

**RULE 1133.3 EMISSION REDUCTIONS FROM GREENWASTE
COMPOSTING OPERATIONS**

(a) Purpose

The purpose of this rule is to reduce fugitive emissions of volatile organic compounds (VOC) and ammonia occurring during greenwaste composting operations.

(b) Applicability

This rule applies to the operator of all new and existing greenwaste composting operations that produce active or finished compost from greenwaste by itself or greenwaste in combination with manure or foodwaste, unless otherwise exempted under subdivision (g) of this rule.

(c) Definitions

For the purposes of this rule, the following definitions shall apply:

- (1) ACTIVE COMPOST means material that is in the process of being rapidly decomposed and is biologically unstable. Active compost is generating temperatures of at least 122 degrees Fahrenheit during decomposition. Active compost includes, but is not limited to, pathogen-reduced mulch.
- (2) ACTIVE PHASE means the phase of the greenwaste composting process that begins when organic waste materials are mixed together for composting and lasts a minimum of 22 days under controlled conditions or until the compost has a Solvita Maturity Index of five or greater measured pursuant to subparagraph (e)(4)(A).
- (3) BACKYARD COMPOSTING means composting conducted by a household including, but not limited to, single family residences, condominiums, duplexes, or apartment buildings.
- (4) BASELINE EMISSION FACTORS mean the uncontrolled emission factors for greenwaste composting operations for VOC and ammonia.
- (5) COMMUNITY COMPOSTING means composting conducted by a residential neighborhood association using feedstock generated within the residential neighborhood to produce compost for the neighborhood's use.

- (6) COMPOSTING means a process in which solid organic waste materials are decomposed in the presence of oxygen through the action of bacteria and other microorganisms.
- (7) COMPOST OVERS mean the oversized woody materials that do not decompose in a typical composting cycle and are screened out of finished product at the end of composting. Compost overs have been through the pathogen reduction process outlined in Title 14, Section 17868.3 of the California Code of Regulations.
- (8) CURING PHASE means the phase of the greenwaste composting process that begins immediately after the end of the active phase of composting and lasts a minimum of 40 days or until the compost has a Solvita Maturity Index of seven or the product respiration rate is below ten milligrams of oxygen consumed per gram of volatile solids per day as measured by direct respirometry, pursuant to subparagraph (e)(4)(B).
- (9) EXISTING GREENWASTE COMPOSTING OPERATIONS mean all greenwaste composting operations that have begun operations on or before July 8, 2011.
- (10) FINISHED COMPOST means a humus-like material and/or compost overs that result from the controlled biological decomposition of organic waste materials and is biologically stable. Both the active and curing phases of the greenwaste composting are required to achieve this product.
- (11) FOODWASTE means any pre- or post-consumer food scraps collected from the food service industry, grocery stores, or residential food scrap collection. Foodwaste also includes food scraps that are chipped and ground.
- (12) GREENWASTE means any organic waste material generated from gardening, agriculture, or landscaping activities including, but not limited to, grass clippings, leaves, tree and shrub trimmings, and plant remains.
- (13) GREENWASTE COMPOSTING means composting of greenwaste by itself or a mixture with foodwaste, or with up to 20 percent manure, per pile volume basis.
- (14) NEW GREENWASTE COMPOSTING OPERATIONS mean greenwaste composting operations that have not started operations as of July 8, 2011.
- (15) NURSERY COMPOSTING means composting conducted at a nursery to produce compost for on-site use.

- (16) ORGANIC WASTE means any organic waste material that includes foodwaste, greenwaste, woodwaste, or manure, or a mixture thereof.
 - (17) OPERATOR means any person that operates a greenwaste composting operation.
 - (18) PILE means compostable material that is heaped together.
 - (19) RECREATIONAL FACILITY COMPOSTING means composting conducted at parks, arboretums and other recreational facilities using feedstock generated on-site to produce compost for on-site use.
 - (20) SOLVITA MATURITY INDEX means an index that defines the stage where compost exhibits resistance to further decomposition, as tested by the Solvita Maturity Test[®].
 - (21) START-UP means the first day of active greenwaste composting operations at the facility.
 - (22) THROUGHPUT means the mass of manure, foodwaste, or greenwaste in tons per year as received by the facility and processed through composting, excluding recycled materials.
 - (23) TMECC means Test Methods for the Examination of Composting and Compost published by the US Composting Council Research and Education Foundation.
 - (24) WOODWASTE means lumber, and the woody material portion of mixed demolition and construction wastes. Woodwaste also includes large wood materials of curbside greenwaste or mixed greenwaste that is screened or unscreened, such as tree trimmings, branches, tree trunks, stumps, and limbs exceeding two inches in any dimension.
- (d) Requirements
- (1) Effective July 8, 2011, the operator of greenwaste composting operations shall comply with the following requirements:
 - (A) Chip or grind, as necessary, and use greenwaste for on-site composting as allowed by the Local Enforcement Agency.
 - (B) Use foodwaste for on-site composting within 48 hours of receipt or cover foodwaste with screened or unscreened finished compost until used, unless otherwise required by the Local Enforcement Agency.
 - (2) Effective upon start-up for new greenwaste composting operations and effective November 8, 2011 for existing greenwaste composting

operations, the operator of greenwaste composting operations processing greenwaste only or up to 20 percent manure, by volume, or up to 5,000 tons per year of foodwaste throughput shall comply with the following requirements:

- (A) Cover each active phase pile with screened or unscreened finished compost within twenty-four hours of initial pile formation such that the top is at least six inches thick and the pile shall not be turned for the first seven days of the active phase of composting, unless subparagraph (d)(2)(D) applies.
- (B) For the first fifteen days after initial pile formation for the active phase period of composting, within six hours before turning, apply water as necessary to the surface area of each active phase pile such that the top one half of the pile is wet at a depth of at least three inches. Alternatively, the operator may apply water during turning using a windrow turner which is equipped with water spraying technology during the entire windrow turning process.
 - (i) For the purpose of this subparagraph, “wet” shall be determined by means of a squeeze ball test or an alternative approved by the Executive Officer, California Air Resources Board, and the United States Environmental Protection Agency. The ball test shall be conducted by taking a sample of the compostable material from the top half of the pile, at least three inches below the outer surface. The material should be squeezed into a ball using hand pressure and wearing a protective glove. There should be at least enough water to form a ball when compressed, but the ball may break when tapped. If the ball crumbles upon release of the hand pressure, apply additional water to the windrow prior to turning until the material passes the ball test.
- (C) If a rain event occurs prior to watering the pile within six hours before turning and the pile is wet to a depth of three inches, the operator may turn the pile without adding additional water. If the top half of the pile is dry to the three inch depth, apply additional water to the pile pursuant to subparagraph (d)(2)(B).

- (D) If the pile needs to be turned within the first seven days for managing temperature or pathogen reduction pursuant to Title 14 Division 7, Chapter 3.1, Section 17868.3 of the California Code of Regulations, the operator does not need to re-apply the screened or unscreened finished compost cover and shall apply water pursuant to subparagraph (d)(2)(B) for the first fifteen days of the active phase.
 - (E) The operator may implement an alternate mitigation measure that will be based on a test protocol approved by the Executive Officer, California Air Resources Board, and the United States Environmental Protection Agency and that demonstrates emission reductions by at least 40 percent, by weight, for VOC and emission reductions by at least 20 percent, by weight, for ammonia for combined screened or unscreened finished compost cover and water application.
- (3) Effective July 8, 2011, the operator of greenwaste composting operations processing greater than 5,000 tons per year of foodwaste throughput shall comply with the following requirements, for the purpose of regulatory compliance:
- (A) Any active phase of composting containing more than 10 percent foodwaste, by weight, shall be conducted using an emission control device designed and operated with an overall system control efficiency of at least 80 percent, by weight, each for VOC and ammonia emissions.
 - (B) The operator may implement a control alternative if the alternative is approved by the Executive Officer, California Air Resources Board, and the United States Environmental Protection Agency, to achieve VOC and ammonia reductions that are greater than or equal to the reductions required pursuant to subparagraph (d)(3)(A).
 - (C) For new greenwaste composting operations that intend to compost greater than 5,000 tons per year of foodwaste throughput, a permit shall be obtained for an emission control device, as specified in subparagraph (d)(3)(A) or (d)(3)(B), prior to construction.

The annual throughput calculation may exclude any non-putrescible materials, including, but not limited to paper, woody, other low-water,

high cellulose materials, and non-compostable contaminants and green waste that are separated either before or after composting and shipped off-site for disposal provided they are quantified and appropriate records are maintained for.

- (4) No later than October 10, 2011, for existing greenwaste composting operations that, as of July 8, 2011, process or plan to process greater than 5,000 tons per year of foodwaste throughput, the operator shall file a permit application for an emission control device and fully implement the emission control device in accordance with subparagraphs (d)(3)(A) or (d)(3)(B) within six months upon approval of the permit application.
 - (5) The overall control efficiency required in subparagraph (d)(3)(A) shall be demonstrated by a source test within three months after implementation of the emission control device, or within nine months of permit approval, whichever occurs sooner, and every three years thereafter. For the purpose of this rule, the baseline emission factors to be used shall be 4.25 pounds of VOC per ton of throughput and 0.46 pounds of ammonia per ton of throughput for the active phase of composting only. The Executive Officer may approve the use of alternate baseline emission factors, if the operator demonstrates through the approved source test that alternate baseline emission factors are representative of uncontrolled operations for that facility
 - (6) All emission control devices shall be installed, operated, and maintained in accordance with the manufacturer's operation and maintenance manual or other similar written materials supplied by the manufacturer or distributor of such equipment to ensure that the system remains in proper operating conditions. Such documentation shall be made available to the Executive Officer upon request.
 - (7) All records, including application of screened or unscreened finished compost and water, operation and maintenance of an emission control device, and source tests, shall be kept and maintained at the facility pursuant to subdivision (f).
- (e) Test Methods and Protocol
- (1) For a greenwaste composting operation subject to paragraphs (d)(3) through (d)(5), the operator shall conduct all required source and laboratory tests in accordance with an Executive Officer approved test

protocol developed in accordance with the guidelines provided in Attachment A of this rule.

- (2) For a greenwaste composting operation subject to paragraphs (d)(3) through (d)(5), the operator shall use a District approved laboratory in accordance with the Attachment A of this rule.
- (3) The following methods shall be used to determine compliance with this rule:
 - (A) SCAQMD Method 207.1 – Determination of Ammonia Emissions from Stationary Sources.
 - (B) SCAQMD Method 25.3 – Determination of Low Concentration Non-Methane Non-Ethane Organic Compound Emissions from Clean Fueled Combustion Sources.
 - (C) SCAQMD Method 1.1 – Sample and Velocity Traverses for Stationary Sources.
 - (D) SCAQMD Method 1.2 – Sample and Velocity Traverses for Stationary Sources with Small Stacks and Ducts.
 - (E) SCAQMD Method 2.1 – Determination of Stack Gas Velocity and Volumetric Flow Rate (S-Type Pitot Tube).
 - (F) SCAQMD Method 2.2 – Direct Measurement of Gas Volume through Pipes and Small Ducts.
 - (G) SCAQMD Method 2.3 – Determination of Gas Velocity and Volumetric Flow Rate from Small Stacks or Ducts.
 - (H) SCAQMD Method 4.1 – Determination of Moisture Content in Stack Gases.
- (4) Triplicate samples shall be taken for the following test methods:
 - (A) TMECC 05.08-E – Solvita Maturity Index (April 7, 2002).
 - (B) TMECC 05.08-A – Specific Oxygen Uptake Rate (April 7, 2002).

(f) Recordkeeping

Records shall be kept in a format approved by the Executive Officer. All operational records and information recorded pursuant to the provisions of this rule shall be maintained for the prior five years of operation, with the most recent two years retained at the facility, which shall be immediately available upon request by the Executive Officer. The remaining three years of records shall be made available to the Executive Officer within one week of request.

(g) Exemptions

- (1) Composting facilities subject to Rule 1133.2 – Emission Reductions from Co-Composting Operations, are exempt from the provisions of this rule.
- (2) If the operator of any greenwaste composting operation installs an emission control device, in accordance with paragraphs (d)(3) through (d)(6), the provisions of paragraph (d)(2) do not apply.
- (3) The following types of facilities and operations are exempt from the requirements of this rule, provided that the operation is not subject to the Local Enforcement Agency Notification or Permit regulations pursuant to Title 14 Division 7, Chapter 3.1, Section 17857.1 of the California Code of Regulations:
 - (A) Community composting;
 - (B) Nursery composting;
 - (C) Backyard composting; and
 - (D) Recreational facility composting.

ATTACHMENT A**GUIDELINES FOR THE DEVELOPMENT OF SOURCE TEST
PROTOCOLS FOR VOC AND AMMONIA EMISSIONS FROM
GREENWASTE COMPOSTING OPERATIONS**

Source test protocols are to consist of testing plans to measure VOC and ammonia emissions due to the composting process. When used for determining the control device efficiency requirement specified for new and existing facilities, the measurements shall consist of lb/hr measurements at the inlet and exhaust of the control device and are subject to the applicable requirements that follow. When used for determining the overall emission reduction requirements as compared to the baseline emissions factors, emissions are to be reported as % reductions for the active phase composting in terms of pounds of emissions per ton of throughput (total raw material as received) and are subject to the applicable requirements that follow. The following are general requirements for all testing as well as specific requirements for the rule sections for each facility-specific protocol which must be prepared by the source test contractor and approved by the SCAQMD prior to testing.

1. Alternative Test Methods

The reference test methods for ammonia, VOC, and flow rate cited in this guideline shall be used to determine compliance with this rule. Alternative test methods may be used if they are determined to be equivalent and approved in writing by the Executive Officer, the California Air Resources Board, and the U.S. Environmental Protection Agency. For the source test protocols, as defined as the manner in which the reference test methods are employed to obtain a measurement of the emissions, alternatives to the procedures cited in this guidelines may be used if they are determined to be equivalent and approved in writing by the Executive Officer.

2. LAP Requirements

The sampling, analysis, and reporting shall be conducted by a laboratory/source test firm that has been approved under the SCAQMD Laboratory Approval Program (LAP) for the cited SCAQMD reference test methods, where LAP approval is available. For SCAQMD reference test methods for which no LAP program is available, the LAP approval requirement shall become effective one year after the date that the LAP program becomes available for that SCAQMD reference test method.

3. Operating Conditions

The testing must be conducted under representative operating conditions with respect to seasonal conditions, compost composition, process throughput,

processing of the materials, and pile geometries. The following operating parameters shall be recorded during testing and reported with the test results:

- a) A thorough description of the composting process and process diagram of each processing area and including residence times in each of the composting process areas.
- b) Process throughput as determined by facility's billing scales or other calibrated measuring device that represents the tons of the material as received that is present at the facility during the time of the testing. When using the District Baseline Emission Factors, the process throughput is to include all of the raw organic materials that are composted excluding material that is recycled from previous similar processing. Several throughputs may be necessary if applicable to the different processing areas or pile ages.
- c) Compost composition (percent and type of materials i.e. manure, greenwaste, foodwaste, etc...).
- d) Age of all piles that were tested and all piles present at the facility during testing.
- e) Detailed dimensions of all piles or the biofilter so that a surface area for each pile type can be calculated.
- f) A description of the biofilter system, including a process diagram and type of biofilter media.
- g) Age of the biofilter media.
- h) A thorough description of the humidification and moisture maintenance system for the biofilter.
- i) Identification of peripheral monitoring equipment, such as moisture or temperature sensors, and data from them during testing.

4. *Ammonia Sampling*

SCAQMD Method 207.1 shall be used to obtain the ammonia samples from each source of emissions to be tested. When sampling from a flux chamber, a sample line of minimal length should be connected to a midjet sampling train consisting of; two midjet impingers each filled with 15 ml of 0.1N Sulfuric Acid, an empty bubbler, and a bubbler filled with tared silica gel. The samples shall be analyzed for ammonium content as ammonia by ion chromatography or ion selective electrode.

5. *VOC Sampling*

Duplicate integrated gas samples shall be taken from each source of emissions to be tested using SCAQMD Method 25.3. The Method 25.3 apparatus should be connected to sample directly inside the flux chamber or duct as applicable. Compost emissions are considered as water soluble sources where the 50 ppm applicability limit of Method 25.3 does not apply.

6. *Specific Requirements for Testing Greenwaste Composting Operations Control Equipment Performance*

For surface types of emissions, such as with open faced biofilter exhausts, the exhaust emission rate shall be determined as in the following Section (8).

For a control device inlet or exhaust that is vented through a testable duct, the gas velocity within the duct shall be measured according to SCAQMD Methods 1.1, 2.1, and 3.1. The flow rate shall also be corrected to dry standard conditions using the moisture content as determined by SCAQMD Method 4.1. This flow rate may then be used to determine mass emission rates.

The overall destruction efficiency is calculated as follows:

$$\text{ODE} = 100 \times (1 - (E / I)) \qquad \text{(Equation 1)}$$

Where:

- ODE = Overall Destruction Efficiency (%)
- E = Total Exhaust Emission Rate (lb/hr)
- I = Total Inlet Emission Rate to Control Device (lb/hr)

7. *Specific Requirements for Existing Greenwaste Composting Operations and New Greenwaste Composting Operations (Overall Emissions Reduction)*

A proposed measurement from the active greenwaste composting process, including but not limited to surface emissions of all piles where the materials are composted, and outlets (vents or surfaces) of control devices must be included in the protocol. If the emissions are vented to atmosphere from a vent stack such as from an otherwise uncontrolled aerated static pile or other vent to atmosphere, then the stack concentration, determined using methods specified in Sections (4) and (5) and flow rate measurements as specified in the previous Section (6) are required. From all surface types of emissions such as from compost piles and biofilter surfaces, the procedure for measuring surface emissions as in Section (8) is required. A measurement for fugitive emissions from aerated static pile surfaces must also be included.

Each type of pile must be tested. If the facility includes several identical piles, then only the largest pile need be tested. If the facility has more than three different age piles that are otherwise identical in processing and composition, then at a minimum three ages can be tested including newer, older, and middle aged piles. In any case, the surface area of all piles at the facility must be included in the determination of pile dimensions as recorded in Section (3).

If the facility elects to use an alternative to the District's baseline emissions factors, then a separate test must be conducted to establish this baseline on the

uncontrolled composting operation (e.g., windrow method) with the same compost mix. Following the source test to determine an alternative baseline, facilities would have the option to use the District's baseline emissions factors or the alternative baseline emissions factors.

Reduction of emissions shall be calculated as follows:

$$\% \text{ Reduction} = 100 \times (1 - TE/B) \quad (\text{Equation 2})$$

Where:

TE = Total Active and Curing Phase Emissions (lb/ton throughput)
 B = District Baseline Emissions or Alternative Baseline Emissions if Tested (lb/ton throughput)

8. *Procedure for Measuring Surface Emissions*

The procedure for measuring surface emissions such as the compost pile and biofilter surfaces that cannot be tested by conventional methods through a stack or duct, is a modified form of the procedures found in the US Environmental Protection Agency's (EPA) *Measurement of Gaseous Emission Rates from Land Surfaces Using an Emission Isolation Flux Chamber User's Guide* (EPA Guide). The modification to the procedures in the EPA Guide is specified in the following requirements.

The flux chamber encompasses a fixed surface area of 1.4 ft² and contains a sweep air system to obtain a homogeneous air sample by employing a mixing fan and sweep gas (10% He in air at 5 liters/min recommended). The sweep gas must contain a non reactive and non-present tracer such as the aforementioned 10% helium so that a correction for the contribution of the surface flow rate can be calculated.

A minimum of ten (10) sample locations or a sufficient number at each pile/surface tested must be obtained in order to achieve a representative sample of the surface emissions. These locations can be composited for each pile/surface to reduce testing costs. For example, for one hour sampling, ten (10) random positions on the pile should be tested for 6 minutes each. Alternatively, a lesser number of sample locations may be sampled provided that an evaluation of spatial variation demonstrates that the number of sample locations is sufficient.

The emissions must be reported in units of lb/hr-ft², lb/hr and lb/ton of throughput. The following calculations shall apply to the test results:

$$\text{Surface Flow Correction Factor} = C_t / C_s \quad (\text{Equation 3})$$

Where:

C_t = Concentration of Tracer in Sweep Gas
 C_s = Concentration of Sweep Gas in Flux Chamber Sample

$$\text{Corrected Flux Chamber Results (lb/hr-ft}^2\text{)} = \text{UFC} \times \text{SFCF} \quad (\text{Equation 4})$$

Where:

UFC = Uncorrected Flux Chamber Results (lb/hr-ft²)
SFCF = Surface Flow Correction Factor

$$\text{lb/hr} = \text{lb/hr-ft}^2 \times \text{Total Compost Surface Area in Category} \quad (\text{Equation 5})$$

$$\text{lb/ton throughput} = \text{lb/hr} \times (24 \text{ hr/day}) / \text{PT} \quad (\text{Equation 6})$$

Where:

PT = Process Throughput (total ton/day as received)

$$\text{Total Emissions (lb/ton throughput)} = \sum P \quad (\text{Equation 7})$$

Where:

P = Active and curing sources of the Facility Compost Emissions (lb/ton throughput)

For a facility where not every age of pile was tested, the surface areas from each pile in the facility must be included and sorted into appropriate age and emissions categories from those that were measured.