



Colorado Department  
of Public Health  
and Environment

# Air Pollution Control Division

## Stationary Sources Program

### PERMITTING SECTION MEMO

TO: Stationary Sources Program Staff, Local Agencies, and Regulated Community

FROM: Matthew S. Burgett, P.E.

DATE: November 1, 2012

RE: **PS Memo # 12-02 – VOC Emissions from Composting Operations**

---

# Composting: VOC Emissions & Best Management Practices

This document establishes the Division's approach to estimating VOC emissions at composting operations in Colorado.

Questions on these procedures may be addressed to the CDPHE Air Pollution Control Division at:

Main phone: (303) 692-3150

[Cdphe.commentsapcd@state.co.us](mailto:Cdphe.commentsapcd@state.co.us)

Other Resources:

Colorado Air Quality Control Commission Regulations:

<http://www.colorado.gov/cs/Satellite/CDPHE-Main/CBON/1251601911433>

Colorado Solid Waste and Materials Management Program – Composting:

<http://www.colorado.gov/cs/Satellite/CDPHE-HM/CBON/1251616361816>

San Joaquin Valley Air Pollution Control District's Compost VOC Emission Factors, September 15, 2010:

[http://www.valleyair.org/busind/pto/emission\\_factors/Criteria/Criteria/Composting/Compost%20EF.pdf](http://www.valleyair.org/busind/pto/emission_factors/Criteria/Criteria/Composting/Compost%20EF.pdf)

Emissions Testing of Volatile Organic Compounds from Greenwaste Composting at the Modesto Compost Facility in the San Joaquin Valley:

<http://www.calrecycle.ca.gov/publications/Detail.aspx?PublicationID=1263>

**Composting:**

According to EPA<sup>1</sup>, composting is the process of:

...combining organic wastes (e.g., yard trimmings, food wastes, manures) in proper ratios into piles, rows, or vessels; adding bulking agents (e.g., wood chips) as necessary to accelerate the breakdown of organic materials; and allowing the finished material to fully stabilize and mature through a curing process.

Compost is the stable humus-like material produced from the controlled aerobic biological decomposition of the organic material. This document will apply to owners and operators of composting operations that utilize feedstocks such as wood chips, untreated wood, plant matter, yard trimmings, agricultural crop waste, food waste, paper and green waste, manure, and biosolids. The composting covered by this document does not include operations such as management of petroleum contaminated soils or land application of alcohol containing beverages. These other operations may have higher emissions due to the materials involved.

The Division has recently become aware of compost operation studies (mostly in California) which have measured the Volatile Organic Compounds (VOCs) that are emitted due to composting. This memo is being written to provide the Division's recommended emission factor based on the VOC emissions data currently available.

The Division finds that the most robust and technically sound study currently available is found in the September 15, 2010 report "San Joaquin Valley Air Pollution Control District's (SJVAPCD) Compost VOC Emission Factors". This report based the emission factor on available scientific source test data from multiple composting sites which conducted testing in various seasons, with a focus on green waste composting. The following emission factor is appropriate for use in estimating VOC emissions from compost windrows in Colorado. This factor is based on the input material (as wet tons), not finished material.

**Windrow VOC Emission Factor: 5.71 lb-VOC/wet ton**

The Division understands that there is limited VOC emission data currently available. As such, other acceptable emission factors may be available in the future. The Division will consider other emission factors on a case-by-case basis. Requests to use an alternate emission factor should be submitted for Division review with adequate justification to explain why the proposed factor is more appropriate. The proposed emission factor and justification should be submitted along with an Air Pollutant Emission Notice (APEN) for Division review.

The SJVAPCD report also provided an emission factor for green waste stockpiles of 1.063 lb-VOC/wet ton/day. The Division does not recommend the use of the SJVAPCD Green Waste Stockpile VOC emission factor at this time. The San Joaquin Valley's climate is different than Colorado's and it is not clear how the climate differences (e.g. moisture, temperature) would alter VOC emissions from an unmaintained stockpile. However, the Division believes that the climate differences should not have a significant impact on the VOC emission factor for the compost windrows since the compost operation is managed to control important parameters (e.g. moisture, nutrients, temperature) regardless of location.

---

<sup>1</sup> <http://www.epa.gov/epawaste/conservation/rrr/composting/basic.htm>

**Best Management Practices (BMPs):**

The Division has also reviewed public information to determine reasonable control options available for compost operations. The October 31, 2007 report “Emissions Testing of Volatile Organic Compounds from Greenwaste Composting at the Modesto Compost Facility in the San Joaquin Valley” published by the California Integrated Waste Management Board provides some data regarding control options. Based on this report, the Division believes that the following control options are valid and can be used to reduce VOC emissions. These BMPs should also help reduce odor emissions.

Control Option	Specific Requirements	VOC Reduction (i.e. control efficiency)
Finished Compost Blanket/pseudo-biofilter	Cover the active compost windrow with a blanket of finished compost. A finished compost blanket must be reapplied following any turning event. The blanket shall be applied such that there are no visible gaps or cracks in the cap.	75%
Finished Compost Blanket/pseudo-biofilter – First two weeks only	Cover the active compost windrow with a blanket of finished compost. A finished compost blanket must be reapplied following any turning event during the first two weeks of composting. The blanket shall be applied such that there are no visible gaps or cracks in the cap.	56.25%

The Division will allow the use of these control efficiencies if the compost operator agrees to meet the specific requirements outlined at all times. The Division will review other control options on a case-by-case basis. The proposed control option and VOC reduction, including adequate justification to support the proposed VOC reduction should be submitted along with an APEN for Division review.

**Air Pollutant Emission Notice (APEN):**

You must submit an APEN to report emissions from your composting operation if uncontrolled actual VOC emissions exceed one ton per year in an ozone nonattainment area, or two tons per year in an ozone attainment or attainment/maintenance area. Uncontrolled actual emissions are calculated prior to taking any credit for emission reductions available through the use of BMPs.

APENs should be submitted along with a detailed explanation of any BMPs used, the requested VOC control efficiency, any alternate emission factors proposed, and adequate justification to support the use of any emission factors or BMPs not included in this memo.

**Fugitive Emissions:**

Fugitive Emissions – defined in the Air Quality Control Commission’s Common Provisions Regulation as:

Emissions that could not reasonably pass through a stack, chimney, vent or other functionally equivalent opening.

Some air quality practices and requirements depend on whether emissions are fugitive or point-source (i.e. not fugitive). For example, fugitive emissions are not considered when determining if an emissions source is a Major Source unless the source belongs to a list of specific source categories (Regulation No. 3, Part A, Section I.B.25.b). The Division has determined that, in most cases, emissions from compost piles will be fugitive in nature since it is not currently reasonable, nor is it common industry practice, to collect the emissions in order to pass through a stack. This determination is not permanent and could be modified in the future should conditions change.

**Permitting:**

AQCC Regulation No. 3, Part B, Section II.D.1.h exempts composting piles from having to obtain a permit. However, all applicable odor requirements of Regulation Number 2 must be met. This permit exemption does not apply to other activities or emission sources at a composting facility (e.g. grinders, screens, engines).

**Recordkeeping:**

Compost operations shall maintain records of the tonnage of wet material composted each year in order to calculate VOC emissions. Records shall also be maintained to document any BMPs used. Records shall be made available to the Division upon request.

**Other On-Site Equipment:**

Other emission units found at composting facilities may need to submit APENs and obtain permits. These other emission units could include crushers, grinders, screens, and engines. Please contact the Division if you need assistance determining the regulatory requirements for your other emission units.

**Reasonably Available Control Technology (RACT):**

AQCC Regulation No. 3, Part B, Section III.D.2.a states that RACT does not apply to emission sources that are exempt from construction permitting per Section II.D. Since composting is a construction permit exempt activity, RACT is not required.