RULE 1133.3 EMISSION REDUCTIONS FROM COMPOSTING OPERATIONS

(a) Purpose

The purpose of this rule is to reduce emissions of volatile organic compounds (VOC) and ammonia from Composting Operations.

(b) Applicability

This rule applies to owners and operators of Composting Operations that are not subject to Rule 1133.2 – Emission Reductions from Co-Composting Operations and excluding Bioreactors with a design capacity of less than 1,000 tons per calendar year.

(c) Definitions

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

(1) ACTIVE PHASE is the portion of the composting process characterized by rapid decomposition and biological instability, generating temperatures of at least 122 degrees Fahrenheit (50 degrees Celsius). The Active Phase includes the Pathogen Reduction Process.

(2) AERATION SYSTEM is a system where air is forced through Organic Waste Material being composted, through the use of fans or blowers.

(3) AGRICULTURAL OPERATIONS are defined in Rule 102 – Definition of Terms.

(4) BACKYARD COMPOSTING is composting conducted by a household including single family residences, condominiums, duplexes, or apartment buildings.

(5) BASELINE EMISSION FACTORS are the uncontrolled emission factors for Composting Operations for VOC and ammonia, respectively.

(6) BIOREACTOR is a fully or partially enclosed vessel primarily constructed of non-earthen materials that facilitates aeration with augers, tumblers, ventilation holes, or blowers to rapidly decompose solid Organic Waste Material, typically in three (3) days or fewer. The composting of Piles with an Aeration System vented to an emission control system is not a Bioreactor.

(7) BIOSOLIDS are the residual solid wastes produced by the anaerobic digestion of sewage and other Organic Waste Material at publicly owned treatment works.

(8) COMMUNITY COMPOSTING is composting conducted by a residential neighborhood association using feedstock generated within the residential neighborhood to produce compost for the neighborhood’s use.

(9) COMPOST OVERS are woody materials that do not decompose in a typical composting cycle and are screened out of Finished Compost at the end of composting. Compost Overs have completed the Pathogen Reduction Process.

(c) (10) COMPOSTING OPERATION is an operation where solid Organic Waste Material is decomposed in the presence of oxygen through the action of bacteria and other microorganisms.

(11) CONTROL EFFICIENCY is the effectiveness, expressed in percent, of an emission control system or mitigation measure to eliminate, reduce or control the issuance of a specific air contaminant.

(12) CURING PHASE is the portion of the composting process that begins immediately after the end of the Active Phase of composting and characterized by slower decomposition until reaching biological stability.

(13) DIGESTATE is the residual material produced by the anaerobic digestion of Organic Waste Material excluding sewage or Biosolids.

(14) FINISHED COMPOST is a humus-like material that results from the controlled biological decomposition of Organic Waste Material and is biologically stable. Both the Active Phase and Curing Phase of composting are required to achieve this product.

(15) FOODWASTE is any 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. Food scraps co-collected with curbside Greenwaste collection are considered Greenwaste.

(16) GREENWASTE is any waste of organic origin generated from gardening, agriculture, or landscaping activities including grass clippings, leaves, tree and shrub trimmings, and plant remains. Food scraps co-collected with curbside Greenwaste collection are considered Greenwaste. Small woody materials, such as prunings and trimmings up to four (4) inches in diameter, are Greenwaste.

(17) MANURE is the solid waste and soiled bedding produced by livestock and zoological operations from the keeping of animals.

(18) NURSERY COMPOSTING is composting conducted to produce compost for on-site use at a facility where seedlings, young plants, and trees are grown for sale or distribution.

(19) ORGANIC WASTE MATERIAL is any waste material of organic origin that may be used as feedstock to produce Finished Compost, Compost Overs, or intermediate material. Organic Waste Material includes Greenwaste, both curbside and non-curbside, Woodwaste, Foodwaste, Biosolids, Digestate, and Manure.

(20) PATHOGEN REDUCTION PROCESS is the process outlined in Title 14, Section 17868.3 of the California Code of Regulations.

(21) PILE is Organic Waste Material that is heaped together.

(c) (22) RECREATIONAL FACILITY COMPOSTING is composting conducted at parks, arboretums, and other recreational facilities using feedstock generated on-site to produce compost for on-site use.

(23) SCHOOL COMPOSTING is composting conducted at a public or private learning facility to produce compost for the primary purpose of education.

(24) THROUGHPUT is the mass of Organic Waste Material in tons per calendar year as received by the Composting Operation and processed through composting, excluding recycled materials.

(25) WOODWASTE is lumber, and the woody material portion of mixed demolition wastes and mixed construction wastes. Large woody materials, such as branches, tree trunks, and stumps exceeding four (4) inches in diameter are Woodwaste.

(26) WINDROW COMPOSTING is the process in which Organic Waste Material is placed in elongated Piles and are mechanically turned on a periodic basis.

(d) Requirements

(1) The owner or operator of a Composting Operation shall:

(A) Chip or grind, as necessary, and use Organic Waste Material 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 Finished Compost or Compost Overs until used, unless otherwise required by the Local Enforcement Agency.

(C) Conduct the Active Phase:

(i) For Composting Operations processing more than 5,000 tons of Foodwaste per calendar year, for all Piles containing more than ten (10) percent Foodwaste, by weight, by using an Aeration System that is vented to an emission control system in accordance with paragraph (d)(3).

(ii) For all other Piles and all other Composting Operations, either by Windrow Composting in accordance with paragraph (d)(2) or by using an Aeration System vented to an emission control system in accordance with paragraph (d)(3).

(D) Conduct the Active Phase until meeting at least one of the following criteria:

(i) For a minimum of 22 consecutive calendar days, beginning when Organic Waste Material is mixed together for composting.

(d) (1) (D) (ii) The Active Phase Pile has a Compost Maturity Index of 4.5 or greater as measured by the Solvita Maturity Test in accordance with subparagraph (e)(4)(A).

(iii) The Active Phase Pile has completed the Pathogen Reduction Process.

(E) Conduct the Curing Phase until meeting at least one of the following criteria:

(i) For a minimum of 40 consecutive calendar days after the end of the Active Phase.

(ii) The Curing Phase Pile has a Compost Maturity Index of 6.0 or greater as measured by the Solvita Maturity Test in accordance with subparagraph (e)(4)(A).

(iii) The Curing Phase Pile respiration rate is below ten (10) milligrams of oxygen consumed per gram of volatile solids per day as measured by direct respirometry in accordance with subparagraph (e)(4)(B).

(2) Windrow Composting Best Management Practices

The owner or operator of a Composting Operation conducting the Active Phase of composting by Windrow Composting shall:

(A) Cover each Active Phase Pile with Finished Compost or Compost Overs within 24 hours of initial Pile formation such that the top of the cover is at least six (6) inches thick.

(B) Within six (6) hours before turning for at least the first 15 days after initial Active Phase Pile formation, apply water or other liquid approved by the Executive Officer to the surface area of each Active Phase Pile until the top one-half of the Active Phase Pile is sufficiently wet to a depth of at least three (3) inches.

(i) The owner or operator shall determine if an Active Phase Pile is sufficiently wet by the squeeze ball test pursuant to clause (d)(2)(B)(ii) or an alternative approved by the Executive Officer, California Air Resources Board (CARB), or the United States Environmental Protection Agency (U.S. EPA).

(ii) Squeeze Ball Test

The owner or operator shall take a sample of material while wearing a protective glove from the top one-half of the Active Phase Pile, at least three (3) inches below the outer surface. The owner or operator shall squeeze the sample into a ball using hand pressure. An Active

Phase Pile is sufficiently wet if the sample forms a ball when compressed, but the ball may break when tapped.

(d) (2) (B) (iii) If the ball crumbles upon release of hand pressure, the owner or operator shall apply additional approved liquid to the Active Phase Pile prior to turning until the Active Phase Pile is sufficiently wet.

(iv) If a rain event occurs within six (6) hours before turning an Active Phase Pile and the Active Phase Pile is sufficiently wet, the owner or operator may turn the Active Phase Pile without adding additional approved liquid. If the Active Phase Pile is not sufficiently wet, the owner or operator shall apply additional approved liquid to the Active Phase Pile pursuant to clause (d)(2)(B)(iii) before turning.

(C) In lieu of complying with the requirement of subparagraph (d)(2)(B), the owner or operator may turn Active Phase Piles using a windrow turner equipped with liquid spraying technology that applies approved liquid during the entire turning process.

(D) The owner or operator may implement an alternate mitigation measure based on a test protocol approved by the Executive Officer, CARB, or U.S. EPA that either:

(1) Meets a Control Efficiency equal to or greater than 40 percent, by weight, for VOC emissions and equal to or greater than 20 percent, by weight, for ammonia emissions; or

(2) Does not exceed 2.97 lbs VOC emissions per ton of Throughput and does not exceed 0.57 lbs ammonia emissions per ton of Throughput.

(3) Aeration System Vented to Emission Control System

The owner or operator of a Composting Operation conducting the Active Phase of composting using an Aeration System vented to an emission control system shall:

(A) Use an emission control system designed and operated that, either:

(i) Meets a Control Efficiency equal to or greater than 80 percent, by weight, for VOC emissions and equal to or greater than 80 percent, by weight, for ammonia emissions, as compared to one of:

(I) Inlet emission rates for VOC and ammonia, respectively, to the emission control system;

(II) Baseline Emission Factors of 4.25 pounds of VOC per ton of Throughput and 0.46 pounds of ammonia per ton of Throughput, respectively; or

(d) (3) (A) (i) (III) Operation-specific Baseline Emission Factors for VOC and ammonia, respectively, if submitted by the owner or operator and approved by the Executive Officer to represent the uncontrolled emission factors of the Active Phase of the Composting Operation; or

(ii) Does not exceed 0.85 lbs VOC emissions per ton of Throughput and does not exceed 0.092 lbs ammonia emissions per ton of Throughput.

(B) Demonstrate compliance with subparagraph (d)(3)(A), as applicable, by source testing in accordance with paragraph (e)(1):

(i) Within one (1) year of startup of the emission control system; and

(ii) Every three (3) years thereafter.

(C) Install, operate, and maintain the emission control system in accordance with the manufacturer's operation and maintenance manual or other similar written materials supplied by the manufacturer or distributor to ensure that the emission control system remains in proper operating condition.

(e) Test Methods and Protocol

(1) Source Testing

The owner or operator of a Composting Operation required to perform source testing shall:

(A) Prior to conducting source testing to demonstrate compliance, submit a source test protocol for approval to the Executive Officer in accordance with the guidelines provided in Attachment A;

(B) Submit an updated or new source test protocol if there are any changes to the emission control system or if the Executive Officer requests an updated or new source test protocol;

(C) Conduct source testing pursuant to the valid source test protocol approved by the Executive Officer; and

(D) Submit the source test report to the Executive Officer within 60 days of completing all sampling for source testing.

(2) The owner or operator of the Composting Operation shall use a laboratory approved by the Executive Officer for all required testing.

(3) The following methods shall be used to determine compliance:

(A) South Coast AQMD Method 207.1 – Determination of Ammonia Emissions from Stationary Sources.

(e) (3) (B) South Coast AQMD Method 25.3 – Determination of Low Concentration Non-Methane Non-Ethane Organic Compound Emissions from Clean Fueled Combustion Sources.

(C) South Coast AQMD Method 1.1 – Sample and Velocity Traverses for Stationary Sources.

(D) South Coast AQMD Method 1.2 – Sample and Velocity Traverse for Stationary Sources with Small Stacks and Ducts.

(E) South Coast AQMD Method 2.1 – Determination of Stack Gas Velocity and Volumetric Flow Rate (S-Type Pitot Tube).

(F) South Coast AQMD Method 2.2 – Direct Measurement of Gas Volume through Pipes and Small Ducts.

(G) South Coast AQMD Method 2.3 – Determination of Gas Velocity and Volumetric Flow Rate from Small Stacks or Ducts.

(H) South Coast AQMD Method 4.1 – Determination of Moisture Content in Stack Gases.

(4) Triplicate samples shall be taken for the following test methods:

(A) Test Methods for the Examination of Composting and Compost (TMECC) 05.08-E – Solvita Maturity Index (April 7, 2002) or its successor.

(B) TMECC 05.08-A – Specific Oxygen Uptake Rate (April 7, 2002) or its successor.

(f) Recordkeeping

The owner or operator of a Composting Operation shall:

(1) Maintain the following records, as applicable:

(A) A copy of the annual Composting Operation report submitted in accordance with subdivision (g);

(B) Records of dates and amounts of composting conducted;

(C) Application of Finished Compost, Compost Overs, and approved liquids, in accordance with paragraph (d)(2);

(D) Source test reports, in accordance with subparagraph (e)(1)(D);

(E) Operation and maintenance of any emission control system, in accordance with paragraph (d)(3); and

(F) Manufacturer's operation and maintenance manual or similar, in accordance with paragraph (d)(3).

(2) Maintain records for the prior five (5) years of operation. The most recent two (2) years shall be retained on-site, which shall be immediately available upon request

by the Executive Officer. The remaining three (3) years of records shall be made available to the Executive Officer within one (1) week of request.

(g) Reporting

The owner or operator of a Composting Operation shall submit to the Executive Officer annually, no later than July 1st of each calendar year, a report summarizing the Composting Operation of the previous calendar year in a format approved by the Executive Officer. The report shall include annual Throughputs of each Organic Waste Material received and annual Throughputs of Finished Compost and Compost Overs.

(h) Exemptions

(1) The owner or operator of any of the following types of Composting Operations shall be exempt from the provisions of subdivisions (d) through (g), provided that the Composting 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.

(D) Recreational Facility Composting.

(E) School Composting.

(F) Agricultural Operation.

(2) The owner or operator of a Composting Operation with a Throughput of less than 100 tons per calendar year shall be exempt from the provisions of subdivisions (d) through (g), except for subparagraph (f)(1)(B) to record Throughput and paragraph (f)(2) to maintain records.

ATTACHMENT A

GUIDELINES FOR THE DEVELOPMENT OF SOURCE TEST PROTOCOLS FOR VOC AND AMMONIA EMISSIONS FROM 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 emission control system Control Efficiency, the measurements shall consist of lb/hr measurements at the inlet and exhaust of the emission control system and are subject to the applicable requirements that follow. When used for determining the Control Efficiency requirements as compared to the Baseline Emissions Factors, emissions are to be reported as % reductions for the Active Phase 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 South Coast AQMD prior to testing. Source test protocols are facility-specific, reflecting the unique conditions and configuration of each Composting Operation and may vary from these guidelines. Any such deviations from test method(s) must be approved by South Coast AQMD in the source test protocols.

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, CARB, or U.S. EPA. 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 these 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 South Coast AQMD Laboratory Approval Program (LAP) for the cited South Coast AQMD reference test methods, where LAP approval is available. For South Coast AQMD reference test methods for which no LAP program is available, the LAP approval requirement shall become effective one (1) year after the date that the LAP program becomes available for that South Coast AQMD 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 South Coast AQMD Baseline Emission Factors, the process Throughput is to include all of the raw Organic Waste 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 Organic Waste Material i.e. Manure, Greenwaste, Foodwaste, etc…).
d) Age of all Piles that were tested and all Piles present at the facility during testing, with age expressed in either calendar days or Compost Maturity Index as measured by the Solvita Maturity Test in accordance with subparagraph (e)(4)(A).
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

South Coast AQMD 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 midget sampling train consisting of; two (2) midget impingers each filled with 15 mL of 0.1N sulfuric acid, an empty impinger, and an impinger 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 South Coast AQMD Method 25.3. South Coast AQMD 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 South Coast AQMD Method 25.3 does not apply.

6. Specific Requirements for Testing 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 accordance with Section (8) below.

For an emission control system inlet or exhaust that is vented through a testable duct, the gas velocity within the duct shall be measured according to South Coast AQMD 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 South Coast AQMD Method 4.1. This flow rate may then be used to determine mass emission rates.

Control Efficiency shall be calculated as follows:

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

Where:

CE = Control Efficiency (%)
E = Total Exhaust Emission Rate (lb/hr)
I = Total Inlet Emission Rate to Emission Control System (lb/hr)

7. Specific Requirements for Composting Operations (Baseline Emission Factors)

A proposed measurement from the Active Phase, including surface emissions of all Piles where the materials are composted, and outlets (vents or surfaces) of emission control systems 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 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 specified 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 (3) different age Piles that are otherwise identical in processing and composition, then at a minimum three (3) ages can be tested including newer, middle-aged, and older Piles from the Active Phase. A newer Pile in the Active Phase has not yet achieved peak temperature and is typically less than seven (7) days old or has a Compost Maturity Index (CMI) of 1.5 or less as measured by the Solvita Maturity Test in accordance with subparagraph (e)(4)(A). A middle-aged Pile in the Active Phase has achieved peak temperature and is typically between seven (7) and 14 days old or has a CMI between 1.5 and 3.0. An older Pile in the Active Phase has decreasing temperature and is typically between 14 and 22 days old or has a CMI between 3.0 and 4.5. In any case, the surface area of all Piles at the facility must be included in the determination of Pile dimensions as specified in Section (3).

If the facility elects to use an alternative to the South Coast AQMD'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 alternative Baseline Emission Factors, facilities would have the option to use the South Coast AQMD's Baseline Emissions Factors or the alternative Baseline Emissions Factors.

Control Efficiency shall be calculated as follows:

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

Where:

CE = Control Efficiency (%)
TE = Total Active Phase Emissions (lb/ton Throughput)
B = South Coast AQMD Baseline Emission Factors or Alternative Baseline Emission Factors 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 U.S. EPA *Measurement of Gaseous Emission Rates from Land Surfaces Using an Emission Isolation Flux Chamber User's Guide* (U.S. EPA Guide). The modifications to the procedures in the U.S. EPA Guide are specified in the following requirements.

The flux chamber encompasses a fixed surface area of 1.4 ft^2 and contains a sweep air system to obtain a homogeneous air sample by employing a mixing fan and sweep gas (10% helium 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 six (6) sample locations per Pile or a sufficient number at each Pile tested must be obtained in order to achieve a representative sample of the Pile surface emissions. A minimum of four (4) Piles at each Composting Operation (a newer Pile, a middle-aged Pile, an older Pile, and a pile in Curing Phase), or a sufficient number of Piles at the Composting Operation must be tested to represent the Composting Operation surface emissions. These locations can be composited for each Pile to reduce testing costs. For example, for one (1) hour sampling, six (6) random positions on the Pile should be tested for ten (10) 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 shall be reported in units of lb/hr-ft^2, 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

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

Where:

UFC = Uncorrected Flux Chamber Results (lb/hr-ft^2)

SFCF = Surface Flow Correction Factor

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

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

Where:

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

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

Where:

P = Active Phase and Curing Phase 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 (newer, middle-aged, older in the Active Phase) and emissions categories (Active Phase and Curing Phase) from those that were measured.