USING A COMPOST CAP FOR ODOR AND EMISSIONS CONTROL

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Why Odor?

- Still #1 reason for problems at compost facilities (in the US)
- We know a lot about odors
- An ounce of prevention is worth a pound of cure
- Can be very site-specific
- Can be hard to recover from
Where Do Odors Come From?
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• Every site is different, but…
  – The largest volume of “odor molecules” are released from the windrows themselves
  – Not necessarily the largest concentration, but a constant low-level stream from every windrow, 24/7
  – In general, most odors released at the beginning of the process and trail off as the process proceeds…
C-CORP

- Detailed study on Compost Odor (CalRecycle, March 2007)
- Great resource for any site
- Odor Mitigation Menu
- Available here: www.calrecycle.ca.gov/Publications
Why Emissions?

• Some air districts in CA regulating Volatile Organic Compounds (VOCs) from composting.
• Reactive VOCs + Oxides of Nitrogen (Nox) + sunlight = Ozone (“Smog”)
• US EPA Clean Air Act defines Federal Standard for Ozone
• Districts in “Extreme” Non Attainment must take action or lose Federal $.
Compost Cap

- *Envisioned* for odor control
- *Studied* for emissions control
- Initial studies sought to quantify emissions; create emission factors
- “Modesto Study” (CalRecycle 2007) quantified the effect of the Cap – in the field = 75% VOC reductions
- SJVAPCD Study (2013); positive forced air + Compost Cap = 98% VOC reduction
Emissions W/ and W/O Cap

Figure 1 - Compost Emission Comparison

- Typical Compost Windrow
- Application of Finished Compost Cover

VOC Emissions *

Day of Composting Process

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

Source: Appendix I to study results report (SJVAPSA, Draft 2011)
• Warm air rises through pile bringing odors and emissions
• Finer, mature cap provides a filter of fine particles.
Compost Cap

Photo Courtesy CalRecycle
Compost Cap

Photo Courtesy CalRecycle
How does it work?

- Creates a “filter” that odor molecules (and VOCs) must pass before exiting the pile.
- Finished compost works best because it has more surface area.
- Finished compost, once “turned in” also “power boosts?” (inoculates?) the fresh pile with active microorganisms.
Compost Cap in Practice

• Cover windrows with:
  2 - 4 inches screened finished compost, or
  6 - 8 inches unscreened compost, or
  12 inches woody overs

• More surface area = more areas for odor/VOC molecules to pass through/adhere to.
• Cooler temps outside of cap condenses moisture w/some volatiles
The Challenge:

- How to apply the "Cap" efficiently?
- Loaders work, but require lots of space
- Articulated loaders work
- Excavators work (slowly)
- Blower trucks?
- Create a custom solution?
Latest Research
Results

98% Reduction!

Disadvantages

• Difficult to apply
• Some double-handling
• Loss of site capacity
• Increase in bulk density/loss of porosity
• Impact on quality?
Summary

- Compost cap can be very effective at reducing odors and VOCs.
- Compost cap + positive aeration can be VERY effective at reducing VOCs
- May power boost/inoculate fresh piles with active microorganisms.
- Good, low cost, do-able BMP which may help manage some odors at some facilities.
THANK YOU