H) As operating experience is gained and as site conditions change, the Design Plan may be revised, subject to the approval of the Executive Officer.
- (2) Any owner or operator of an active MSW landfill must install and operate a gas collection and control system within 18 months after approval of the Design Plan.
  - (3) Any owner or operator of a closed or inactive MSW landfill must install and operate a gas collection and control system within 30 months after approval of the Design Plan.
  - (4) If an owner or operator is modifying an existing gas collection and control system to meet the requirements of this subarticle, the existing Design Plan must be amended to include any necessary updates or addenda, and must be certified by a professional engineer.
  - (5) The gas collection system must be operated, maintained, and expanded in accordance with the procedures and schedules in the approved Design Plan.
- (b) *Gas Collection and Control System Requirements.*
- (1) *General Requirements.* The owner or operator must satisfy the following requirements when operating a gas collection and control system:
    - (A) Route the collected gas to a gas control device or devices, and operate the gas collection and control system continuously except as provided in sections 95464(d) and 95464(e).
    - (B) Operate the gas collection and control system so that there is no landfill gas leak that exceeds 500 ppmv, measured as methane, at any component under positive pressure.
    - (C) The gas collection system must be designed and operated to draw all the gas toward the gas control device or devices

(2) *Requirements for Flares.* An MSW landfill owner or operator who operates a flare must satisfy the following requirements:

(A) Route the collected gas to an enclosed flare that meets the following requirements:

1. Achieves a methane destruction efficiency of at least 99 percent by weight.
2. Is equipped with automatic dampers, an automatic shutdown device, a flame arrester, and continuous recording temperature sensors.
3. During restart or startup there must be a sufficient flow of propane or commercial natural gas to the burners to prevent unburned collected methane from being emitted to the atmosphere.
4. The gas control device must be operated within the parameter ranges established during the initial or most recent source test.

(B) Route the collected gas to an open flare that meets the requirements of 40 CFR 60.18 (as last amended 65 Fed.Reg. 61752 (October 17, 2000), which is incorporated by reference herein. The operation of an open flare is not allowed except under the following conditions:

1. An open flare installed and operating prior to August 1, 2008, may operate until January 1, 2018.
2. Operation of an open flare on or after January 1, 2018, may be allowed if the owner or operator can demonstrate to the satisfaction of the Executive Officer that the landfill gas heat input capacity is less than 3.0 MMBtu/hr pursuant to section 95471(b) and is insufficient to support the continuous operation of an enclosed flare or other gas control device.
3. The owner or operator is seeking to temporarily operate an open flare during the repair or maintenance of the gas control system, or while awaiting the installation of an enclosed flare, or to address offsite gas migration issues.
  - a. Any owner seeking to temporarily operate an open flare must submit a written request to the Executive Officer pursuant to section 95468.

- (3) *Requirements for Gas Control Devices other than Flares.* An MSW landfill owner or operator who operates a gas control device other than a flare must satisfy one of the following requirements:
- (A) Route the collected gas to an energy recovery device, or series of devices that meets the following requirements:
    - 1. Achieves a methane destruction efficiency of at least 99 percent by weight. Lean burn internal combustion engines must reduce the outlet methane concentration to less than 3,000 ppmv, dry basis, corrected to 15 percent oxygen.
    - 2. If a boiler or a process heater is used as the gas control device, the landfill gas stream must be introduced into the flame zone. Where the landfill gas is not the primary fuel for the boiler or process heater, introduction of the landfill gas stream into the flame zone is not required.
    - 3. The gas control device must be operated within the parameter ranges established during the initial or most recent source test.
  - (B) Route the collected gas to a treatment system that processes the collected gas for subsequent sale or use. All emissions vented to the atmosphere from the gas treatment system are subject to the requirements of sections 95464(b)(2).
- (4) *Source Test Requirements:* The owner or operator must conduct an annual source test for any gas control device(s) subject to the requirements of sections 95464(b)(2)(A) or 95464(b)(3)(A) using the test methods identified in 95471(f). An initial source test must be conducted within 180 days of initial start up of the gas collection and control system. Each succeeding complete annual source test must be conducted no later than 45 days after the anniversary date of the initial source test.
- (A) If a gas control device remains in compliance after three consecutive source tests the owner or operator may conduct the source test every three years. If a subsequent source test shows the gas collection and control system is out of compliance the source testing frequency will return to annual.
- (c) *Wellhead Gauge Pressure Requirement:* Each wellhead must be operated under a vacuum (negative pressure), except as provided in sections 95464(d) and 95464(e), or under any of the following conditions:

- (1) Use of a geomembrane or synthetic cover. The owner or operator must develop acceptable pressure limits for the wellheads and include them in the Design Plan; or
  - (2) A decommissioned well.
- (d) *Well Raising*: The requirements of sections 95464(b)(1)(A), 95464(b)(1)(B), and 95464(c), do not apply to individual wells involved in well raising provided the following conditions are met:
- (1) New fill is being added or compacted in the immediate vicinity around the well.
  - (2) Once installed, a gas collection well extension is sealed or capped until the raised well is reconnected to a vacuum source.
- (e) *Repairs and Temporary Shutdown of Gas Collection System Components*: The requirements of sections 95464(b)(1)(A), 95464(b)(1)(B), and 95464(c), do not apply to individual landfill gas collection system components that must be temporarily shut down in order to repair the components, due to catastrophic events such as earthquakes, to connect new landfill gas collection system components to the existing system, to extinguish landfill fires, or to perform construction activities pursuant to section 95466, provided the following requirements are met:
- (1) Any new gas collection system components required to maintain compliance with this subarticle must be included in the most recent Design Plan pursuant to section 95464(a)(4).
  - (2) Methane emissions are minimized during shutdown pursuant to section 95464(a)(1)(E).

Note: Authority cited: Sections 38501, 38510, 38560, 38560.5, 38580, 39600, and 39601, Health and Safety Code. Reference: Sections 38501, 38505, 38510, 38550, 38551, 38560, 38560.5, 39003, 39500, 39600, and 39601, Health and Safety Code.

**§ 95465. Surface Methane Emission Standards**

- (a) Except as provided in sections 95464(d), 95464(e), and 95466, beginning January 1, 2011, or upon commencing operation of a newly installed gas collection and control system, no location on the MSW landfill surface may exceed either of the following methane concentration limits:
  - (1) 500 ppmv, other than non-repeatable, momentary readings, as determined by instantaneous surface emissions monitoring.

- (2) An average methane concentration limit of 25 ppmv as determined by integrated surface emissions monitoring.

Note: Authority cited: Sections 38501, 38510, 38560, 38560.5, 38580, 39600, and 39601, Health and Safety Code. Reference: Sections 38501, 38505, 38510, 38550, 38551, 38560, 38560.5, 39003, 39500, 39600, and 39601, Health and Safety Code.

**§ 95466. Construction Activities**

- (a) The requirements of section 95465 do not apply to the working face of the landfill or to areas of the landfill surface where the landfill cover material has been removed and refuse has been exposed for the purpose of installing, expanding, replacing, or repairing components of the landfill gas, leachate, or gas condensate collection and removal system, or for law enforcement activities requiring excavation.
- (b) Any new gas collection system components, or modifications to the existing system, must be included in the Design Plan pursuant to section 95464(a).

Note: Authority cited: Sections 38501, 38510, 38560, 38560.5, 38580, 39600, and 39601, Health and Safety Code. Reference: Sections 38501, 38505, 38510, 38550, 38551, 38560, 38560.5, 39003, 39500, 39600, and 39601, Health and Safety Code.

**§ 95467. Permanent Shutdown and Removal of the Gas Collection and Control System**

- (a) The gas collection and control system at a closed MSW landfill can be capped or removed provided the following requirements are met:
  - (1) The gas collection and control system was in operation for at least 15 years, unless the owner or operator can demonstrate to the satisfaction of the Executive Officer that due to declining methane rates the MSW landfill will be unable to operate the gas collection and control system for a 15-year period.
  - (2) Surface methane concentration measurements do not exceed the limits specified in section 95465.
  - (3) The owner or operator submits an Equipment Removal Report to the Executive Officer pursuant to section 95470(b)(2).

Note: Authority cited: Sections 38501, 38510, 38560, 38560.5, 38580, 39600, and 39601, Health and Safety Code. Reference: Sections 38501, 38505, 38510, 38550, 38551, 38560, 38560.5, 39003, 39500, 39600, and 39601, Health and Safety Code.

## **§ 95468. Alternative Compliance Options**

- (a) The owner or operator may request alternatives to the compliance measures, monitoring requirements, test methods and procedures of sections 95464, 95469, and 95471. Any alternatives requested by the owner or operator must be submitted in writing to the Executive Officer. Alternative compliance option requests may include, but are not limited to, the following:
  - (1) Semi-continuous operation of the gas collection and control system due to insufficient landfill gas flow rates.
  - (2) Additional time allowance for leak repairs for landfills having consistent issues related to the procurement and delivery of necessary parts to complete the repair.
  - (3) Alternative wind speed requirements for landfills consistently having winds in excess of the limits specified in this subarticle.
- (b) Criteria that the Executive Officer may use to evaluate alternative compliance option requests include, but are not limited to: compliance history; documentation containing the landfill gas flow rate and measured methane concentrations for individual gas collection wells or components; permits; component testing and surface monitoring results; gas collection and control system operation, maintenance, and inspection records; and historical meteorological data.
- (c) The Executive Officer will review the requested alternatives and either approve or disapprove the alternatives within 120 days. The Executive Officer may request that additional information be submitted as part of the review of the requested alternatives.
  - (1) If a request for an alternative compliance option is denied, the Executive Officer will provide written reasons for the denial.
  - (2) The Executive Officer must deny the approval of any alternatives not providing equivalent levels of enforceability or methane emission control.

Note: Authority cited: Sections 38501, 38510, 38560, 38560.5, 38580, 39600, and 39601, Health and Safety Code. Reference: Sections 38501, 38505, 38510, 38550, 38551, 38560, 38560.5, 39003, 39500, 39600, and 39601, Health and Safety Code.

## **§ 95469. Monitoring Requirements**

- (a) *Surface Emissions Monitoring Requirements:* Any owner or operator of a MSW landfill with a gas collection and control system must conduct instantaneous and

integrated surface monitoring of the landfill surface quarterly using the procedures specified in section 95471(c).

- (1) *Instantaneous Surface Monitoring:* Any reading exceeding the limit specified in section 95465(a)(1) must be recorded as an exceedance and the following actions must be taken:
  - (A) The owner or operator must record the date, location, and value of each exceedance, along with re-test dates and results. The location of each exceedance must be clearly marked and identified on a topographic map of the MSW landfill, drawn to scale with the location of both the grids and the gas collection system clearly identified.
  - (B) Corrective action must be taken by the owner or operator such as, but not limited to, cover maintenance or repair, or well vacuum adjustments and the location must be re-monitored within ten calendar days of a measured exceedance.
    1. If the re-monitoring of the location shows a second exceedance, additional corrective action must be taken and the location must be re-monitored again no later than 10 calendar days after the second exceedance.
    2. If the re-monitoring shows a third exceedance, the owner or operator must install a new or replacement well as determined to achieve compliance no later than 120 calendar days after detecting the third exceedance, or it is a violation of this subarticle.
  - (C) Any closed or inactive MSW landfill, or any closed or inactive areas on an active MSW landfill that has no monitored exceedances of the limit specified in section 95465(a)(1) after four consecutive quarterly monitoring periods may monitor annually. Any exceedances of the limits specified in section 95465(a)(1) detected during the annual monitoring that can not be remediated within 10 calendar days will result in a return to quarterly monitoring of the landfill.
  - (D) Any exceedances of the limit specified in section 95465(a)(1) detected during any compliance inspections will result in a return to quarterly monitoring of the landfill.
- (2) *Integrated Surface Monitoring:* Any reading exceeding the limit specified in section 95465(a)(2) must be recorded as an exceedance and the following actions must be taken:

- (A) The owner or operator must record the average surface concentration measured as methane for each grid along with re-test dates and results. The location of the grids and the gas collection system must be clearly marked and identified on a topographic map of the MSW landfill drawn to scale.
  - (B) Within 10 calendar days of a measured exceedance, corrective action must be taken by the owner or operator such as, but not limited to, cover maintenance or repair, or well vacuum adjustments and the grid must be re-monitored.
    - 1. If the re-monitoring of the grid shows a second exceedance, additional corrective action must be taken and the location must be re-monitored again no later than 10 calendar days after the second exceedance.
    - 2. If the re-monitoring in section 95469(a)(2)(B)1. shows a third exceedance, the owner or operator must install a new or replacement well as determined to achieve compliance no later than 120 calendar days after detecting the third exceedance, or it is a violation of this subarticle.
  - (C) Any closed or inactive MSW landfill, or any closed or inactive areas on an active MSW landfill that has no monitored exceedances of the limit specified in section 95465(a)(2) after 4 consecutive quarterly monitoring periods may monitor annually. Any exceedances of the limits specified in section 95465(a)(2) detected during the annual monitoring that can not be remediated within 10 calendar days will result in a return to quarterly monitoring of the landfill.
  - (E) Any exceedances of the limits specified in section 95465(a)(2) detected during any compliance inspections will result in a return to quarterly monitoring of the landfill.
- (3) An owner or operator of a closed or inactive MSW landfill, or any closed or inactive areas on an active MSW landfill that can demonstrate that in the three years before the effective date of this subarticle that there were no measured exceedances of the limits specified in section 95465 by annual or quarterly monitoring may monitor annually. Any exceedances of the limits specified in section 95465 detected during the annual monitoring that can not be remediated within 10 calendar days will result in a return to quarterly monitoring of the landfill.
- (b) *Gas Control System Equipment Monitoring:* The owner or operator must monitor the gas control system using the following procedures:



- (1) For enclosed flares the following equipment must be installed, calibrated, maintained, and operated according to the manufacturer's specifications:
    - (A) A temperature monitoring device equipped with a continuous recorder which has an accuracy of plus or minus ( $\pm$ ) 1 percent of the temperature being measured expressed in degrees Celsius or Fahrenheit.
    - (B) At least one gas flow rate measuring device which must record the flow to the control device(s) at least every 15 minutes.
  - (2) For a gas control device other than an enclosed flare, demonstrate compliance by providing information describing the operation of the gas control device, the operating parameters that would indicate proper performance, and appropriate monitoring procedures. Alternatives to this section must be submitted as specified in section 95468. The Executive Officer may specify additional monitoring procedures.
  - (3) Components containing landfill gas and under positive pressure must be monitored quarterly for leaks. Any component leak must be tagged and repaired within 10 calendar days, or it is a violation of this subarticle.
    - (A) Component leak testing at MSW landfills having landfill gas-to-energy facilities may be conducted prior to scheduled maintenance or during planned outage periods.
- (c) *Wellhead Monitoring:* The owner or operator must monitor each individual wellhead monthly to determine the gauge pressure. If there is any positive pressure reading other than as provided in sections 95464(d) and 95464(e), the owner or operator must take the following actions:
- (1) Initiate corrective action within five calendar days of the positive pressure measurement.
  - (2) If the problem cannot be corrected within 15 days of the date the positive pressure was first measured, the owner or operator must initiate further action, including, but not limited to, any necessary expansion of the gas collection system, to mitigate any positive pressure readings.
  - (3) Corrective actions, including any expansion of the gas collection and control system, must be completed and any new wells must be operating within 120 days of the date the positive pressure was first measured, or it is a violation of this subarticle.

Note: Authority cited: Sections 38501, 38510, 38560, 38560.5, 38580, 39600, and 39601, Health and Safety Code. Reference: Sections 38501, 38505, 38510, 38550, 38551, 38560, 38560.5, 39003, 39500, 39600, and 39601, Health and Safety Code.

**§ 95470. Recordkeeping and Reporting Requirements.**

**(a) Recordkeeping Requirements.**

- (1) An owner or operator must maintain the following records for at least five years:
  - (A) All gas collection system downtime exceeding five calendar days, including individual well shutdown and disconnection times, and the reason for the downtime.
  - (B) All gas control system downtime in excess of one hour, the reason for the downtime, and the length of time the gas control system was shutdown.
  - (C) Expected gas generation flow rate calculated pursuant to section 95471(e).
  - (D) Records of all instantaneous surface readings of 200 ppmv or greater; all exceedances of the limits in sections 95464(b)(1)(B) or 95465, including the location of the leak (or affected grid), leak concentration in ppmv, date and time of measurement, the action taken to repair the leak, date of repair, any required re-monitoring and the re-monitored concentration in ppmv, and wind speed during surface sampling; and the installation date and location of each well installed as part of a gas collection system expansion.
  - (E) Records of any positive wellhead gauge pressure measurements, the date of the measurements, the well identification number, and the corrective action taken.
  - (F) Annual solid waste acceptance rate and the current amount of waste-in-place.
  - (G) Records of the nature, location, amount, and date of deposition of non-degradable waste for any landfill areas excluded from the collection system.
  - (H) Results of any source tests conducted pursuant to section 95464(b)(4).

- (I) Records describing the mitigation measures taken to prevent the release of methane or other emissions into the atmosphere:
  - 1. When solid waste was brought to the surface during the installation or preparation of wells, piping, or other equipment;
  - 2. During repairs or the temporary shutdown of gas collection system components; or,
  - 3. When solid waste was excavated and moved.
  
- (J) Records of any construction activities pursuant to section 95466. The records must contain the following information:
  - 1. A description of the actions being taken, the areas of the MSW landfill that will be affected by these actions, the reason the actions are required, and any landfill gas collection system components that will be affected by these actions.
  - 2. Construction start and finish dates, projected equipment installation dates, and projected shut down times for individual gas collection system components.
  - 3. A description of the mitigation measures taken to minimize methane emissions and other potential air quality impacts.
  
- (K) Records of the equipment operating parameters specified to be monitored under sections 95469(b)(1) and 95469(b)(2) as well as records for periods of operation during which the parameter boundaries established during the most recent source test are exceeded. The records must include the following information:
  - 1. For enclosed flares, all 3-hour periods of operation during which the average temperature difference was more than 28 degrees Celsius (or 50 degrees Fahrenheit) below the average combustion temperature during the most recent source test at which compliance with sections 95464(b)(2) and 95464(b)(3)(A) was determined.
  - 2. For boilers or process heaters, whenever there is a change in the location at which the vent stream is introduced into the flame zone pursuant to section 95464(b)(3)(A)2.

3. For any owner or operator who uses a boiler or process heater with a design heat input capacity of 44 megawatts (150 MMBtu/hr) or greater to comply with section 95464(b)(3), all periods of operation of the boiler or process heater (e.g., steam use, fuel use, or monitoring data collected pursuant to other federal, State, local, or tribal regulatory requirements).
- (2) The owner or operator must maintain the following records for the life of each gas control device, as measured during the initial source test or compliance determination:
    - (A) The control device vendor specifications.
    - (B) The expected gas generation flow rate as calculated pursuant to section 95471(e).
    - (C) The percent reduction of methane achieved by the control device determined pursuant to section 95471(f).
    - (D) For a boiler or process heater, the description of the location at which the collected gas vent stream is introduced into the boiler or process heater over the same time period of the performance test.
    - (E) For an open flare: the flare type (i.e., steam-assisted, air-assisted, or non-assisted); all visible emission readings, heat content determination, flow rate or bypass flow rate measurements, and exit velocity determinations made during the performance test as specified in CFR 40 60.18 (as last amended 65 Fed.Reg. 61752 (October 17, 2000), which is incorporated by reference herein; and records of the flare pilot flame or flare flame monitoring and records of all periods of operations during which the pilot flame or the flare flame is absent.
  - (3) *Record Storage:* The owner or operator must maintain copies of the records and reports required by this subarticle and provide them to the Executive Officer within five business days upon request. Records and reports must be kept at a location within the State of California.
- (b) *Reporting Requirements.*
- (1) *Closure Notification:* Any owner or operator of a MSW landfill which has ceased accepting waste must submit a Closure Notification to the Executive Officer within 30 days of waste acceptance cessation.

- (A) The Closure Notification must include the last day solid waste was accepted, the anticipated closure date of the MSW landfill, and the estimated waste-in-place.
  - (B) The Executive Officer may request additional information as necessary to verify that permanent closure has taken place in accordance with the requirements of any applicable federal, State, local, or tribal statutes, regulations, and ordinances in effect at the time of closure.
- (2) *Equipment Removal Report:* A gas collection and control system Equipment Removal Report must be submitted to the Executive Officer 30 days prior to well capping, removal or cessation of operation of the gas collection, treatment, or control system equipment. The report must contain all of the following information:
- (A) A copy of the Closure Notification submitted pursuant to section 95470(b)(1).
  - (B) A copy of the initial source test report or other documentation demonstrating that the gas collection and control system has been installed and operated for a minimum of 15 years, unless the owner or operator can demonstrate to the satisfaction of the Executive Officer that due to declining methane rates the landfill is unable to operate the gas collection and control system for a 15-year period.
  - (C) Surface emissions monitoring results needed to verify that landfill surface methane concentration measurements do not exceed the limits specified in section 95465.
- (3) *Annual Report:* Any owner or operator subject to the requirements of this subarticle, except section 95463, must prepare an annual report for the period of January 1 through December 31 of each year. Each subsequent annual report must be submitted to the Executive Officer by March 15 of the following year. The annual report must contain the following information:
- (A) MSW landfill name, owner and operator, address, and solid waste information system (SWIS) identification number.
  - (B) Total volume of landfill gas collected (reported in standard cubic feet).
  - (C) Average composition of the landfill gas collected over the reporting period (reported in percent methane and percent carbon dioxide by volume).

- (D) Gas control device type, year of installation, rating, fuel type, and total amount of landfill gas combusted in each control device.
  - (E) The date that the gas collection and control system was installed and in full operation.
  - (F) The percent methane destruction efficiency of each gas control device(s).
  - (G) Type and amount of supplemental fuels burned with the landfill gas in each device.
  - (H) Total volume of landfill gas shipped off-site, the composition of the landfill gas collected (reported in percent methane and percent carbon dioxide by volume), and the recipient of the gas.
  - (I) Most recent topographic map of the site showing the areas with final cover and a geomembrane and the areas with final cover without a geomembrane with corresponding percentages over the landfill surface.
  - (J) The information required by sections 95470(a)(1)(A), 95470(a)(1)(B), 95470(a)(1)(C), 95470(a)(1)(D), 95470(a)(1)(E), and 95470(a)(1)(F), 95470(a)(1)(H), and 95470(a)(1)(K).
- (4) *Waste-in-Place Report:* Any owner or operator subject to the requirements of sections 95463(a), or 95643(b)(2)(B) must report the following information to the Executive Officer:
- (A) MSW landfill name, owner and operator, address, and solid waste information system (SWIS) identification number.
  - (B) The landfill's status (active, closed, or inactive) and the estimated waste-in-place, in tons.
  - (C) Most recent topographic map of the site showing the areas with final cover and a geomembrane and the areas with final cover without a geomembrane with corresponding percentages over the landfill surface.
- (5) *Landfill Gas Heat Input Capacity Report:* Any owner or operator subject to the requirements of section 95463(b) must calculate the landfill gas heat input capacity using the calculation procedures specified in section 95471(b) and report the results to the Executive Officer within 90 days of the effective date of this subarticle or upon reaching

450,000 tons of waste-in-place. The calculation, along with relevant parameters, must be provided as part of the report.

- (6) Any report, or information submitted pursuant to this subarticle must contain certification by a responsible official of truth, accuracy, and completeness. This certification, and any other certification required under this subarticle, must state that, based on information and belief formed after reasonable inquiry, the statements and information in the document are true, accurate, and complete.

Note: Authority cited: Sections 38501, 38510, 38560, 38560.5, 38580, 39600, and 39601, Health and Safety Code. Reference: Sections 38501, 38505, 38510, 38550, 38551, 38560, 38560.5, 39003, 39500, 39600, and 39601, Health and Safety Code.

### **§ 95471. Test Methods and Procedures**

- (a) *Hydrocarbon Detector Specifications:* Any instrument used for the measurement of methane must be a gas detector or other equivalent instrument approved by the Executive Officer that meets the calibration, specifications, and performance criteria of EPA Reference Method 21, Determination of Volatile Organic Compound Leaks, 40 CFR Part 60, Appendix A (as last amended 65 Fed.Reg. 61744 (October 17, 2000)), which is incorporated by reference herein, except for the following:
- (1) "Methane" replaces all references to volatile organic compounds (VOC).
  - (2) The calibration gas shall be methane.
- (b) *Determination of Landfill Gas Heat Input Capacity:* The landfill gas heat input capacity must be determined pursuant to sections 95471(b)(1), 95471(b)(2), or 95471(b)(3), as applicable:
- (1) *MSW Landfills without Carbon Adsorption or Passive Venting Systems:* The heat input capacity must be calculated using the procedure as specified in Appendix I. The Executive Officer may request additional information as may be necessary to verify the heat input capacity from the MSW landfill. Site-specific data may be substituted when available.
  - (2) *MSW Landfills with Carbon Adsorption Systems:* The landfill gas heat capacity must be determined by measuring the actual total landfill gas flow rate, in standard cubic feet per minute (scfm), using a flow meter or other flow measuring device such as a standard pitot tube and methane concentration (percent by volume) using a hydrocarbon detector meeting the requirements of 95471(a). The total landfill gas flow rate must be multiplied by the methane concentration and then multiplied by the gross heating value (GHV) of methane of 1,012 Btu/scf to determine the landfill gas heat input capacity.

- (3) *MSW Landfills with Passive Venting Systems:* The landfill gas heat input capacity must be determined pursuant to both of the following and is the higher of those determined values:
- (A) Section 95471(b)(1); and
  - (B) The owner or operator must measure actual landfill gas flow rates (in units of scfm) by using a flow measuring device such as a standard pitot tube and methane concentration (percent by volume) using a hydrocarbon detector meeting the requirements of 95471(a) from each venting pipe that is within the waste mass. Each gas flow rate must then be multiplied by its corresponding methane concentration to obtain the individual methane flow rate. The individual methane flow rates must be added together and then multiplied by the GHV of methane of 1,012 Btu/scf to determine the landfill gas heat input capacity.
- (c) *Surface Emissions Monitoring Procedures:* The owner or operator must measure the landfill surface concentration of methane using a hydrocarbon detector meeting the requirements of section 95471(a). The landfill surface must be inspected using the following procedures:
- (1) *Monitoring Area:* The entire landfill surface must be divided into individually identified 50,000 square foot grids. The grids must be used for both instantaneous and integrated surface emissions monitoring.
    - (A) Testing must be performed by holding the hydrocarbon detector's probe within 3 inches of the landfill surface while traversing the grid.
    - (B) The walking pattern must be no more than a 25-foot spacing interval and must traverse each monitoring grid.
      - 1. If the owner or operator has no exceedances of the limits specified in section 95465 after any four consecutive quarterly monitoring periods, the walking pattern spacing may be increased to 100-foot intervals. The owner or operator must return to a 25-foot spacing interval upon any exceedances of the limits specified in section 95465 that cannot be remediated within 10 calendar days or upon any exceedances detected during a compliance inspection.
      - 2. An owner or operator of a MSW landfill can demonstrate that in the past three years before the effective date of this subarticle that there were no measured exceedances of the limits specified in section 95465 by annual or quarterly monitoring may increase the walking pattern spacing to



100-foot intervals. The owner or operator must return to a 25-foot spacing interval upon any exceedances of the limits specified in section 95465 that cannot be remediated within 10 calendar days or upon any exceedances detected during a compliance inspection.

- (C) 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. Paved roads that do not have any cracks, pot holes, or other penetrations may also be excluded.
  - (D) Surface testing must be terminated when the average wind speed exceeds five miles per hour or the instantaneous wind speed exceeds 10 miles per hour. The Executive Officer may approve alternatives to this wind speed surface testing termination for MSW landfills consistently having measured winds in excess of these specified limits. Average wind speed must be determined on a 15-minute average using an on-site anemometer with a continuous recorder for the entire duration of the monitoring event.
  - (E) Surface emissions testing must be conducted only when there has been no measurable precipitation in the preceding 72 hours.
- (2) *Instantaneous Surface Emissions Monitoring Procedures.*
- (A) The owner or operator must record any instantaneous surface readings of methane 200 ppmv or greater, other than non-repeatable, momentary readings.
  - (B) Surface areas of the MSW landfill that exceed a methane concentration limit of 500 ppmv must be marked and remediated pursuant to section 95469(a)(1).
  - (C) The wind speed must be recorded during the sampling period.
  - (D) The landfill surface areas with cover penetrations, distressed vegetation, cracks or seeps must also be inspected visually and with a hydrocarbon detector.
- (3) *Integrated Surface Emissions Monitoring Procedures.*
- (A) Integrated surface readings must be recorded and then averaged for each grid.

- (B) Individual monitoring grids that exceed an average methane concentration of 25 ppmv must be identified and remediated pursuant to section 95469(a)(2).
- (C) The wind speed must be recorded during the sampling period.
- (d) *Gas Collection and Control System Leak Inspection Procedures.* Leaks must be measured using a hydrocarbon detector meeting the requirements of 95471(a).
- (e) *Determination of Expected Gas Generation Flow Rate.* The expected gas generation flow rate must be determined as prescribed in the 2006 Intergovernmental Panel on Climate Change (IPCC) Guidelines for National Greenhouse Gas Inventories, Chapter 3, which is incorporated by reference herein, using a recovery rate of 75 percent.
- (f) *Control Device Destruction Efficiency Determination.* The following methods of analysis must be used to determine the efficiency of the control device in reducing methane:

- (1) *Enclosed Combustors:* One of the following test methods, all of which are incorporated by reference herein (and all as promulgated in 40 CFR, Part 60, Appendix A, as last amended 65 Fed.Reg. 61744 (October 17, 2000)), must be used to determine the efficiency of the control device in reducing methane by at least 99 percent, or in reducing the outlet methane concentration for lean burn engines to less than 3,000 ppmv, dry basis, corrected to 15 percent oxygen:

U.S. EPA Reference Method 18, Measurement of Gaseous Organic Compound Emissions By Gas Chromatography;

U.S. EPA Reference Method 25, Determination of Total Gaseous Nonmethane Organic Emissions as Carbon;

U.S. EPA Reference Method 25A, Determination of Total Gaseous Organic Concentration Using a Flame Ionization Analyzer; or

U.S. EPA Reference Method 25C, Determination of Nonmethane Organic Compounds in Landfill Gases.

The following equation must be used to calculate destruction efficiency:

$$\text{Destruction Efficiency} = \left[ 1 - \left( \frac{\text{Mass of Methane - Outlet}}{\text{Mass of Methane - Inlet}} \right) \right] \times 100\%$$

- (2) *Open Flares:* Open flares must meet the requirements of 40 CFR 60.18 (as last amended 65 Fed.Reg. 61752 (October 17, 2000)).

- (g) *Determination of Gauge Pressure.* Gauge pressure must be determined using a hand-held manometer, magnahelic gauge, or other pressure measuring device approved by the Executive Officer. The device must be calibrated and operated in accordance with the manufacture's specifications.
- (h) *Alternative Test Methods.* Alternative test methods may be used provided that they are approved in writing by the Executive Officer.

Note: Authority cited: Sections 38501, 38510, 38560, 38560.5, 38580, 39600, and 39601, Health and Safety Code. Reference: Sections 38501, 38505, 38510, 38550, 38551, 38560, 38560.5, 39003, 39500, 39600, and 39601, Health and Safety Code.

**§ 95472. Penalties**

- (a) Penalties may be assessed for any violation of this subarticle pursuant to Health and Safety Code section 38580. Each day during any portion of which a violation occurs is a separate offense.
- (b) Any violation of this subarticle may be enjoined pursuant to Health and Safety Code section 41513.
- (c) Each day or portion thereof that any report, plan, or document required by this subarticle remains unsubmitted, is submitted late, or contains incomplete or inaccurate information, shall constitute a single, separate violation of this subarticle.

Note: Authority cited: Sections 38501, 38510, 38560, 38560.5, 38580, 39600, and 39601, Health and Safety Code. Reference: Sections 38501, 38505, 38510, 38550, 38551, 38560, 38560.5, 39003, 39500, 39600, and 39601, Health and Safety Code.

**§ 95473. Implementation, Enforcement, and Related Fees**

The Executive Officer, at his or her discretion, may enter into an agreement with a District to implement and enforce this subarticle. Pursuant to this agreement, an owner or operator of a MSW landfill must pay any fees assessed by a District for the purpose of recovering the District's cost of implementing and enforcing the requirements of this subarticle.

Note: Authority cited: Sections 38501, 38510, 38560, 38560.5, 38580, 39600, and 39601, Health and Safety Code. Reference: Sections 38501, 38505, 38510, 38550, 38551, 38560, 38560.5, 39003, 39500, 39600, 39601, and 40001(a), Health and Safety Code.

## **§ 95474. Applicability of Other Rules and Regulations**

Compliance with this regulation does not exempt a person from complying with other federal, State, or local law, including but not limited to, California Health and Safety Code Section 41700; rules pertaining to visible emissions, nuisance, or fugitive dust, or from permitting requirements of a District, the Regional Water Quality Control Board, local enforcement agencies, the Integrated Waste Management Board, and other local, State, and federal agencies.

## **§ 95475. Definitions**

(a) For purposes of this subarticle, the following definitions apply:

- (1) "Active MSW Landfill" means a MSW landfill that is accepting solid waste for disposal.
- (2) "Component Leak" means the concentration of methane measured one half of an inch or less from a component source that exceeds 500 parts per million by volume (ppmv), other than non-repeatable, momentary readings. Measurements from any vault must be taken within 3 inches above the surface of the vault exposed to the atmosphere.
- (3) "Component" means any equipment that is part of the gas collection and control system and that contains landfill gas including, but not limited to, wells, pipes, flanges, fittings, valves, flame arrestors, knock-out drums, sampling ports, blowers, compressors, or connectors.
- (4) "Construction and Demolition Wastes" means waste building materials, packaging and rubble resulting from construction, remodeling, repair and demolition operations on pavements, houses, commercial buildings and other structures.
- (5) "Continuous Operation" means that the gas collection and control system is operated continuously, the existing gas collection wells are operating under vacuum while maintaining landfill gas flow, and the collected landfill gas is processed by a gas control system 24 hours per day.
- (6) "Closed MSW Landfill" means that a MSW landfill is no longer accepting solid waste for disposal and has documentation that the closure was conducted in accordance with the applicable statutes, regulations, and local ordinances in effect at the time of closure, or can document that the landfill is no longer receiving solid waste.
- (7) "District" means any air quality management district or air pollution control district in the State of California.

- (8) "Destruction Efficiency" means a measure of the ability of a gas control device to combust, transform, or otherwise prevent emissions of methane from entering the atmosphere.
- (9) "Enclosed Combustor" means an enclosed flare, steam generating boiler, internal combustion engine, or gas turbine.
- (10) "Energy Recovery Device" means any combustion device that uses landfill gas to recover energy in the form of steam or electricity, including, but not limited to, gas turbines, internal combustion engines, boilers, and boiler-to-steam turbine systems.
- (11) "Exceedance" means the concentration of methane measured within 3 inches above the landfill surface that exceeds 500 ppmv, other than non-repeatable, momentary readings, as determined by instantaneous surface emissions monitoring; or the average methane concentration measurements exceed 25 ppmv, as determined by integrated surface emissions monitoring.
- (12) "Executive Officer" means the Executive Officer of the Air Resources Board, or his or her delegate.
- (13) "Facility Boundary" means the boundary surrounding the entire area on which MSW landfill activities occur and are permitted.
- (14) "Gas Control Device" means any device used to dispose of or treat collected landfill gas, including, but not limited to, enclosed flares, internal combustion engines, boilers and boiler-to-steam turbine systems, fuel cells, and gas turbines.
- (15) "Gas Collection System" means any system that employs various gas collection wells and connected piping, and mechanical blowers, fans, pumps, or compressors to create a pressure gradient and actively extract landfill gas.
- (16) "Gas Control System" means any system that disposes of or treats collected landfill gas by one or more of the following means: combustion, gas treatment for subsequent sale, or sale for processing offsite, including for transportation fuel and injection into the natural gas pipeline.
- (17) "Inactive MSW Landfill" means a MSW landfill that is no longer accepting solid waste for disposal.
- (18) "Landfill Gas" means any untreated, raw gas derived through a natural process from the decomposition of organic waste deposited in a MSW

landfill, from the evolution of volatile species in the waste, or from chemical reactions of substances in the waste.

- (19) "Landfill Surface" means the area of the landfill under which decomposable solid waste has been placed, excluding the working face.
- (20) "Municipal Solid Waste Landfill" or "MSW Landfill" means an entire disposal facility in a contiguous geographical space where solid waste is placed in or on land.
- (21) "Non-decomposable Solid Waste" means materials that do not degrade biologically to form landfill gas. Examples include, but are not limited to, earth, rock, concrete asphalt paving fragments, clay products, inert slag, asbestos-containing waste, and demolition materials containing minor amounts (less than 10 percent by volume) of wood and metals. Materials that do not meet this definition are considered decomposable solid waste.
- (22) "Non-repeatable, Momentary Readings" means indications of the presence of methane, which persist for less than five seconds and do not recur when the sampling probe of a portable gas detector is placed in the same location.
- (23) "Operator" means any person or entity, including but not limited to any government entity, corporation, partnership, trustee, other legal entity, or individual that:
  - (A) Operates the MSW landfill;
  - (B) Is responsible for complying with any federal, state, or local requirements relating to methane emissions from real property used for MSW landfill purposes and subject to this subarticle;
  - (C) Operates any stationary equipment for the collection of landfill gas;
  - (D) Purchases landfill gas from an owner or operator of a MSW landfill and operates any stationary equipment for the treatment of landfill gas; or
  - (E) Purchases untreated landfill gas from an owner or operator of a MSW landfill and operates any stationary equipment for the combustion of landfill gas.
- (24) "Owner" means any person or entity, including but not limited to any government entity, corporation, partnership, trustee, other legal entity, or individual that:
  - (A) Holds title to the real property on which the MSW landfill is located, including but not limited to title held by joint tenancy, tenancy in

common, community property, life estate, estate for years, lease, sublease, or assignment, except title held solely as security for a debt such as mortgage;

- (B) Is responsible for complying with any federal, state, or local requirements relating to methane emissions from real property used for MSW landfill purposes and subject to this subarticle.
  - (C) Owns any stationary equipment for the collection of landfill gas;
  - (D) Purchases the landfill gas from an owner or operator of a MSW landfill and owns any stationary equipment for the treatment of landfill gas; or
  - (E) Purchases untreated landfill gas from an owner or operator of a MSW landfill and owns any stationary equipment for the combustion of landfill gas.
- (25) "Perimeter" means along the MSW landfill's permitted facility boundary.
- (26) "Professional Engineer" means an engineer holding a valid certificate issued by the State of California Board of Registration for Professional Engineers and Land Surveyors or a state offering reciprocity with California.
- (27) "Solid Waste" means all decomposable and non-decomposable solid, semisolid, and liquid wastes, including garbage, trash, refuse, paper, rubbish, ashes, industrial waste, manure, vegetable or animal solid and semisolid wastes, sludge, and other discarded solid and semisolid wastes. Solid waste also includes any material meeting the definition of Solid Waste in 40 CFR 60.751 (as last amended 64 Fed.Reg 9262, Feb 24, 1999) as incorporated by reference herein.
- (28) "Subsurface Gas Migration" means underground landfill gases that are detected at any point on the perimeter pursuant to California Code of Regulations Title 27, section 20921.
- (29) "Waste-in-Place" means the total amount of solid waste placed in the MSW landfill estimated in tons. The refuse density is assumed to be 1,300 pounds per cubic yard and the decomposable fraction is assumed to be 70 percent by weight.
- (30) "Well Raising" means a MSW landfill activity where an existing gas collection well is temporarily disconnected from a vacuum source, and the non-perforated pipe attached to the well is extended vertically to allow the addition of a new layer of solid waste or the final cover; or is extended

horizontally to allow the horizontal extension of an existing layer of solid waste or cover material. The extended pipe (well extension) is then re-connected in order to continue collecting gas from that well.

- (31) "Working Face" means the open area where solid waste is deposited daily and compacted with landfill equipment.

Note: Authority cited: Sections 38501, 38510, 38560, 38560.5, 38580, 39600, and 39601, Health and Safety Code. Reference: Sections 38501, 38505, 38510, 38550, 38551, 38560, 38560.5, 39003, 39500, 39600, and 39601, Health and Safety Code.

**§ 95476. Severability**

Each part of this subarticle is deemed severable, and in the event that any part of this subarticle is held to be invalid, the remainder of this subarticle continues in full force and effect.

Note: Authority cited: Sections 38501, 38510, 38560, 38560.5, 38580, 39600, and 39601, Health and Safety Code. Reference: Sections 38501, 38505, 38510, 38550, 38551, 38560, 38560.5, 39003, 39500, 39600, and 39601, Health and Safety Code.



**1.0 Calculate Heat Input Capacity**

Heat Input Capacity (MMBtu/hr) = Methane Gas Generation (scfm) x 60 minutes/1 hour x Collection Efficiency x GHV x 1 MMBtu/1,000,000 Btu

Where:

Collection Efficiency = the landfill gas collection efficiency in percent (%), which is 75 percent.

GHV (Gross Heating Value) = Gross heating value of methane, which is 1,012 in units of British thermal units per standard cubic feet, or Btu/scf; source: <http://epa.gov/lmop/res/converter.htm>).

**2.0 Methane Gas Generation:** CH<sub>4</sub> Generation is calculated using the following equation:

$$CH_4 \text{ Generation (Mg of CH}_4) = \frac{\{ANDOC_{\text{year-start}} \times [1 - e^{-k}] - ANDOC_{\text{deposited-last year}} \times [1/k \times (e^{-k \times (1-M/12)} - e^{-k})] - (M/12) \times e^{-k}\} + ANDOC_{\text{deposited-same year}} \times [1 - ((1/k) \times (1 - e^{-k \times (1-M/12)}) + (M/12))]}{FCH_4}$$

Where:

CH<sub>4</sub> Generation = CH<sub>4</sub> generated in the inventory year in question (Mg of CH<sub>4</sub>) using the Mathematically Exact First-Order Decay Model provided in the 2006 Intergovernmental Panel on Climate Change (IPCC) Guidelines for National Greenhouse Gas Inventories, Chapter 3 (Source: [http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/5\\_Volume5/V5\\_3\\_Ch3\\_SWDS.pdf](http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/5_Volume5/V5_3_Ch3_SWDS.pdf)).

FCH<sub>4</sub> = Fraction of decomposing carbon converted into CH<sub>4</sub> (Default = 0.5)

ANDOC<sub>year-start</sub> = ANDOC in place at the beginning of the inventory year in question

ANDOC<sub>deposited-last year</sub> = ANDOC deposited during the previous inventory year

ANDOC<sub>deposited-same year</sub> = ANDOC deposited during the inventory year in question

### 3.0 To Convert Methane Generated from Mg of CH<sub>4</sub> to SCFM

$$\text{CH}_4 \text{ Gas Generated (scfm)} = \text{CH}_4 \text{ Generation (Mg/year)} \times \\ 1 \text{ year} / 525,600 \text{ minutes} \times 1,000,000 \text{ g/Mg} \times 1 \text{ mole CH}_4 / 16.04246 \text{ g CH}_4 \times \\ 0.83662 \text{ SCF/mole landfill gas}$$

### 4.0 Define ANDOC%

$$\text{ANDOC}\% = \sum \text{WIPFRAC}_i \times \text{TDOC}_i \times \text{DANF}_i$$

Where:

WIPFRAC<sub>i</sub> = Fraction of the i<sup>th</sup> component in the waste-in-place

TDOC<sub>i</sub> = Total Degradable Organic Carbon fraction of the i<sup>th</sup> waste component (Mg of that component/Mg of Total waste-in-place)

DANF<sub>i</sub> = Decomposable Anaerobic Fraction of the i<sup>th</sup> waste component, that fraction capable of decomposition in anaerobic conditions (Mg of decomposable carbon for that component/Mg TDOC<sub>i</sub> for that component)

### 5.0 Define ANDOC

$$\text{ANDOC} = \text{WIP (Tons)} \times 0.9072 \text{ (Mg/Ton)} \times \text{ANDOC}\%$$

Where:

ANDOC = Anaerobically Degradable Organic Carbon, carbon that is capable of decomposition in an anaerobic environment (Mg of carbon)

WIP = Waste-in-Place estimate of all the landfilled waste (wet weight) as reported to the CIWMB (tons)

### 6.0 Calculate ANDOC<sub>year-end</sub>

$$\text{ANDOC}_{\text{year-end}} = \text{ANDOC}_{\text{year-start}} \times e^{-[k]} + \text{ANDOC}_{\text{deposited-last year}} \times \left[ \frac{1}{k} \times \left( e^{-[k \times (1-M/12)]} - e^{-[k]} \right) - (M/12) \times e^{-[k]} \right] + \text{ANDOC}_{\text{deposited-same year}} \times \left[ \left( \frac{1}{k} \right) \times \left( 1 - e^{-[k \times (1-M/12)]} \right) + (M/12) \right]$$

Where:

ANDOC<sub>year-end</sub> = ANDOC remaining undecomposed at the end of the inventory year in question

$ANDOC_{year-start}$  = ANDOC in place at the beginning of the inventory year in question

$ANDOC_{deposited-last\ year}$  = ANDOC deposited during the previous inventory year

$ANDOC_{deposited-same\ year}$  = ANDOC deposited during the inventory year in question

M = Assumed delay before newly deposited waste begins to undergo anaerobic decomposition (Months, Default = 6)

k = Assumed rate constant for anaerobic decomposition;  
k =  $\ln 2 / \text{half-life (years)}$ ; half-life is the number of years required for half of the original mass of carbon to degrade

The following values for the assumed rate constant for anaerobic decomposition (or "k") must be used:

**Table 1. Average Rainfall and k Values**

Average Rainfall (Inches/Year)	k Value
<20	0.020
20-40	0.038
>40	0.057

Source: U.S. EPA  
<http://www.ncgc.nrcs.usda.gov/products/datasets/climate/data/precipitation-state/ca.html>.

The following waste characterization default values shown in Tables 1A, 1B, 2, and 3 in addition to the model equations must be used in estimating the methane generation potential for a MSW landfill:

Table 1A Waste Type	Waste Type (%) by Year				
	Up to 1964	1965-1974	1975-1984	1985-1992	1993-1995
Newspaper	6.4%	6.4%	5.9%	4.8%	3.9%
Office Paper	10.7%	11.3%	12.0%	13.1%	15.0%
Corrugated Boxes	10.8%	13.5%	11.5%	10.5%	10.3%
Coated Paper	2.2%	2.0%	2.4%	2.1%	1.8%
Food	14.8%	11.3%	9.5%	12.1%	13.4%
Grass	12.1%	10.3%	10.1%	9.0%	6.6%
Leaves	6.1%	5.1%	5.0%	4.5%	3.3%
Branches	6.1%	5.1%	5.0%	4.5%	3.3%
Lumber	3.7%	3.3%	5.1%	7.0%	7.3%
Textiles	2.1%	1.8%	1.7%	3.3%	4.5%
Diapers	0.1%	0.3%	1.4%	1.6%	1.9%
Construction/Demolition	2.6%	2.5%	3.5%	3.9%	4.5%
Medical Waste	0.0%	0.0%	0.0%	0.0%	0.0%
Sludge/Manure	0.0%	0.0%	0.0%	0.0%	0.0%

Source: US EPA Municipal Solid Waste publication: <http://www.epa.gov/msw/pubs/03data.pdf>.

<b>Table 1B</b>	<b>Waste Type (%) by Year</b>	
<b>Waste Type</b>	<b>1996-2002<sup>1</sup></b>	<b>2003-present<sup>2</sup></b>
Newspaper	4.3%	2.2%
Office Paper	4.4%	2.0%
Corrugated Boxes	4.6%	5.7%
Coated Paper	16.9%	11.1%
Food	15.7%	14.6%
Grass	5.3%	2.8%
Leaves	2.6%	1.4%
Branches	2.4%	2.6%
Lumber	4.9%	9.6%
Textiles	2.1%	4.4%
Diapers	6.9%	4.4%
Construction/Demolition	6.7%	12.1%
Medical Waste	0.0%	0.0%
Sludge/Manure	0.1%	0.1%
Source: <sup>1</sup> CIWMB Statewide Waste Characterization Study (1999). <sup>2</sup> CIWMB Statewide Waste Characterization Study (2004).		

<b>Table 2</b>		
<b>Waste Type</b>	<b>TDOC</b>	<b>Source</b>
Newspaper	46.5%	EPA
Office Paper	39.8%	EPA
Corrugated Boxes	40.5%	EPA
Coated Paper	40.5%	EPA
Food	11.7%	EPA
Grass	19.2%	EPA
Leaves	47.8%	EPA
Branches	27.9%	EPA
Lumber	43.0%	IPCC
Textiles	24.0%	IPCC
Diapers	24.0%	IPCC
Construction/Demolition	4.0%	IPCC
Medical Waste	15.0%	IPCC
Sludge/Manure	5.0%	IPCC
Sources EPA <i>Solid Waste Management and Greenhouse Gases: A Life-Cycle Assessment of Emissions and Sinks</i> , Exhibits 7-2, 7-3 (May 2002). IPCC <i>Guidelines for National Greenhouse Gas Inventories</i> , Chapter 2, Table 2.4, 2.5 and 2.6 (2006).		

<b>Table 3</b>		
<b>Waste Type</b>	<b>DANF</b>	<b>Source</b>
Newspaper	16.1%	EPA
Office Paper	87.4%	EPA
Corrugated Boxes	38.3%	EPA
Coated Paper	21.0%	EPA
Food	82.8%	EPA
Grass	32.2%	EPA
Leaves	10.0%	EPA
Branches	17.6%	EPA
Lumber	23.3%	CEC
Textiles	50.0%	IPCC
Diapers	50.0%	IPCC
Construction/Demolition	50.0%	IPCC
Medical Waste	50.0%	IPCC
Sludge/Manure	50.0%	IPCC
Sources: EPA <i>Solid Waste Management and Greenhouse Gasses: A Life-Cycle Assessment of Emissions and Sinks</i> Exhibits 7-2, 7-3 (May 2002). CEC <i>Inventory of California Greenhouse Gas Emissions and Sinks: 1990-2004</i> (December 2006). IPCC <i>Guidelines for National Greenhouse Gas Inventories</i> , Chapter 3, 3.13 (2006).		