UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

APR 02 1996

REPLY TO THE ATTENTION OF:

DRP-8J

Mr. Thomas Brent
Code 5090 SER 095/U5273
Department of the Navy
Naval Surface Warfare Center
300 Highway 361
Crane, Indiana 47522-5001

RE: Bench Scale Compost Testing
Naval Surface Warfare Center
Crane, IN
IN5 170 023 498

Dear Mr. Brent:

The United States Environmental Protection Agency (U.S. EPA) has reviewed the Draft Interim Report concerning the Bench Scale Compost Testing, dated February 23, 1996. The attached comments are a compilation of issues found during review of the material by Harry Craig from Region 10, and Allen Debus and myself from Region 5.

Although it appears from the preliminary test results that the explosives are degrading at good levels, there are still some concerns about the appropriate mixes to be utilized. RDX degradation appears to be good. The treatment for Amino DNT could be better, since the Region 10 sites are getting treatment down to the non-detection level. If you change the mix a bit and assure daily mixing it will probably will reduce the contamination more effectively.

It appears that the existing research available for bench scale testing of explosive contaminated soils was not fully looked at prior to the testing. Studies have shown that "POTW" wastes do not work well, plus there is a possible problem with inconsistency of the actual waste stream being used. Also, we do not encourage the use of "non-native" amendments such as paper wastes, since the end compost mixture would result in a "paper-mache" type of material (a solid waste) instead of a soil. Although these two amendments (paper and POTW wastes) have been already tested, we do not want to see either used in the pilot scale or any further bench scale testing. Bulking agents of sawdust and alfalfa do not provide enough porosity at the pilot scale. There has to be a greater percent of wood chips to sawdust used to increase the porosity of the piles.

The cow manure with alfalfa is the Naval Surface Warfare Center (NSWC) tested mix of choice (Mix 7), but we have some concerns when the mixture is converted to a pilot scale level. We would suggest the following, depending on time frames involved. Repeat some of the bench scale testing with different mixes, which should be discussed with the U.S. EPA prior to testing, and/or at the pilot scale, test initially 3-5 types of mix batches as follows:

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Mix 1. "Umitilla Mix": equal parts of amendments and soil (one part wood chips, one part alfalfa, one part vegetable wastes, one part manure, one part soil)

Mix 2. NSWC Bench Scale Mix 7: (saw dust (we prefer to see wood chips at pilot scale), alfalfa, cow manure, soil) (20 % soil, 40 % manure, 40 % amendments)

Mix 3-5. Cow Mix or Swine or Turkey Mix:

(25% manure, 25% alfalfa, 20% bulking agent (wood chips % > sawdust %), 30% soil)

Mixing must be daily in order to reduce total treatment time, since this has been shown to be more effective than every other day at the Region 10 sites. All amendments must be consistent at all times.

We also need to see the data from the metals testing to assure that there will be no metals issues related to the final soil materials. Please provide a response to comments and a revised draft version of the bench scale results in a full report format, including test methods, quality assurance data, etc. according to your composting schedule. If you have any questions regarding this matter, please contact me at (312) 886-6146.

Sincerely,

Carol Witt-Smith
Corrective Action Expert
WMB, IL/IN/MI Section

cc: Tom Linson, IDEM
Brian Von Gunten, IDEM BRAC
Adrienne Wilson, SOUTHDIV
James May, ACE
Allen Debus, WMB
Harry Craig, Region 10

Comments on the Draft Interim Report
Crane NSWC Bench Scale Compost Testing
February 23, 1996

A. Description of Methods

1. Describe the specific test methods used for all the parameters evaluated analytically (i.e., pH, total volatile solids (TVS), etc.).

2. Is the pH taken in a slurry form?

3. What is the rationale behind the Carbon: Nitrogen (C:N) ratio evaluation?

4. Which measurement provides the dry weight available carbon parameter?

5. Clarify the distinction of "volatiles" when the temperature is < 100 degrees Celsius and > 300 degrees Celsius.

6. We will assume the formula for the biodegradation rate constant is correct since we could not obtain the reference in order to prepare these comments in a timely fashion.

7. Include an explanation of exactly where the soil samples came from and what type of contamination they represent. Also describe in more detail how the sample from the facility was divided to be representative for this test.

B. Mixes

1. What was the logic behind the selection of the mix types? Currently available composting results have shown that POTW sludges don't work well, and are a waste of time to test for. The NSWC POTW sludge seemed to have some good results with the sawdust, but we are concerned about final disposal methods since the material would still be considered a waste and not a soil. Paper is a non-native material and is not good in the aspect of final disposal methods. The material would have to be disposed of in a landfill and could not be reapplied as soil.

2. How do the results relate to other combinations of mixes that might possibly work, such as swine manure and sawdust?

3. Wood chips must be considered in the pilot scale instead of just sawdust. Wood chips are better from a porosity standpoint and will allow for more oxygen flow through the pile. The percentage of wood chips must be greater than sawdust.

C. Results

1. Table 2

a. On page 5 and 6, there is a statement that "Every treatment had an acceptable pH and moisture content except mix 1 and 5..." What about mix 7's final pH of 8.50? Isn't that an unacceptable level when you compare to Mix 1 having 8.13 and Mix 5 having 9.00?

b. Explain in the text up front, as in the Table 3 explanation, the acceptable pH (5-8) and moisture content ranges (40-60%).

c. Mix 5, not Mix 4, had the 82.27% moisture content.

d. Why are the C:N ratios listed as "Data Not Shown"?

e. What are the TKN values compared with to say they are "surprisingly low"? What does this mean?

2. Table 3

a. How is the following interpreted? "In this study, the TVS remained constant or a reduction occurred." Is it related to CO_2 emission rates?

b. How are the C:N ratios calculated and what is its rationale?

c. in the footnote to the table "% Carbon = TVS/1.8" where does the 1.8 come from? This equation wasn't explained elsewhere.

d. How important is it that the final pH and moisture contents could not be taken due to lack of sample? Does this effect the overall conclusions or not?

e. Mix 1 (8.23) does not fall into the 5-8 pH range. It's just outside.

f. Mixes 2 (61.48), 6 (63.81), and 7 (63.85) fall outside the moisture content range of 40-60%.

g. Why are the final values for Mix 1 for TVS and TKN missing?

h. How did you figure out that the TVS remained constant or a reduction occurred? Please explain.

i. Why aren't the final C:N ratios shown?

3. Table 4

How were the values for "Percent Carbon" and "Dry Weight Carbon" measured or calculated? And, do they reflect initial or final conditions?

4. Table 5

Add some explanation as to why being able to predict the final wet weight is important.

5. Table 6

a. The right column of Table 6 values for TNT were cut off during copying. Please supply a copy with the legible values.

b. What does the acronym "SD" stand for? Is it "standard deviation"? Why do these values appear high for HMX compared to the other constituents?

c. Explain when the initial and final concentrations were tested. Was it analyzed before or after mixing with the amendments? How do the mixed values relate to the actual levels at the facility at the various sites? If the Rockeye site is high in TNT and another site is high in HMX, will the "best" mix be able to treat effectively both sites, or will there be specific mixes for each of the sites remediated based on their explosive constituents and concentrations? A description of the relationship of the bench scale results compared to the facility cleanup potential should be included in the report. Also, does the initial concentration make a difference when comparing mix performance, if the initial concentration of the constituent is higher or lower than other mixes?

6. Table 7

a. Do the rankings reflect or relate to toxicity to humans or the environment? How is that factored in?

b. Exactly how were the rankings calculated? We could not duplicate the results.

7. Temperature Profiles

The temperature profiles appear satisfactory.

8. We agree that the RDX reduction looks good with Mix 7. The Amino DNT levels could be better. Region 10 sites are getting non-detection levels.

9. Table 8

Table 8 is referred to as Table 1 on Page 9. This needs to be corrected.

D. Conclusions

1. Shouldn't the conclusion read that Mix 4 and Mix 7 have the "best" rankings versus the "highest" rankings?

2. Can you supply the calculations for the best mixes, so we can run a comparison evaluation of your conclusions?

3. Mixing and porosity issues are lacking and will need to be addressed. A daily turning must occur to quicken the breakdown of contaminants.

4. The soil loading could run higher. We want the best decomposition with the greatest volume in order to reduce extra bulk where possible and considering the volume of soils that we have at the site, to reduce the overall treatment life of this cleanup. A 30% soil rate should be looked at.

5. How would Mix 7 perform with an increased soil level of 30% instead of 20% and adding more bulking agent to increase the porosity? This would make the mix 25% manure, 25% alfalfa, 20% bulking agent (wood chips), and 30% soil.

6. In the pilot scale real data should be collected up to day 10 versus trying to force fit half-life models to work in evaluating degradation.

7. In the pilot-scale test, you need to make sure that the amendments are consistent all the time.

8. Scale-up problems need to be evaluated and explained. A brief description on how the chosen Mix will likely perform in the pilot-scale should be included.