

Questions, Comments & Recommendations on GHG Emissions from Green Compost Paper:

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This brief document contains preliminary questions, comments and recommendations regarding the study and Draft Final Report titled: "Emissions of Greenhouse Gases (GHGs) from Green Waste Composting". (Prepared for: SAN JOAQUIN VALLEY UNION AIR POLLUTION CONTROL DISTRICT, 09-01-CCOS; and Prepared by: Fatih Buyuksonmez, San Diego State University, Civil, Construction, and Environmental Engineering, San Diego, CA. First, on this page below, is a bullet summary list of major concerns. This is followed by a more comprehensive list of questions, comments and recommendations on pages 2 to 4.

We refer to this as "preliminary" since, depending on how our various questions and recommendations are addressed, it may lead to further questions about the study, report and how it will be used in setting new best management practices for green waste composting under a new Rule 4566. We look forward to discussing this further in greater depth in the conference calls and stakeholder meetings in the weeks ahead. Please feel free to have the Project Scientist be in touch with us directly, if he would like to get further clarification of our questions, comments and recommendations.

Summary List of Concerns with the Draft Final Report:

- No measurement of basic compost parameters of either the feedstock or finished compost parameters, e.g. C:N ratios, pile moisture, total organic matter, EC, etc.
- Very high evolution of CH₄ and VOC, with no explanation of mass balance and *why* these are *not* to be used as emissions factors.
- No detailed discussions of the "interactive" pile management methods, along with many other technical details that are not clear (outlined on following 3 pages).
- Not a clear understanding of how water is impacting the piles, i.e. what "further research needed"?
- No specific recommendations on how this should relate directly to the rule making exercise for which this study was performed.
- Report is poorly written (lots of errors in the copy): no Executive Summary, needs reorganization of much of the data into Appendix, needs detailed peer review to assess why this doesn't match previous research work on this subject.

Detailed Questions, Comments and Recommendations:

General Issues:

The report seems incomplete in the following ways:

- Why not make recommendations on the VOC regulatory rule making? Why no comment on the actual reductions as being worthy or worthwhile for the purposes of VOC regulatory rule making? How does this relate to rule making and emissions factors? Please explain. Recommendation: Make clear recommendations on VOC rule making.
- Page 1: States: “It is important to understand that determination of emission factors and/or lifecycle emissions were not the focus of this investigation. Even though, the term “*emission factor*” is used in comparing different mitigation alternatives, these results should not be used, treated, or cited as emission factors.” Why? This seems critically important. Recommendation: Include this explanation in *both* the body of the report *and* the “Executive Summary”.
- Why is there no “Executive Summary”? Recommendation: Include an Executive Summary.

Additional Comments:

- Making us draw conclusions relative to rule making seems very inappropriate in our assessment. We don’t know what to actually critique, since no broader conclusions or recommendations were given, beyond the limited conclusions of the study. Also, since we don’t have access to the raw data, we can’t duplicate or check the study’s calculations. Recommendation: Give this report to a competent 3rd party scientist and pay them to “peer review” it and make independent recalculations of the data and results and conclusions.
- There are numerous wording, typographical and other errors in the report, too much for us to enumerate here. This report is NOT ready for general distribution. Recommendation: Have it professionally reviewed and edited, as indicated above.

Some more specific questions, comments and recommendations follow, based on our review.

Technical Issues:

1. Feedstock and Finished Compost Data: What are the actual characteristics of the feedstock and finished compost? For example, C:N ratios, Organic mater, N, P, K, EC, moisture content, etc. Why wasn’t STA (TMECC methods <http://www.compostingcouncil.org/programs/sta/>) analytical measurements run on the material, before and after composting? We don’t really know what this material is ... so making conclusions about it are in the absence of this key information. Recommendation: If the data has already been collected, include it in the report and relate it to the study conclusions. If it wasn’t collected, estimate it (give important ranges) and explain why it is either not important or is important and should be collected next time.

2. What's the point of all the thermal scans? Why is this necessary?
Recommendation: Explain it, but put it *all* in the Appendix, except for a brief explanation.
3. Why all the thermal histograms? How are they constructed? Are they from the thermal scans? What does this mean, except about time and temperature?
Recommendation: Explain it, but put it *all* in the Appendix, too, along with the thermal scans.
4. Where are the actual sampling points on the piles? Recommendation: Include the raw data of sampling points and actual calculations so that we can be assured of at least the traditional time and temperature data has been collected and replicated on these piles.
5. Is there any speciation of VOC's evolved other than methane (CH₄)? Why or why not? Recommendation: If VOC's are not speciated, explain why this is, or is not, important for this study.
6. Data on VOC mass balance... where is it? Why are the CH₄, VOC and N₂O not actual "emissions" values? Recommendation: Calculate actual emissions values based on this data; or explain, in detail, why this can't be done as well as why is, or is not, relevant for this study.
7. Table 6, Pg 71: The total emissions values show a major evolution of CH₄ (100 to >300 g/kg)! How can this be true without lots of pile mass loss, up to 1/3? Wouldn't this be mostly CO₂? Wouldn't a logical recommendation be, collect the methane and use it for energy recovery? Why is this so high? Why is this not explained? Recommendation: Give a *detailed* explanation as to why these values are so much higher than anything we've seen in previous studies! (see also #12 below).

Study Hypotheses and Conclusion Issues;

8. We found the presentation of data as "Percentage of data follows the hypothesis" to be almost meaningless to us. What is "the hypothesis"? Why not present that actual data? Recommendation: Put all of this in the appendix, including the actual data, summarize it briefly in the body of the report so it makes sense why it's important (assuming it is), otherwise, leave it out of the report.
9. Pg 67, 2nd paragraph states - "One of the main hypotheses of this investigation was the use of thermal imaging to determine the high and low emission points on a composting windrow." Why is this important? Was this actually used to do the actual emission measurements? Why are these sampling points not overlaid with the actual piles? Recommendation: Include this data in the appendix, but summarize it in the body of the report.
10. "Based on these results, it can be concluded that the of thermography technique to determine the sampling locations can be effectively used to improve the accuracy of the emission sampling studies." OK, however, where did that *actual* sampling take place on each pile? Recommendation: Again, include actual sampling points relative to the thermography data.
11. Pg 70, 1st paragraph states: "From the onset, it should be stated that the emission results and factors provided herein are only for comparison of mitigation alternatives investigated in this study. They should not be interpreted, used,

- referenced, or cited as emission factors or emissions resulting from composting process.”... Why? Recommendation: The reason for this must be explained.
12. Pg 71 3rd paragraph, 3rd sentence says: “It should also be noted that the carbon dioxide emissions and their effect on the GHG emissions are omitted herein.” Why? Isn’t CO₂ a “green house gas”? Why was it omitted? Recommendation: This needs to be explained, and how it fits into a mass balance measurement along with the CH₄ and VOC off gassing measurements and calculations.
 13. Table 6: The interactive pile shows good (26.5%), greenhouse gas reduction. However, there is not enough information in the report on how this pile was managed. Recommendation: Include detailed information on how this pile was actually managed during the course of this study, and how this might be replicated as best management practice for GHG reduction.
 14. Table 6: Looks like the biofilter significantly cut VOC, however it raised the methane. What does that mean? Did the pile go anaerobic? Why didn’t this happen with the “interactive” pile. Recommendation: Explain what you think is going on here in the conclusions.
 15. Water usage: In a number of places, the piles were watered (drip rather than mist?). However, there is no detailed data about water usage and how this relates to ambient air temperatures. Water is an important resource in composting, so this data would be useful for this study and the mitigation measures. Recommendation: Add back in the water data, if available, and if not, at least make estimates and explain its importance or lack of importance to the conclusions of this study.

Reporting and Rulemaking Conclusion Issues:

16. Why no conclusions about how this all relates to the impending rule making exercise in Jan. ‘09? Isn’t *this* why the study was performed? What will this actually mean for the VOC rulemaking? Who is expected to decide that and how can industry have a say in that? Recommendation: Include specific conclusions as to how this study relates to the Rule making process.