U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Admin.
National Ocean Service
Office of Ocean Resource Conservation and Assessment
Hazardous Materials Response and Assessment Division
c/o EPA Waste Management Division (HEE-6)
J.F. Kennedy Federal Building
Boston, MA 02203
23 February 1996

Ms. Christine Williams
U.S. EPA Waste Management Division
J.F. Kennedy Federal Building
Boston, MA 02203

Dear Christine:

Enclosed are technical reviews for two documents sent to me by the U.S. Navy: 1. the Draft Final, NCBC Allen Harbor Landfill, Phase III Remedial Investigation and 2. the Draft NCBC Allen Harbor Landfill, Feasibility Study Report, both Prepared by EA Engineering, January 1996. I was in the middle of reviewing the Phase III RI when I received your comment letter, dated 15 February 1996, addressing this document . I was under the impression I had much more time to review the Phase III RI; hence, I cut back my review of the RI and spent more time with the FS. Nevertheless, the following comments refer to both the RI and FS as they are closely related.

The following issues will be emphasized:

- Is the intertidal environment adversely stressed; are concentrations leaving the landfill of import?
- Which pathway is the source of contamination to the intertidal environment in front of the landfill—surface flow, groundwater, or tidal action?
- Which remedy would be most appropriate?

The Phase III investigation collected groundwater from 21 wells analyzing samples for VOCs. High concentrations of VOCs were observed in groundwater beneath the landfill. Concentrations exceeded 10,000 µg/l for several including trichloroethene, 1,1,2,2-tetrachloroethane, acetone, vinyl chloride, and 1,2-dichloroethene. Although concentrations of several VOCs were high, their volatility, coupled with their relatively low toxicity and attenuation upon discharge to surface waters, make these substances a secondary concern. For the protection of natural resources and habitats in Allen Harbor, the previous phases of the RI that investigated PCBs, pesticides, SVOCs, and trace elements provided more pertinent information and data.

Bioassessment studies were conducted during each of the three Phases of the RI and found significant toxicity associated with landfill sediment and leachate. Toxicity was observed in sediment bioassays in areas contaminated by landfill discharges as well as areas associated with the Spink Neck outfall. Toxicity observed at stations clearly associated with the landfill was significant, but not severe. Coarse grain-size could have also contributed to increased mortality in amphipod sediment bioassays. No toxicity was observed in sediment bioassays conducted during Phase III investigations. Bioassays conducted to determine the toxicity of groundwater leachate found significant effects.

These findings indicate that toxic effects may be occurring in the intertidal zone near the face of the landfill. The FS statement that seep waters pose limited risks to aquatic resources is unfounded. A suite of bioassays was conducted on leachate and significant effects were observed with sea urchins (larval development), red algae (*Champia* reproduction), and coot clam (larval development). This provides a weight of evidence that indicates the potential toxicity of groundwater leachate. The level of toxicity upon discharge and entrainment to the intertidal sediments is less clear. The attenuation and dilution of contamination upon discharge to the intertidal zone may mitigate toxic effects to some extent, but data suggest that localized biological effects are still occurring and would likely continue without some level of source control.

There is no evidence to indicate that surface runoff is the cause of intertidal sediment contamination at the face of the landfill, as the Navy contends. Surface runoff investigations were not conducted at the landfill; this conclusion appears viable for only the area proximal to the Spink Neck outfall. The contaminants observed in landfill leachate (e.g., lead, copper, nickel, zinc, total PAHs) are consistent with those observed in intertidal sediments. Contaminated intertidal sediments generally appear downgradient of contaminated seeps, suggesting that leachate is the cause of sediment contamination. The FS appears to lay the foundation that runoff from the Spink Neck outfall is a more important source than the landfill. Given the degree of contamination observed in sediments proximal to both sources, this is not an unreasonable supposition. As reported, however, the burden of evidence indicates that localized areas of the intertidal zone have been contaminated by landfill discharges and biological effects are occurring. There is no evidence to indicate that the contaminated seeps will stop discharging without source control. Although the areas with biological effects are localized, they are occurring in ecologically valuable intertidal wetlands.

Tidal action may contribute to the liberation of contamination from the landfill, but there does not appear to be any direct evidence or data collected as part of the RI investigations to support this. The Phase III RI reported that groundwater measurements in the unconfined shallow fill zone were largely unaffected by tides (Section 3.7.5), but also reported that groundwater and harbor water mix and move back and forth in this layer near the shore (Section 3.7.6.5). Salinity measurements of groundwater were reported to be in Appendix I, but I was unable to find them (Appendix I consisted of 3 pages). This should be corrected. These data indicate that tides do not have a large affect on groundwater flow, but this does not mean tidal effects are minimal. It appears that a substantial amount of saltwater intrusion occurs in the fill material in areas of the landfill closest to the shore, indicating that the estuarine system can be in direct contact with source contamination.

Overall, groundwater investigations indicate that groundwater in contact with contaminated soils associated with fill material eventually discharges to the intertidal zone in the form of seeps. Saltwater intrusion also indicate that the groundwater is influenced by the estuarine system and not just by surface water infiltration (i.e., precipitation). In these cases, a soil cap would not likely decrease the amount of leachate generated by the landfill or prevent its discharge at the landfill face. An impermeable cap would likely decrease the amount of leachate discharged by the landfill by preventing the infiltration of precipitation but would not prevent the intrusion of seawater into the fill material. It would also not prevent regional groundwater flow upgradient of the landfill from flowing through the fill material and discharging as seeps to the intertidal zone. A combination of an impermeable cap and barrier walls isolating the landfill from the intertidal zone would be necessary to completely isolate contamination from the intertidal zone. Remedial Alternative 4 provides for both an impermeable cap and barrier to prevent groundwater discharge to the intertidal zone.

Given that uncontrolled landfill discharges have resulted in only localized areas of biological effects, an impermeable cap (Alternative 3) may provide sufficient protection to the intertidal

zone, although it is unlikely that it will completely eliminate groundwater seeps. A reasonable alternative to Alternative 4 may be to cap the landfill (Alternative 3) and put in place a monitoring program to determine if contaminated seeps have decreased to a level where the intertidal zone can recover. If not, further remediation in the form of a barrier wall can then be conducted (assuming that placement of an impermeable cap does not preclude the future placement of a barrier wall).

Source control would likely allow contaminated areas of the intertidal zone to recover naturally. As reported, contamination in the intertidal area is not severe and biological effects are localized.

Alternatives 2, 3, and 4 include the creation of wetlands along the entire site shore connecting the southern and northern wetlands. The creation of viable wetland areas would likely increase the habitat value of the intertidal zone near the face of the landfill. Since wetlands tend to be depositional areas for fine-grained sediments, they may also act as a sink for burying residual contamination during the remedial and post-remedial phases. The source control remedy at the landfill should be considered in the wetland design to make sure the hydrological regime is sufficient to support wetland development.

One specific question concerns the discussion of HQs on page 25 of the FS. HQs are calculated using toxicity reference values, usually a no effects level. They are not calculated using reference data as shown. Perhaps the discussion of Prudence Coggeshall Cove reference data refers in some way to the TOC-normalization. This should be clarified.

Please let me know if you have any questions.

Sincerely,

Kenneth Finkelstein, Ph.D.

cc: Tim Prior (USF&WS)