

US EPA ARCHIVE DOCUMENT



SYNAGRO

A Residuals Management Company



Case Study: Compost Facilities in Air Quality Non- Attainment Districts

2010 Pacific Southwest Organic Residuals Symposium

September 14, 2010

Challenges Driving Biosolids Management

- ◆ Regulations restricting or banning both the land application and use of Class B biosolids as ADC
- ◆ Local restrictions (Solano & Kern counties, etc.)
- ◆ Limited landfill capacity (Especially in So Cal)
- ◆ Longer hauling distances to Class B sites (greater than 300 miles one way to sites in Arizona)
- ◆ Increasing costs for Class B land application (>\$50/ton)
- ◆ Composting rules eliminating windrow composting
 - San Joaquin Valley APCD Rule 4565
 - South Coast AQMD Rule 1133

But Why Regulate Compost?

- ◆ The CAA requires EPA to set primary National Ambient Air Quality Standards (NAAQS) for criteria air pollutants that pose public health threats.
- ◆ Currently, NAAQS exist for six criteria pollutants - ground level ozone, Particulate Matter, carbon monoxide, sulfur dioxide, lead and nitrogen dioxide.
- ◆ NAAQS are defined as the levels of air quality that is necessary to protect the public health.
- ◆ **Ozone** is formed by chemical reactions that require heat, sunlight, NO_x from combustion sources & **VOCs**.
- ◆ Ammonia combines with NO_x and SO_x to form nitrate and sulfate particles, a component of PM pollution.

Compost Emissions

- ◆ Emissions

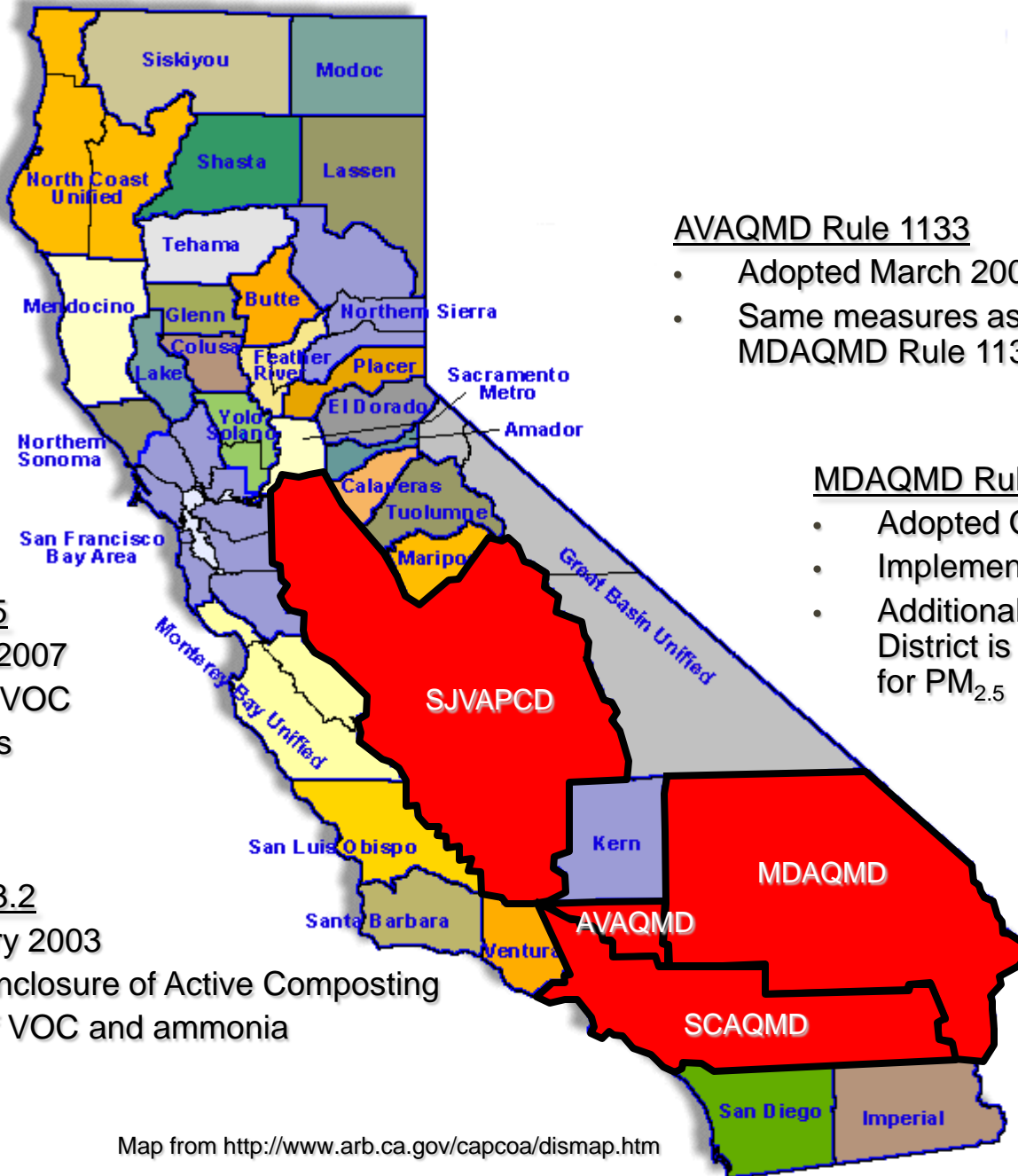
- ◆ VOCs
- ◆ PM
- ◆ NH₃



- ◆ Links to the regulations

- ◆ <http://www.arb.ca.gov/DRDB/SC/CURHTML/R1133-2.PDF>
- ◆ <http://www.arb.ca.gov/drdb/sju/curhtml/r4565.pdf>

Composting Regulations in California



AVAQMD Rule 1133

- Adopted March 2009
- Same measures as MDAQMD Rule 1133

MDAQMD Rule 1133

- Adopted October 2008
- Implement BMPs
- Additional measures if District is in non-attainment for $PM_{2.5}$

SJVAPCD Rule 4565

- Adopted March 2007
- 80% removal of VOC
- Implement BMPs

SCAQMD Rule 1133.2

- Adopted January 2003
- Requires Full Enclosure of Active Composting
- 80% removal of VOC and ammonia

Case Study

Temescal Canyon – Corona, CA

- ◆ Temescal Canyon
(Corona, California)
 - ◆ 500 wet tons per day
 - ◆ Open Windrow



Case Study

South Kern Composting

- ◆ Kern County
(near Taft)
 - ◆ 500 wet tons per day
 - ◆ Aerated Static Pile
 - ◆ Enclosed Receiving and Mixing
 - ◆ BACT for Air



Compost AQ Regulations

- ◆ Pre-2003
 - ◆ Primarily regulated for nuisance odor and dust.
 - ◆ No biosolids composting sites had been permitted with specific reduction requirements for VOC or NH₃.
 - ◆ Biofilters were utilized primarily for odor treatment necessitating an enclosed facility or due to the compost technology chosen (i.e).

- ◆ SJVAPCD Compost Regulation
 - ◆ None – at time of SKCMF permit application/issuance.
 - ◆ BACT for VOC and NH₃ at biosolids composting in the SJVAPCD was set via the SKCMF project
 - ◆ SJVAPCD Rule 4565 adopted on March 15, 2007 with requirement to reduce VOC emissions by 80%.

South Kern Compost Manufacturing Facility





Major Equipment/Processes

Enclosed Biosolids Receiving & Feedstock Mixing Operation



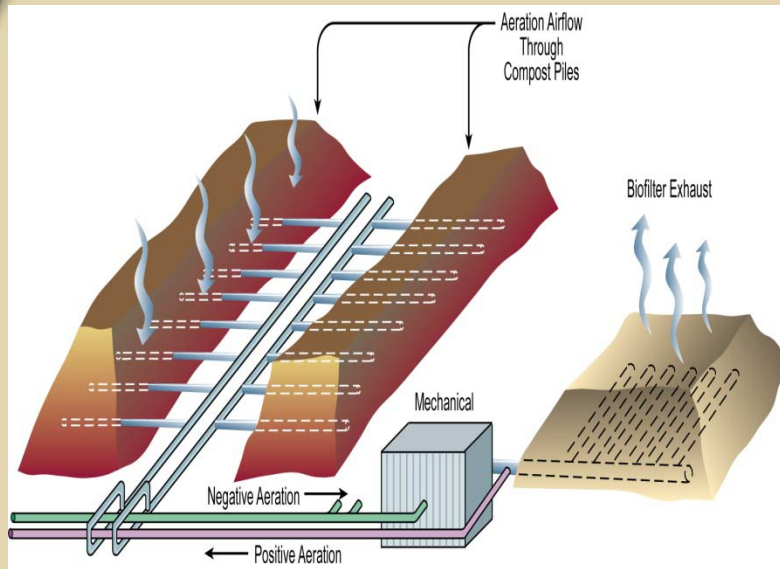
Aerated Static Piles (ASP)

Vacuum applied
beneath ASPs



Major Equipment/Processes

Engineered Negative Aerated Static Pile Composting



Major Equipment/Processes

Process & Contact Stormwater Impoundment



Major Equipment/Processes

Screening Operation



Environmental Benefit

- ◆ 2009 Source Test Data
 - ◆ Total lbs. of VOC's removed by biofilters per year is 539,432 lbs.
 - Percent removal rate = 85% (permit requires 80%)
 - ◆ Total lbs. of Ammonia removed by biofilters per year is 162,494 lbs.
 - Percent removal rate = 99.25% (permit requires 80%)

Impact (500 tons of biosolids/day)

- ◆ Average distance to Corona was ~ 90 mi round-trip miles
- ◆ Average distance to SKIC is ~300 round-trip miles.
- ◆ Does not account for other quantities hauled to AZ due to Corona closure, which would be even further....
- ◆ SKIC cost \$30M to construct, and \$5M for the property/permit
- ◆ At least \$20M is in the ASP system needs to comply with 4565
- ◆ Electrical costs currently are primarily ASP/4565 related
- ◆ Management cost per ton Corona ~\$28 (\$5M/yr)
- ◆ Management cost per ton SKIC ~\$65 (\$12M/yr)
- ◆ Annual diesel consumption (RT) @25 tons/truck & 6 MPG
 - Corona 7,300 trips/yr X 15 gal/trip = 109,500 gallons/yr, 657,000 miles/yr
 - SKIC 7,300 trips/yr X 90 gal/trip = 657,000 gallons/yr, 2,200,000 miles/yr

Usage Comparison	Days Billed	Kwh Billed	Kwh per Day
This Year	30	524,123.000000	17,470.766667
Last Year	N/A	N/A	N/A

Emission Factors for On-Road Heavy-Duty Diesel Trucks

- ◆ **HHDT-DSL (pounds/mile)(1,543,000mi/yr)**
- ◆ **CO 0.01195456 = 18,500 pounds/year**
- ◆ **NO_x 0.03822102 = 59,000**
- ◆ **ROG 0.00304157 = 4,700**
- ◆ **PM₁₀ 0.00183062 = 2,800**
- ◆ **PM_{2.5} 0.0016008 = 2,500**
- ◆ **CO₂ 4.21120578 = 6,500,000**

www.aqmd.gov/ceqa/handbook/onroad/onroadEFHHDT07_26.xls

Carbon Dioxide Emissions Coefficients for Electric Power

- ◆ Factor - 0.61lbs CO₂/Kwh (CA factor)
- ◆ SKIC electrical consumption/month – 542,000Kwh
- ◆ 330,000 lbs CO₂/mo
- ◆ ~4,000,000 lbs CO₂/yr

<http://www.eia.doe.gov/oiaf/1605/pdf/EFactors1998-2000.pdf>

UC Davis VOC Study

- ◆ Study to determine whether the types of Volatile Organic Compounds (VOCs) emitted from typical biosolids operations will react with oxides of nitrogen (NO_x) and form ozone.
- ◆ Current assumption that because VOCs are being emitted, ozone will be formed. However, VOCs vary greatly in their reactivity and in their propensity to contribute to ozone formation
- ◆ The assumption that a given source contributes to ozone formation should to be evaluated before the implementation of new rules which will raise biosolids composting operating costs.



Thank You

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