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Date: June 7, 1995

Ms. Brenda Norton, PE
Atlantic Division, Naval Facilities Engineering Command
Environmental Quality Division
Code: 1822
Building N 26, Room 54
1510 Gilbert Street
Norfolk, Va 23511-2699

Re: Naval Weapons Station, Yorktown, Va.
Review of draft *Summary of Background Constituent Concentrations and Characterization of the Biotic Community from the York River Drainage Basin*

Dear Ms. Norton:

The U.S. Environmental Protection Agency (EPA) has reviewed the Navy's draft *Summary of Background Constituent Concentrations and Characterization of the Biotic Community from the York River Drainage Basin* at the Naval Weapons Station-Yorktown (WPNSTA) NPL facility. Based upon that review, EPA has the following comments, concerns and suggestions to offer on the draft document:

## GENERAL COMMENTS

1) The document was well written and adequate and, overall, meets its objectives of providing good background data for comparison to impacted sites at the WPNSTA. The sampling appears to have characterized background concentrations of trace elements and organic compounds in soils, groundwater, surface water, and sediments. The fish and benthic sampling should also provide a reasonable baseline for comparison to sites at the WPNSTA.

2) However, additional background and reference samples should be collected at the same time that potentially impacted sites are sampled because abundance and diversity of benthic communities and fish populations may vary considerably over time due to factors such as seasonal migration or emergence. Also, biota samples should be stratified by habitat type and physical parameters such as grain size and TOC for purposes of comparison.

3) Soil concentrations should be compared to background soils of the same soil association. Also, normalizing factors such as grain size, TOC, iron, or aluminum should be reported and used in comparisons of impacted to background soil concentrations.

4) The greater the degree of variability, the greater the number of samples required to support statistical tests at a given level of power and probability of alpha (page 3-3). By selecting aluminum specifically because of its low variability, the number of samples required has likely been underestimated. Additionally, if there are in fact differences among the five soil types, the number of samples required should have been 40 per soil type - not total.

5) There appears to be turbidity problems in a number of wells. This is most likely due to the lack of

proper well development. Please refer to the discussion of well development in the *Master Project Plans* for the Naval Weapons Station.

6) The benthic macroinvertebrate characterization is very good, but the study was performed at a time of relatively high aquatic stress (August), when water levels are low, water temperatures are high, and much of the infauna have left the stream. Information concerning the benthic communities at the background stations during the spring/early summer (March-June) would have been very useful in determining the conditions during the optimal productive season. Subsequent benthic characterization work performed on WPNSTA streams and ponds should be accomplished during the same season as the background study and under similar physical conditions. Interpretation of comparative analyses between site and background streams should address these variables.

7) Statistical analyses for ground water and surface water should be included in the final document.

8) Omission of outliers from a data set is generally not appropriate without the appropriate statistics. Generally, in a small data set it is difficult to omit outliers, as they may be representative of the true population in a large data set. Given that the data set appears to be lognormally distributed, the expected distribution of concentration values may be skewed so that the large concentrations seen in the data set for inorganics in soil may be legitimate.

9) It is not clear why the W-test was not used for testing for normality or lognormality instead of the Quantile-Quantile Plot. This section needs to be expanded in the Report. All statistical analyses should be explained in the text.

10) A sample calculation for the statistical analyses used to determine sample size should be provided in the Appendix. In addition, a statement as to the type of sampling performed (e.g., random stratified soil sampling) should be provided.

11) The Tables in Section 5 should specify the units in which the data are reported in the Tables.

12) It is recommended that Tolerance Limits be used when assessing statistical differences in the Upper Confidence Limits (UCLs) between the background and onsite soil samples.

Specific Comments

1) Page 2-15, Section 2.8.4

It is stated that the federally-listed endangered bald eagle (*Haliaeetus leucocephalus*) was identified onsite, at Pond 11. Pond 11 was designated as an area of special interest. However, it was noted on page 2-16 that the tree in which the bald eagle nested was destroyed in a "recent storm," and that the eagle may no longer nest at Pond 11. Our records indicate that the eagle's nest was destroyed in 1993, but the nest was rebuilt in 1994, about 1000 feet from the previous location. This nest was active in 1994, and is again active in 1995. The current status of the eagle's nest should be updated in Section 2.8.4.

2) Inorganic and organic chemicals were detected at low concentrations in most of the sampling locations chosen to represent background soil conditions. The only exceptions noted were soil sample numbers BGS21 and BGS48RR, which had elevated concentrations of arsenic and polynuclear aromatic hydrocarbons, respectively. The level of arsenic detected in sample number BGS21 was considered an anomaly (page 6-2) and dropped from statistical analyses. Presence of elevated polynuclear aromatic hydrocarbons in sample number BGS48RR can probably be attributed to the close proximity of this sample to the railroad tracks. What would be the source of the arsenic?

3) Inorganic and organic chemicals were also detected at low concentrations in most of the sampling

locations chosen as background surface water and sediment conditions. However, the following samples exceeded federal chronic ambient water quality criteria or effects range-low (unless otherwise noted) sediment guidelines (Long et al., 1993). Four creeks at the Colonial National Historical Park (Park) were chosen to represent background conditions in freshwater streams, and five surface water and sediment samples were collected and analyzed. Elevated levels of lead were detected in Yorktown Creek in both surface water and sediment sample numbers BGCPSW01 and BGCPSD01, respectively. No exceedances of criteria or guidelines were noted in samples collected from the other locations within the Park.

4) Woodstock Pond was sampled as a freshwater pond. Sediment samples BGWPSD01, 02, 03, and 04 had elevated concentrations of DDE, and BGWPSD01, 02, and 04 had elevated concentrations of nickel. DDE levels were reported as the sample detection limit, which was above effects range-low guidelines. Powell Lake was also sampled as a freshwater pond, and samples BGPLSD03 and 04 had elevated levels of DDE, mercury, and nickel. Levels of DDE were above effects range-medium guidelines, and were reported as detection limit/biased low. Taskinas Creek is a tidal freshwater stream, and cyanide levels were elevated in surface water sample number BGTCSW03. Sediment samples BGTCSD01, 02, and 03 had elevated levels of nickel. Timberneck Creek also represents a tidal freshwater stream, and surface water sample numbers BGTNSW01 and 02 had elevated levels of cadmium. Sediment sample numbers BGTNSD01, 02, and 03 had elevated levels of nickel. Sediment sample number BGTNSD03 exceeded the effects range-medium guideline for nickel, and also had elevated levels of zinc. Due to the elevated levels of some organic and inorganic constituents in these samples, caution must be exercised when using these numbers as background conditions for comparisons to other locations.

5) The investigator should explain how the off-site pond background values will be used in the risk assessment. If these background values were to be used in the development of the criteria factors for the ecological risk assessment, it is likely that risk would be underestimated, depending upon how the values were statistically manipulated. If it is decided to use background values in the risk assessment, we strongly recommend a parallel assessment be carried out using conservative criteria. We suggest NOAA's ER-L values for sediment and wetland assessments and the EPA chronic water quality criteria for aquatic risk assessments. We also suggest using literature values for terrestrial assessment and we can supply some values for use as a point of departure if needed.

6) Table 5-23

The fish species identified as "*Fungulus*" is incorrect. The genus *Fundulus* represents the Killifishes. Should this fish be included with the rainbow killifish or is it a separate killifish?

7) Section 6.1.1

Arsenic and manganese values do not appear to be elevated when compared to other efforts at describing "background" levels. The reason for the special attention these two elements received in this section is unclear. This section also fails to draw conclusions on whether the distribution of elements among the five soil types is different or not.

8) Section 6.1.2

Despite third-party data validation, the authors still have decided to attribute detections of VOCs in the Anthropogenic Background samples to contamination. The rationale or evidence to support this claim should be provided in this report. Were similar observations made on the background samples, or were these detections limited to just those from impacted but not site-specific samples? Again, no efforts were made to distinguish these samples statistically from the others.

9) Page 6-6

There appears to be some correlation between benthic macroinvertebrate taxa representation/density/indices and the salinity of tidal streams. Please summarize these relationships in Section 6.2.2.3.

This concludes EPA's comments on the Navy's draft *Summary of Background Constituent Concentrations and Characterization of the Biotic Community from the York River Drainage Basin* at the WPNSTA NPL facility. If you have any questions regarding the above, please feel free to call me at (215) 597-1110,

Sincerely,

Robert Thomson

Robert Thomson, PE
VA/WV Superfund Federal Facilities (3HW71)

cc: Stephen Mihalko (VADEQ, Richmond)
Jeff Harlow (WPNSTA, Code 09E)
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