SAN JOAQUIN VALLEY UNIFIED AIR POLLUTION CONTROL DISTRICT

DRAFT STAFF REPORT

Draft New Rule 4566
(Composting and Related Operations)

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I. SUMMARY

Under their regulatory authority to assess the health impact of air pollutants and to establish air quality requirements, the California Air Resources Board (ARB) and United States Environmental Protection Agency (EPA) have established standards for ozone levels that impact public health. The San Joaquin Valley Unified Air Pollution Control District (District) adopted the 2007 Ozone Plan to establish the strategy for attaining the eight-hour ozone standards through regulatory and incentive-based measures to reduce emissions of nitrogen oxides (NOx) and volatile organic compounds (VOC), precursors of ground-level ozone

Conversion of organic material to compost (composting) emits VOC but provides benefits by reducing odors, eliminating pathogens, and reducing the bulk of organic material. In comparison to natural decay, bacterial activity in the conversion of material to compost provides a benefit for reduction of global warming emissions by keeping carbon in the bacterial cell structure thereby reducing the total amount of carbon escaping into the air. EPA evaluated composting and determined that the thirty year

(life cycle analysis) retention by carbon sequestration results in reduction of warming that far outweighs the other composting emissions of carbon and nitrous oxide. Further discussion of this topic is included in the Climate Change section of this staff report. Composting converts material into a form that makes nutrients available for plant growth, resulting in material that is a rich soil amendment for Valley agriculture. Composting also eases the burden on landfills by helping cities and counties meet landfill diversion targets.

Throughout the development of new District Rule 4566 (Composting and Related Operations), which would apply to the Valley's facilities that compost and stockpile organic material, the District has sought to balance requiring reduction of composting VOC emissions with allowing for the continued benefits achieved by composting. The District's goal in Draft New Rule 4566 is to reduce VOC emissions through requirements that can be feasibly implemented without resulting in operational expenses or finished product costs that would render composting operations economically inoperable.

District efforts to develop a regulation that would reduce emissions from organic material composting and related operations began in 2007. After extensive review and collaboration with stakeholders, the District delayed adoption from first quarter, 2009 to fourth quarter, 2010, to allow for additional research and analysis. In 2009, the District collaborated with numerous stakeholders and agencies to direct a field study designed to measure the effectiveness of four candidate best management practices: finished compost cover, surface irrigation, interactive management, and smaller piles. Based on the results of this field study, the Draft New Rule 4566 focuses on finished compost cover for large facilities and surface irrigation for medium facilities. The 2008 version of Draft New Rule 4566 has been superseded by the September 2010 draft rule. The District is specifically soliciting comments on control costs, technical feasibility, economic impacts, and other limitations or benefits to this regulatory approach.

A. Reasons for Rule Development and Implementation

The San Joaquin Valley Air Basin is nonattainment for the National Ambient Air Quality Standard (NAAQS) for 8-hour ozone. The Valley is also nonattainment for the California ozone standards. The District's *2007 Ozone Plan* included a green waste composting control measure (S-GOV-5, Rule 4566) to reduce VOCs. Although VOC emissions contribute to ozone, VOC reductions are generally less important to the Valley's long-term attainment goals as compared to reductions in oxides of nitrogen (NOx).

In the *2007 Ozone Plan*, District staff estimated that the total VOC emissions from composting operations would be about 62 tons per day (tpd) in 2014, based on the best data available at that time. Staff noted that research was being conducted to refine the emission factors for this source category, since the Air Resources Board (ARB) inventories did not yet account for green waste composting. Newer information indicates that the total VOC emission, based on current actual throughput levels, is about 19 tpd. The revised

emission estimate is less than previously expected, but still a significant portion of the total VOC inventory.

Development of new Rule 4566 is intended to obtain as much VOC emissions reduction from the source category as is technologically and economically feasible, as determined by the District's Governing Board.

B. Description of the Project

Consistent with the *2007 Ozone Plan* commitments, Draft New Rule 4566 would establish VOC limits, including operational and administrative requirements, for organic material composting and other related operations. For the rule, "organic material" includes green material, food material, wood material, and food processing by-products, or a mixture thereof.

The District recognizes stakeholders' efforts to comply with applicable regulations from various agencies involving the disposal and recycling of organic material, particularly for composting. While composting of organic material is one of the desired alternative methods to divert waste from landfills, it also has a potential to have a significant impact on air quality within the SJVAB. The District also recognizes that several composting facilities are already in compliance with some of the proposed requirements. The District believes that implementation of mitigation measures will help minimize composting impacts.

During composting operations, the active compost stage is a significant part of the process in which the compost feedstock is rapidly decomposing (California Code of Regulations (CCR) Title 14, Chapter 3.1, Section 17852). VOC emissions occur in the highest amounts during the active stage. The curing stage of composting follows the active phase and is characterized by lower VOC emission rates. Draft New Rule 4566 utilizes the significant difference in emissions between the active phase and curing phase as a means to focus the VOC reduction efforts to a shorter period of the compost development process. This focus reduces the cost of implementation of the rule while ensuring sufficient VOC reduction effectiveness.

Draft New Rule 4566 would establish VOC emission reduction requirements on the basis of actual throughputs, rather than allowable capacity limits, for large and medium facilities. Large facilities will be defined as facilities processing 25,000 tons per year or greater of actual throughput of organic material. Medium facilities will be defined as facilities processing from 10,000 to less than 25,000 tons per year. Small facilities are facilities subject to the draft rule and process less than 10,000 tons per year.

Draft New Rule 4566 would require large facilities to apply a pseudo-biofilter, or a cover of finished compost material, to each windrow for the entire active phase of composting, or use an alternate measure which provides equivalent VOC reductions. According to the field study, application of finished compost as a cover (acting as a passive biofilter) during the active phase of composting can achieve a 53% reduction in VOC for the full

active phase and curing phase of compost production in comparison to standard operations of windrow composting without the finished compost cover.

For medium facilities, Draft New Rule 4566 would require surface irrigation of the windrows during the active composting phase, using sprinklers to apply water to the pile before turning, or use an alternate measure which provides equivalent VOC reductions. The District's field study determined that the additional irrigation mitigation measure would provide a 24% reduction in VOC emissions. The tests of mitigation methods demonstrated that these methods are effective in reducing VOC emission from composting and preliminary cost analysis suggests that implementation of these measures will not be cost prohibitive, compared to other VOC controls.

C. Rule Development Process

District staff began the rule development process with a public scoping meeting on January 10, 2008. The District also held public workshops in April and August 2008, and convened two technical workgroups in May and July 2008.

To gain first-hand knowledge of these operations, District staff visited several composting facilities, including:

- Tulare County Composting & Biomass, Inc. (June 16, 2008)
- City of Modesto and Highway 59 (May 2, 2008)
- South Kern Compost Manufacturing Facility (November 1, 2007)
- Mariposa County Solid Waste Composting Facility (October 25, 2007)
- Community Recycling Lamont Composting Facility (October 18, 2007)

Although the meetings and visits in 2008 were intended to culminate in Governing Board adoption of Rule 4566 in the first quarter of 2009, information that came to light showed that more time would be needed to develop an effective composting rule. District staff had determined that emissions from this source category were much lower than previously estimated in the *2007 Ozone Plan*. There was also insufficient information available, at that time, on the effectiveness of potential mitigation measures in reducing VOCs. For these reasons, District staff determined that additional time was needed to study the effectiveness in various control methods in reducing VOC emissions. The information generated would help develop of a rule that maximizes emissions reductions while remaining technologically and economically feasible. District staff therefore requested a rule development schedule extension, and the District Governing Board amended the *2007 Ozone Plan* on December 18, 2008 to extend the Rule 4566 adoption schedule from the first quarter of 2009 to the fourth quarter of 2010.

In 2009, multiple agencies contributed $200,000 for the composting field study, which was conducted at Tulare County Composting by the San Diego State University Research Foundation. The District engaged in extensive stakeholder involvement and

numerous technical workgroup meetings to help define the parameters of the field study. Participants of these meetings included composting operators, ARB, California Department of Resources Recycling and Recovery (CalRecycle), agricultural groups, environmental advocates, other air districts, and city and county agencies. The results of this study form the basis for the District's September 2010 Draft Rule 4566.

The District will be holding a workshop to discuss the preliminary concepts of Draft New Rule 4566 on September 22, 2010. After incorporating public comments and developing a draft Socioeconomic analysis report, the District plans to hold another workshop, tentatively planned for October 2010. District staff plans to publish the Proposed Rule, staff report with appendices, and final draft socioeconomic analysis report in November 2010. The publication will allow affected sources and interested parties additional opportunity to review and comment on the proposal prior to a public hearing before the District Governing Board, who will consider adoption of Rule 4566 in December 2010.

II. BACKGROUND

A. The Composting Process

Organic material naturally decomposes by both bacterial (biotic) and nonbacterial (abiotic) natural processes. Organic waste decomposes naturally in the presence of water, warmth, and oxygen. Composting accelerates the process of decomposition by adding moisture and creating a physical arrangement (windrows) that maintain an elevated temperature and provide an ideal environment to facilitate biotic decomposition to transform the stock material into nutrient-rich humus like material commonly referred to as compost. The composition and density of stock material affect the rate of decomposition.

Intentional composting involves six major processes:

1. **Recovery and Preparation**. Facilities recover the organic material feedstock from either private or public industries and may screen the material for physical contaminants, pursuant to Title 14, Div. 7, Chapter 3.1 Article 7, Section 17868.5. The feedstock may also need to undergo further chipping or shredding to obtain the appropriate size material for the composting process.

2. **Mixing**. Feedstock may be mixed with additives or amendments to adjust the bulk weight, carbon to nitrogen ratio, moisture content, and porosity of the material. The mix enhances the composting process, provides structural support for the compost piles, or produces compost with specific characteristics. Operators often select additives and amendments based on availability, cost, and degradable content. Some additives and amendments include finished compost, peanut hulls, rice hulls, sawdust, straw, shredded tires, and wood chips.

However, shredded tires and wood chips do not readily compost and may be recycled through multiple composting cycles.

3. **Piling**. The compost material is typically placed into piles on open fields or enclosed in an in-vessel system. The piles can stretch up to a few hundred yards in length.

4. **Active Composting**. Microorganisms break down the material and consume the most easily degradable organic matter. These microorganisms give off significant heat, raising the temperature of the compost and destroying pathogens. The material is aerated by turning or by forcing air through the piles to provide oxygen for the microorganisms. Most of the VOC emissions generated by composting are expected to occur during the active stage. At the end of the active stage, operators may screen the compost material to remove any physical contaminants or additives.

5. **Curing Composting**. The microbial populations shift to bacteria and fungi, which break down the less degradable organic matter like chitin, cellulose, and lignin. The curing process stabilizes the compost by transforming it to a material that cannot be further easily decomposed. Heat and VOC emissions are more stable during the curing stage, as compared to the active compost stage.

6. **Finished Composting**. During the final stage, compost may be stored to complete the maturing process and to ensure that the compost material is resistant to further microbial breakdown, which could potentially harm living plants. Once the maturing process is complete, the compost may undergo screening and be ground for sale or use.

Composting material can enrich the soil, replace fertilizer, divert waste from landfills, and serve other purposes. Intentional composting is often advantageous for bulk reduction, pathogen reduction, and odor reduction. It also produces a material with various beneficial uses, such as landscape, soil amendment, road use, and alternative daily covers (ADC) at landfills. Intentional composting also helps local government agencies meet state solid waste diversion goals to preserve landfill capacity by reducing the amount of organic waste sent to landfills for disposal.

Organic materials may also inadvertently compost during stockpiling from related operations, such as land application, chipping and grinding, or other use, if not handled through appropriate management practices. Unintentional composting may occur during related operations, including piling or spreading the organic material on land, in open basins, or in pits.

The composting industry has been expanding and will continue to expand. CalRecycle (which administers programs formerly managed by the California Integrated Waste Management Board, or CIWMB) Strategic Directive 6.1 aims to reduce the amount of

organics in the waste stream by 50% by 2020. [1] Diversion of half of CalRecycle's 2006 baseline of 29.7 million tons would require the development of 50 to 100 new composting facilities in California. While diversion of materials from landfill disposal to composting will help ease the burden on landfills and achieve associated environmental benefits, the increase in composting will also increase VOC emissions. Implementation of mitigation measures can help minimize impacts in the Valley.

Although there are many benefits to intentional composting, and there can be benefits to processes that can lead to inadvertent composing, composting generates VOC emissions. Air quality goals must be balanced with diversion goals. The primary objective of Draft New Rule 4566 will be to reduce VOC emissions, as required in the *2007 Ozone Plan,* from common organic waste operations, including handling, disposing, and processing of the materials, without making composting cost prohibitive.

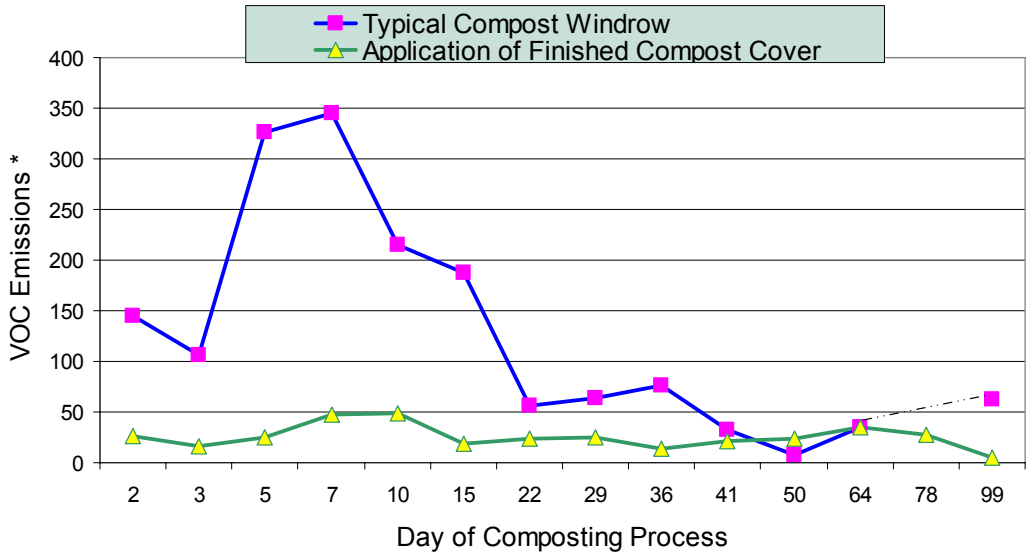
B. Locally Studied VOC Emission Control Technologies for Composting

District staff obtained an understanding of composting factors through discussions with stakeholders and scientists who have researched compost emissions. Some factors that affect the process of composting require professional judgment by the facility operator during the composting process, while other factors provide a more routine and quantifiable response that was determined to be more suitable for research on possible mitigation approaches. District staff, in discussion with stakeholders, set up a research evaluation of composting in 2009, designating one windrow as a scientific "control" with standard procedures to compare to other windrows with application of water prior to turning; application of finished compost cover to act as a passive biofilter; alternative interactive management; and a small windrow reducing the height and volume compared to the control. During the composting process, the compost pile is mixed (turned) every few days to prevent compaction and maintain air space within the pile material. The finished compost cover was reapplied after each turn during the composting process.

Based on the study results, both the practices of applying water before turning and applying a finished compost cover were found to reduce emission of VOC. The following figure provides a comparison of the control windrow to the windrow with application of finished compost applied as a cover. Figure 1 shows that most of the VOC reduction is accomplished in the first 22 days which was the time period of the active phase for the control windrow. Reducing volume of the windrow was found to actually increase VOC emissions. Interactive management was determined to be a difficult process to quantify.

[1] http://www.calrecycle.ca.gov/AboutUs/StrategicPlan/2009/SD06.htm

Figure 1 - Compost Emission Comparison



* VOC measurements are comparison values, not converted to per compost ton or per windrow units

In addition to the research results, staff learned from stakeholder and researcher communications about other factors that have been found to negative impact the composting process. For example, stacking materials too high or compacting materials too tightly causes areas of the pile to have low oxygen levels, resulting in anaerobic decomposition, which increases odor emissions. Odor emissions include some VOC compounds, therefore, proper management to control odor may also reduce VOC emissions.

C. Potential VOC Emission Control Technologies for Composting

In addition to the methods examined in the District's composting study, commonly available technologies for controlling VOC emissions include:

Aerated Static Pile (ASP) system

For the ASP method, operators pile the feedstock over a base of porous materials. Perforated pipes or plates are connected to a blower that either pulls (negative pressure) or pushes (positive pressure) air through the pile. Several facilities in California and other parts of the country use ASP vented to secondary controls, such a biofilter, with control efficiencies of at least 80%. Additional information on secondary controls can be found on the following page.

There are two forms of ASP systems. The first form generally uses long triangular piles with a base width that is two times as long as the height. Aeration pipes run lengthwise beneath the ridge of each pile and serve the entire pile. Each pile contains feedstock of roughly the same mixture and age.

The second form uses extended piles consisting of individual cells that are stacked against each other. Cells of new feedstock are constructed in one pile, and cells of nearly mature compost are placed in another pile. The space between the piles allows for the removal of old cells from one pile and the addition of new cells to another pile. Generally, there is also an individual blower and timer during the aeration process of each cell. The captured VOC emissions from the ASP system may be transferred to a secondary control, such as a biofilter, for further VOC reductions.

Enclosed Aerated Systems

In enclosed aerated systems, the material is placed in a bag, container, or other enclosure, and then the material is aerated. The aeration method controls moisture, temperature, and airflow; however, it does not vent the air in the enclosure to a control device. The system achieves VOC emission reductions by increasing the percent of aerobic composting and decreasing the percent of anaerobic composting by providing oxygen to promote aerobic activities.

Within-Vessel and In-Vessel Composting

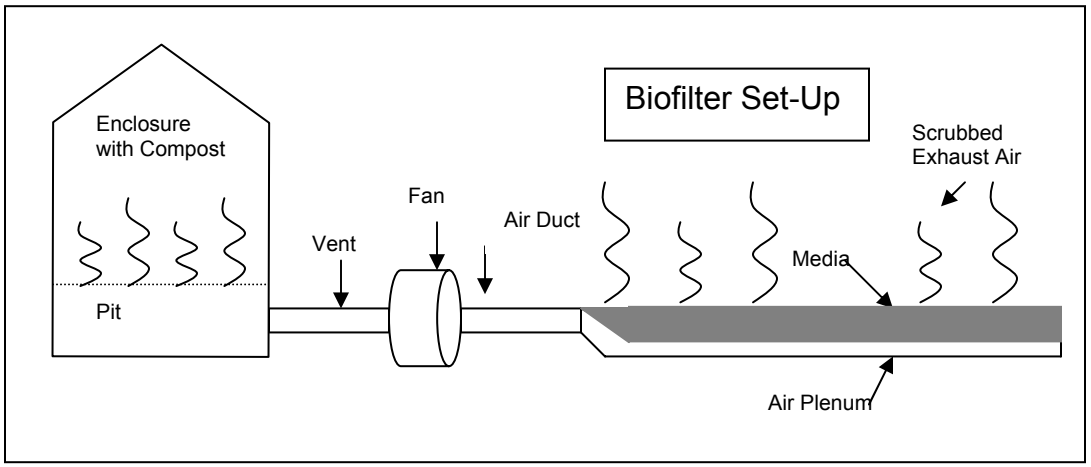
The within-vessel and in-vessel composting methods allow the operator to control the moisture, temperature, and airflow to a more exact science and to capture most of the emissions. The VOC capture efficiency for in-vessel systems ranges from 90% to 99%, while the VOC capture efficiency for within-vessel systems ranges from 70% to 90%. Within-vessel composting operations are performed by processing the feedstock material and loading it into bags or containers. In-vessel composting operations occur in a permanent enclosure under negative pressure. An electric blower system controls airflow and temperature for both systems. A secondary control receives and further reduces the captured VOC emissions. The secondary control includes, but is not limited to, a biofilter or a liquid capture and control system.

Secondary Controls, including biofilters

Secondary controls can further reduce VOC emissions captured from primary controls, such as ASPs. Secondary controls include biofilters, carbon adsorption systems, and packed tower scrubbers. Biofiliters are the most commonly-used secondary controls at composting facilities. Currently, biofilters are used at over 200 composting facilities in Europe, over twenty composting facilities in the U.S., and at least five composting facilities in California.

The typical biofilter design consists of fans, ducts, media support (a bed liner), an air plenum, and the media (often a blend of finished compost or soil, and wood chips). Wall ventilation and pit fans blow air from the building and pit through ducts, then into an air plenum below the biofilter media. The air passes through the media, where microorganisms treat the air before it escapes to the atmosphere. Figure 2 shows a schematic of an enclosed biofilter system. Recent District BACT determinations indicate that biolfilters have a VOC removal efficiency of at least 80%.

Figure 2 - Sample Biofilter Design



The control technologies mentioned are currently operated by several composting/co-composting facilities, which handle primarily biosolids, animal manure, and poultry litter. At this time, District staff is not aware of any composting facilities in the SJVAB that operate these controls for organic material, as defined in Draft New Rule 4566.

III. CURRENT AND PROPOSED REGULATIONS

A. Current Regulations

District staff has reviewed applicable regulations from the District, other air districts, and other agencies to assist in the development of Draft New Rule 4566. District Rule 4565 (Biosolids, Animal Manure, and Poultry Litter Operations), which was adopted in March of 2007, regulates the composting and co-composting of biosolids, animal manure, and poultry litter. Currently, the District does not have any prohibitory rules that specifically regulate VOC emissions from composting and stockpiling of organic material.

The development of draft new Rule 4566 is not intended to replace any more stringent local, state, federal, or other governmental agency requirements. Where multiple rules apply to a facility, the operator must comply with all applicable rules. Composting and other organic waste handling or processing facilities in the Valley may be subject to regulations from other agencies:

- CalRecycle composting requirements under Title 14, Div. 7, Chapter 3.1 Article 6, Section 17867, along with other CalRecycle regulations;

- Waste discharge requirements of the Porter-Cologne Water Quality Act (California Code of Regulations Section 13020), as administered by the Regional Water Quality Control Board.

B. Review of Other Air District Related Regulations

The South Coast and Antelope Valley have adopted regulations for chipping and grinding operations and co-composting (composting that involves animal manure or poultry litter), with each titled "Rule 1133: Composting and Related Operations." Green waste composting facilities are not currently regulated by the three air districts.

C. Proposed Regulation

Draft Rule 4566 would implement Reasonably Available Control Technology (RACT) for this emissions source category, as required by the California Health and Safety Code (CH&SC) requirements for nonattainment areas.

Section 1.0 Purpose / Section 2.0 Applicability

The purpose of Draft Rule 4566 is to limit VOC emissions from organic material operations and to minimize inadvertent decomposition from related operations. The draft rule applies to all facilities that stockpile and/or compost the organic material.

Section 3.0 Definitions

Draft New Rule 4566 would regulate organic material, which includes green material, food material, wood material, and food processing by-products. Wood material not mixed with any other organic material would be excluded from the requirements of this rule. Draft New Rule 4566 would allow small mixture of less than 100 tons per year of biosolids, animal manure, or poultry litter. Many of the definitions presented in this rule are from existing regulations from the District, other air districts, and state and local agencies.

The definitions for active composting and curing composting would give operators the opportunity to select from several test methods to determine the composting phases. The various test methods for the active composting phase and curing composting phase are currently used in practice and are consistent with the definitions from Rule 4565 and other air districts. The reference points for determining the composting phases using the Specific Oxygen Uptake Rate, Carbon Dioxide Evolution Rate, or the Solvita® Maturity Index are from the Compost Stability Index (Table 05.08-1) as provided in the Test Methods for the Examination of Composting and Compost (TMECC) manual by the US Composting Council Research and Educational Foundation.

Section 4.0 Exemptions

Facilities which require a permit from CalRecycle, but would be otherwise be exempt under this section, would be subject to the draft provisions.

Section 4.0 would exempt facilities that conduct organic material operations in small scales and those that are already considered and subject to emissions limits from other

District rules involving organic materials. Some of the exemptions include composting operations and stockpiling organic materials from chipping and grinding operations in small scales. Small community-operated residential/neighborhood organic material drop-off sites and stockpiling of organic material for land incorporation and land application would also be exempt provided that provisions are met, since these operators do not have easy access to finished compost or other type of daily covers. Small community drop off sites, that use containers and manage the site, encourage trip reduction and is an economically viable option for many small residential communities.

Facilities handling only woody materials would not be subject to the draft provisions of this rule, since the level of moisture content is too low for inadvertent decomposition. Based on comments received from participants, facilities that accept wood material (biomass plants, for example) will check for moisture content on incoming material to ensure that the material is dry. This exemption would not include operators that chip or grind wood material that is mixed in with other organic material.

Facilities subject to the following District rules would be exempt from Draft New Rule 4566 to minimize overlapping requirements:

- Rule 4570 (Confined Animal Facilities),
- Rule 4550 (Conservation Management Practices), and
- Rule 4204 (Cotton Gins).

The draft rule would also exempt facilities that are exempt under Rule 4570, Rule 4550, and Rule 4204, since those facilities are considered to be small scale.

Draft New Rule 4566 would also exempt composting facilities that are subject to Rule 4565 (Biosolids, Animal Manure, and Poultry Litter Operations) and process less than 10,000 tons per year of organic materials, which are not biosolids, animal manure, or poultry litter.

While District Rule 4565 exempts composting/co-composting facilities whose throughput includes a total of less than 100 wet tons per year of biosolids, animal manure, and poultry litter; these facilities may still be subject to Draft Rule 4566 based on the total throughput of other organic materials, which were not considered in the throughput determination for that rule.

Section 5.0 Requirements

Section 5.0 addresses specific requirements for the handling and processing of organic material and focuses on stockpile and composting.

Stockpile Control Requirements

The draft rule would minimize inadvertent decomposition and reduce VOC emissions from facilities that are subject to rule requirements and stockpile organic material.

Organic material is often processed by either chipping or grinding the material prior to its final use. The processed material may be stockpiled for several days prior to being used for various purposes, such as mulch, fuel, alternative daily cover at landfills, and composting feedstock. To control emissions from the inadvertent decomposition in the stockpiles, operators of facilities, with throughputs greater than or equal to 10,000 wet tons of organic material per year, would be required to cover materials that are stockpiled for more than three days, or implement an equivalent alternative mitigation measure. District staff is soliciting comments on other limitations or benefits to this regulatory approach for chipping and grinding facilities, landfill facilities, and other facilities that stockpile organic material.

The stockpile control requirements apply to both composting and non-composting facilities that 1) typically have finished compost, earthen material, or other types of cover available onsite, 2) may be required by other agencies to remove the organic material off-site within a certain number of days of receipt, or 3) further process the organic material for other use.

Composting Control Requirements

Composting operations, equipment, resources, and practices vary among the facilities in the composting industry. Therefore, the draft rule would address operational variation through tiers and control options as summarized in the table below:

Table 1 – Summary of Composting Requirements

Minimum % Reduction, by Weight, in VOC Emissions	Proposed Rule Requirements	Facilities Subject to Control
Windrow Composting		
Best management practice	Maintain oxygen and moisture contents	All composting facilities subject to the rule
At least 24%	Implement a sprinkler irrigation system <or> alternative mitigation measure	10,000 tpy ≤ throughputs < 25,000 tpy
At least 53%	Implement finished compost cover <or> alternative mitigation measure	throughputs ≥ 25,000 tpy
Other Composting		
At least 80%	Aerated Static Pile Systems, In-vessel Systems, or Other	Optional

*tpy: tons per year

Composting facilities subject to draft rule requirements would be required to maintain oxygen concentration level and moisture content as part of the best management practices. Based on discussion and comments received from stakeholders and researchers, oxygen and moisture contents are considered to be important process controls during composting operations. The requirements for both moisture content and oxygen concentration are consistent with District Rule 4565, where the moisture content

range is between 40% and 70%. According to one the comments received, compost is supposed to be at 40% to 60% moisture for the composing process to properly occur. As part of the field study, the contractor also indicated that maintaining moisture content between 40% and 70% is desired. Operators that choose to install and operate VOC control systems, with at least 53% capture and control, would not be subject to the best management practices requirements, since monitoring moisture content and oxygen concentration may reduce the efficiency of the VOC control system.

District staff has considered temperature and Carbon-to-Nitrogen ratio for rulemaking. Temperature and Carbon-to-Nitrogen ratio requirements would be excluded based on the following considerations:

- Temperature control is required by CalRecycle for pathogen reduction (Title 14, Div. 7, Chapter 3.1 Article 7, Section 17868.3)

- For Carbon-to-Nitrogen ratio, the organic materials received at composting facilities vary, in terms of season, the type of feedstock, and preferences in mixture of feedstock for finished product.

Section 6.0 Administrative Requirements

Section 6 includes recordkeeping requirements for facilities that are subject to the draft rule. The test methods provided in Section 6.2 of Draft Rule 4566 are consistent with District Rule 4565 and other air districts. District staff also included TMECC Method 05-08-A (SOUR: Specific Oxygen Uptake Rate) for testing the compost maturity/stability of the composting phase, which would be consistent with other air district's requirement for a direct respirometry.

Section 7.0 Compliance Schedule

Table 2 indicates the compliance schedule for facilities subject to Draft Rule 4566.

Table 2 – Compliance Schedule

Compliance After Rule Adoption Date	Proposed Rule Requirements	Facility
Composting Requirements		
Six months	Maintain oxygen and moisture contents	All composting facilities subject to rule
One year	Implement a sprinkler irrigation system <or> alternative mitigation measure	10,000 tpy ≤ throughputs < 25,000 tpy
One year	Implement finished compost cover <or> alternative mitigation measure 33% Phase-In	throughputs ≥ 25,000 tpy
Two years	Implement finished compost cover <or> alternative mitigation measure 66% Phase-In	throughputs ≥ 25,000 tpy
Three years	Implement finished compost cover <or> alternative mitigation measure 100% Phase-In	throughputs ≥ 25,000 tpy
Three years	Aerated Static Pile Systems, In-vessel Systems, or Other	throughputs ≥ 25,000 tpy
Stockpile Requirements		
Six months	Process/cover stockpile <or> implement alternative mitigation measure	throughputs ≥ 10,000 tpy

IV. BASELINE INVENTORY AND EMISSION REDUCTIONS

Based on this data, District staff estimates emission reductions of approximately 3,581 tons per year (tpy) or a reduction of 52% of the baseline VOC emissions. When the 2006 emission inventory baseline reductions (overall of 52%) are applied to the 2014 Ozone Plan baseline emissions, the equivalent reduction is 32 tons per day by the time that this rule is fully implemented. The VOC emission reduction analysis is included in Appendix B of the Draft Staff Report.

V. COSTS AND COST EFFECTIVENESS ANALYSIS

The purpose of conducting a cost effectiveness analysis is to evaluate the economic reasonableness of the pollution control measure or rule. The analysis also serves as a guideline in developing the control requirements. District staff has evaluated costs and cost effectiveness for composting facilities affected by Draft New Rule 4566.

The rule would require medium facilities to implement the additional irrigation control and the large facilities to implement finished compost cover as a control. Based on the District's preliminary analysis for the finished compost cover method, the cost effectiveness for these largest compost facilities ranges from about $433 to $4,151/ton of VOC reduced. The cost effectiveness for the medium-sized composting facilities ranges from about $418 to $3,677 per ton VOC reduced.

Please see Appendix C of the draft staff report for a preliminary analysis of the costs and cost effectiveness of the proposed controls.

VI. SOCIOECONOMIC ANALYSIS

Pursuant to CH&SC 40728.5, District staff is required to analyze the socioeconomic impacts of any proposed rule or rule amendment that significantly affects air quality or strengthens an emission limitation. District staff will solicit volunteers from stakeholders and manufacturers to participate as members of the socioeconomic focus group for this rule development project. District staff will work with the focus group to determine direct compliance costs and business impacts from Draft Rule 4566. District staff will use the socioeconomic analysis to refine the draft new rule as appropriate and mitigate any adverse effects to the extent feasible and reasonable. The socioeconomic report will be published as an appendix to a future staff report, and will be presented to the public at the final workshop for Rule 4566. District staff will also present the final socioeconomic report to the District Governing Board at the public hearing for adoption of the proposed rule amendments in order to disclose any expected economic impacts.

VII. CLIMATE CHANGE

The California Global Warming Solutions Act of 2006 (AB 32) created a comprehensive, multi-year program to reduce greenhouse gas (GHG) emissions in California, with the overall goal of restoring emissions to 1990 levels by the year 2020. In the coming years, ARB and the Legislature will be developing policies and programs to implement AB32.

The District believes that the evidence and the rationale that climate change is occurring is compelling and convincing. In addition to the long-term consequences of climate change, the District is concerned with the potential ramifications of more moderate but imminent changes in weather patterns. The Valley depends heavily on agriculture for its economy and has developed agricultural practices based on the last several decades of weather patterns. Unanticipated and large fluctuations in these patterns could have a devastating effect on the Valley's economy.

While there are many win-win strategies that can reduce both GHG and criteria/toxic pollutant emissions, when faced with situations that involve tradeoffs between the two,

District staff believes that the more immediate public health concerns that may arise from an increase in criteria or toxic pollutant emissions should take precedence.

A. Global Warming Gases

Global warming is affected by gases which are directly emitted in the form of global warming gases and by emissions which either create other global warming gases or break down in the atmosphere into such gases. Carbon dioxide (CO2) and methane (CH4) and nitrous oxide (N2O) are directly emitted warming gases.

VOC compounds break down in the atmosphere over time (generally in one to ninety days) into some combination of carbon dioxide and methane. Because this transformation occurs over a short period of time, most of the GHG inventories include the VOC emissions by adding them as a quantity of carbon dioxide. It is important to consider other warming impacts from VOC emission that occur before this conversion occurs. Ozone formed in the air we breathe (in the troposphere as opposed to high altitude stratospheric ozone that protects us from ultraviolet radiation) is formed as an additional warming gas created by VOC and the emission of other nitrogen oxides (NOx). Ozone global warming potential is a significant facet of the total GHG inventory and should not be dismissed from consideration.

B. Composting Impacts

Natural decomposition of organic matter occurs from both nonbacterial (abiotic) and bacterial (biotic) processes. Biotic processes transform carbon into cellular mass but result in waste gas emissions of carbon dioxide, methane and nitrous oxide. Composting accelerates the biotic process which results in more rapid emission of VOC, CO and methane. The speed of emission is not significant as a global warming issue since the material will break down with or without composting. The speed is important for ozone formation as this would result in higher concentrations of harmful ozone. The impact on tropospheric ozone and its affect on human health is the reason why the District must consider the impact of VOC emission from the composting process.

Composting also transforms nitrogen in composted matter and nitrogen oxides (NOx) emitted from intermediate bacterial processes into nitrous oxide. The release of intermediate waste gases of NOx would have a short term negative impact for ozone production. The final biotic product waste gas emission of N2O is a long term disbenefit for warming as the gas remains in the stratosphere for many years.

As a global warming issue, the total amount of carbon released must be considered. If composting increases the total amount of carbon then it would have a negative warming impact. However, it is very important to consider the full carbon output including VOC that will eventually become a warming gas and produces ozone warming gases before its breakdown to simpler forms. The amount of carbon in different forms is decreased by the amount processed by bacteria into cell matter. EPA has assessed the balance

between the cellular uptake and the amount of carbon emissions and nitrous oxide emissions from composting. EPA considering the thirty year retention of carbon and determined that composting reduces warming by carbon sequestration that far outweighed the emissions of carbon and nitrous oxide (converted into equivalents of carbon). The EPA analysis did not include composting reduction of natural abiotic and biotic VOC emission for its reduced tropospheric ozone formation warming impact.

C. Effects of Proposed Regulations

The effect of reducing VOC emission by establishing regulatory requirements for composting must consider if the requirements increase the net carbon emissions and nitrous oxide emission. Analysis must also include any ancillary emissions that occur due to implementation of the requirements.

For the changes in the composting process, reduction of VOC to an equal amount of carbon dioxide and methane is not a warming increase since the VOC would break down in the stratosphere to the same compounds. Only an increase in total carbon flux would be an increase in warming emissions. However, any ancillary emissions required to implement the process changes and any increases in nitrous oxide emissions must be considered in assessing the total warming impact. The reduction of tropospheric ozone as a warming gas should also be considered as a warming reduction accomplished by the implementation of the regulation.

VIII. ENVIRONMENTAL IMPACTS

The California Environmental Quality Act (CEQA) requires that District staff investigate the likely environmental impacts of Draft New Rule 4566. District staff is currently investigating environmental impacts under CEQA and will recommend appropriate action to the District Governing Board.

IX. RULE CONSISTENCY ANALYSIS

Pursuant to California Health & Safety Code Section 40727.2, District staff will prepare a rule consistency analysis that compares the elements of Draft New Rule 4566 with the corresponding elements of other District rules, as well as federal regulations and guidelines that apply to the same source category or type of equipment. District staff will conduct the analysis later in the rule development process.

X. REFERENCES

1. California Code of Regulations, Title 14, Division 7 available at http://www.ciwmb.ca.gov/Regulations/Title14.

2. California Code of Regulations, Title 27, Division 2 available at http://www.ciwmb.ca.gov/Regulations/Title27/.

3. San Joaquin Valley Unified Air Pollution Control District Rule 4565, Rule 4565 Staff Report and Appendices.

4. SCAQMD Rule 1133, staff report, and technology assessment.

5. SJVUAPCD 2007 Ozone Plan

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