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**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**
**REGION III**
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Date: March 5, 1996

Mr. Jim Harris
Atlantic Division, Naval Facilities Engineering Command
Environmental Quality Division
Code: 1822
Building N 26, Room 54
1510 Gilbert Street
Norfolk, Virginia 23511-2699

Re: Naval Base-Norfolk, Virginia
Building LP-20
Review of draft *Remedial Investigation Report, Baseline Risk Assessment & Feasibility Study*

Dear Mr. Harris:

The U.S. Environmental Protection Agency (EPA) has preliminarily reviewed the Navy's draft *Remedial Investigation Report, Baseline Risk Assessment, and Feasibility Study* for the L-20 Site, located at the Naval Base - Norfolk, and we offer the following comments and concerns as outlined below:

GENERAL COMMENTS

1. Since the LP-20 vicinity is comprised mostly of buildings and paved surface, the concern of the EPA-Region III BTAG is for any off-site migration to habitats of ecological value. The main area of importance is Willoughby Bay and the major pathways to the bay appear to be groundwater transport and the concrete culvert that encases Bousch Creek.

   VOCs, SVOCs, and metals from past storage, pipes, spills, and leaks in the IWTP lines, have been detected in soils. A plume of chlorinated solvents has been observed in the shallow aquifer extending from the site toward Willoughby Bay. Maximum contaminant levels (e.g., 44 ppm for TCE) are roughly equivalent to biological species mean acute lethality levels for daphnids and several fish species. Minor penetration to the lower aquifer by solvents was observed as well. Free product has also been observed repeatedly in the NADEP area.

   The culvert was built apparently in the 1940's. Free product has been observed on several occasions where the culvert drains to Willoughby Bay. The integrity of the culvert has not been determined, but given its age and the observation of free product, it can't be good. Because the culvert was found to be tidally influenced, it is likely a significant route for the transportation of COCs to the bay.

2. There is one spike in lead values in the shallow aquifer (shown in Fig 7-3) of 70.3 ug/L. This is the sample location where benzene (Fig 7-8), and over a half foot of free product were observed (Fig 5-9). This suggests either a leak in the culvert, JP5 line (there have been enough leaks in this supply line to require installation of two product recovery systems), or some other local source. One other

observations is that when plumes in trace element levels in groundwater are evident, there seems to be a generalized migration pattern towards Willoughby Bay.

Otherwise, the metal data do not indicate a major source of trace elements in soils at the site. Arsenic, cadmium, lead, and zinc were rarely detected at concentrations exceeding average U.S. soil concentrations and never exceeded those averages by more than one order of magnitude. Silver was detected once at a concentration of concern: 15.4 mg/kg compared to the U.S. average of 0.05 mg/kg. Results from measurements of total and dissolved concentrations of trace elements in shallow groundwater did not indicate that these substances would migrate to Willoughby Bay at concentrations that would threaten ecological resources. Lead and mercury were the only substances detected at concentrations exceeding their chronic AWQCs by more than ten times. Lead was detected in most of the monitoring wells close to the Bousch Creek Culvert on the northwest side, but most of these concentrations were low and only the total lead concentration at one of these wells exceeded the AWQC (70.3 $\mu$g/l at MW-20). Dissolved mercury was only detected in one groundwater sample from LP-20 MW-6 at 0.27 $\mu$g/l. Total mercury was detected in several groundwater samples at concentrations up to 0.99 $\mu$g/l and, depending upon its equilibrium mixture of species i.e., organic/inorganic) bears watching as part of a long-term monitoring program. Both dissolved mercury as well as adsorbed (sediment and suspended solids) should be examined.

3. The fact that VOCs which typically form DNAPLs were observed in the shallow and deep groundwater samples (and in soils) indicates that the contamination of groundwater is significant. Attenuation is quite rapid, as is expected for a DNAPL; the parent material does not travel with groundwater but "bleeds off." As noted above, maximum levels observed (e.g., 44 ppm for TCE) are roughly equivalent to biological species mean acute lethality levels for daphnids and several fish species. The proximity of the site to Willoughby Bay, and accounting for acute-chronic plus lethal to sublethal impacts, it is likely that significant levels could be discharging and impacting the near-shore benthic community. Moreover, the condition of the culvert suggests a route of exposure of considerably less resistance than groundwater migration.

4. The lack of adequate data to evaluate the extent of contamination and the potential threat to environmental receptors is still valid after reviewing this report. Groundwater sampling along the gradient between the site and possible discharge areas (Willoughby Bay and the Bousch Creek drainage system) still needs to be conducted and reviewed, especially since significant groundwater contamination has been discovered on site. The potential for contaminant migration via both surface runoff and groundwater discharge to the Bousch Creek drainage system and to Willoughby Bay has not been adequately addressed.

5. The need exists for a watershed approach to evaluating risk to environmental receptors, but this was not included in this report; This approach has been mentioned in the prior comment memo on this site. Also, the information in this report is of limited value in an ecological risk assessment. In the case of the Bousch Creek drainage, watershed sampling could help determine loading from other sources, such as the Camp Allen Landfill and non-point source runoff, thereby aiding in the design of remedial actions that would not necessarily be site specific, but would be protective of environmental receptors.

6. The work plan description of the baseline risk assessment was very vague, but did indicate "...a qualitative baseline risk assessment will be conducted to determine all ecological concerns." The baseline risk assessment that is contained in the reviewed document only addresses human health. The BTAG is concerned that the ecological risk assessment may be given low priority and perhaps never completed. As noted previously, the location of Willoughby Bay suggests that abundant populations of aquatic receptors may occur regularly near the site. In addition, critical habitat for blue crab lies offshore from Norfolk in the Chesapeake Bay. The scope of the ecological investigation

should address these concerns and would be a logical addition to the watershed-wide risk assessment. concept mentioned above.

7. The primary concern with this report is that there is no ecological risk assessment. The conclusion of the soils investigation is that they have been impacted by organic and inorganic contaminants. VOCs were present in shallow groundwater across the site in concentrations well above Federal MCLs. The Yorktown Aquifer has been impacted by VOC and SVOC contaminants from the shallow aquifer. This site and the majority of the sample locations are within the area of the historic Bousch Creek. However, the industrialization of this area has confined the former Bousch Creek into a 12 foot by 20 foot culvert under this site. This culvert empties into Willoughby Bay. This culvert represents a potential pathway for these contaminants to migrate to Willoughby Bay. However, no surface water or sediment samples from this culvert, Willoughby Bay, or upstream of the culvert were collected or analyzed for contaminants in this study. These additional samples need to be collected in order to complete the nature and extent of contamination study of site LP-20. These samples could also be used in the preparation of a screening level ecological risk assessment.

8. The detection limits for metals in water still exceed the chronic marine AWQC for mercury (0.025 $\mu$g/l) by at least an order of magnitude. We suggest that the investigator either use a method that achieves a lower limit than the current method or if this is impossible, assume 1/2 the detection limit for ecological risk assessment.

9. One concern at the LP-20 facility would be the transport mechanisms which appear to be present at this site. The floor drains, Industrial Waste Sewer, storm sewers and Bousch Creek Culvert all provide significant opportunity for contaminant movement well beyond the territorial confines of the site. Specifically, impacts to Willoughby Bay seem likely do to the document presence of free product illustrated by the presence of oil booms.

## SPECIFIC COMMENTS

1. **Executive Summary, Page ES-2, Paragraph 2,** describes the underground concrete culvert which encases Bousch Creek. To what degree has the culvert been investigated in terms of potential impacts at its discharge?

2. No mention is made in the report related to vertical hydraulic gradient. By my calculations from the February 11, 1995 (shallow aquifer, Figure 5-10) and February 14, 1995 (deep aquifer, Figure 5-13) data, there appears to be a downward gradient present between the two aquifers. Based upon this downward gradient, the undulating confining unit and the potential for the presence of Dense Non-Aqueous Phase Liquids (DNAPLs) it is not surprising that the lower aquifer has been impacted. Further assessment of the variability of the vertical gradient should be examined in order to evaluate, recharge areas, contaminant transport preferences and use in the understanding of remedial alternatives.

3. **Section 1.4.2.7 Environmental Concerns, Page 1-10,** describes drainage systems. An overall understanding of the potential discharge points for the storm sewers and how these do or don't tie in with the Bousch Creek Culvert should be made.

4. **Section 1.4.3.2 Environmental Concerns, Page 1-12,** describes the storage and bulk storage units present on site. A brief description of the product delivery systems should be made. This would include how product was supplied to these units as how product was dispensed. As any soil gas work been performed as part of any of the investigations conducted at this facility? Based upon my limit review of previous investigations this seems to be lacking.

5. **Section 2.4 O'Brien and Gere Investigation (November 1990), Page 2-3, Paragraph 1,** describes various chemical releases which have occurred at the site. Specifically, it refers to a April 1990 release of 500

to 750 gallon release of calibration fluid. Please specify what calibration fluid is and its chemical constituents.

6. **Section 2.6, Environmental Science and Engineering, Inc. (ESE) Investigation (February 1991), Page 2-5, Paragraph 3,** describes the presence to phenols ranging in concentration from 2 ug/l to 250 ug/l. This is the only mention of this parameter in the report. An explanation of this occurrence and that apparent lack of subsequent detection should me made.

7. **Section 2.13 Existing Remedial Activities, Page 2-10, Paragraph 4,** describes the discharge from oil/water separators to a subsurface drain, which eventually connects to the Bousch Creek culvert. Is this a continuing source of contamination. Once again the eventual disposition of the culvert discharge comes into question.

8. **Section 2.13 Existing Remedial Activities, Page 2-10, Paragraph 4,** Are these petroleum sites part of the overall CERCLA action. Has an examination of the cosolvency potential of a mixed petroleum and chlorinated solvent plume(s) been examined. A geochemical understanding of this could assist in explain the presence of toluene in the deep Yorktown aquifer.

9. **Section 3.4 Surface Drainage, Page 3-2, Paragraph 1,** describes the Bousch Creek Culvert. Based upon my review of the surficial aquifers complex flow system a more thorough understanding of the role this culvert occupies in the overall shallow ground water flow system is necessary. This may require piezometers to better define the flow system in the culvert area as well as a determination of the culvert to act as a drain for the local ground water system. Section 5.2.1 provides some insight but a more thorough understanding of this features impact on the ground water flow structure is necessary especially when remedial alternatives are considered.

10. **Section 4.1.3 Phase 3 - February 1995, Page 4-3, Paragraph 1,** states that a in-situ sample point of ground water was collected inside of building LP-20. The section does not specify the sample identification nomenclature or the results of the analyses. This sample may be of interest due to its possible ability to characterize the presence of contaminant source areas and provide insight to the potential affects of floor drains.

11. **Section 4.2 Subsurface Soil Investigation, Page 4-6, Paragraph 2,** describes the evaluation of subsurface soils with on-site instrumentation (PID meter) during drilling operations. Very few samples appear to have been screened based upon data in Table 4-9 (based upon my understanding of the NS - not sampled, within the tables legend). Yet Section 4.2.2.2 Phase I activities notes that continuous sampling was performed by two foot intervals.

12. **Section 4.4.3 Ground Water Sampling - Phase 5, Page 4-23. Paragraph 3,** describes the evaluation of ground water samples for the presence of DNAPLs. The document should state the method employed to determine the presence of DNAPL.

13. A Section within the report should deal with the issues related to transport and fate. This should include the roles of the culvert and support pilings. Additionally a description of the geochemical properties of both the contaminants and aquifer should be made.

14. **Section 7.6.2.2 Yorktown Aquifer - Inorganics Distribution...., Page 7-15,** describes an indication of deteriorating ground water quality based upon two sampling events with results of 6J ug/l and 28 ug/l. This evaluation is a little dramatic. No judgement should be based upon two sampling events. And a variation of 22 ug/l in concentration is generally insignificant. Additionally, it appears that the same

paragraph has been used on this page within the fifth paragraph. Does this indicate that something is missing.

15. The presence of acetone and SVOCs is discounted as laboratory contamination. This should be substantiated through the various QA/QC checks and referenced in the text.

16. The report should provide an examination of water quality both from comparisons to background we LP20-MW-9 and to general ambient water quality in the region.

17. **Section 7.6.2.2 Yorktown Aquifer - Inorganics Distribution...., Page 7-18,** describes the presence of Arsenic, Chromium and Aluminum without any explanation of potential sources a proper examination of the various constituents to background samples along with a correlation to such on-site facilities such as the blasting, plating and stripping operation and the presence of discharge points may assist in understanding the distribution and presence of Inorganics.

18. Due to the nature of the ground water flow system in the shallow aquifer it would be advisable to include any existing wells which are near the study area so that a more thorough understanding of the regional flow system could be obtained. There appears to be a potential mound present in the of building U-132 and an interesting feature northwest of building LP-14 along Bellinger Blvd. Additionally, there doesn't appear to be a uniform set of readings collected for the preparation of potentiometric maps in view of data not incorporated into Figures 5-10 and 5-11. These would include data specifically from the area in the southwest portion of the site such as ground water elevation data incorporated into Figure 5-11 from MW-4, MW-40 as well as other wells within the study area.

19. The locations of the pilings associated with Building LP-20 should be provided on one of the base maps. Or at a minimum the number construction and depth be provided with a examination of the depth to the confining unit associated with the pilings.

20. In regards to the Feasibility Study, I generally have no comments based upon how it was submitted. They do not appear to arrive at any specific technology to propose, although i might be reading it wrong.

    Related to this I would strongly urge you to note the yields associated with the pumping tests performed. It appears that ground water extraction rates are very good. Depending on the ability of the water table to be depressed a pump and treat system with associated soil vapor extraction would seem the most affective remedial alternative. In this regard special attention should be made to the nature of water quality beneath the site. The water has high total dissolved solids, generally high metals concentrations due to its somewhat brackish nature. In other words you will generate a lot of water and have a significant scaling problems associated with pump and treat.

21. Data generated during this investigation should be submitted to EPA in electronic media. The data should include a scaled site map (in Digital Exchange Format DXF) which shows all sampling locations as well as physical features, locational data of all sampling points, analytical data in a spreadsheet format.

**Baseline Risk Assessment:**

22. The new oral RfD for manganese is 0.024 mg/kg/d, not 0.14 mg/kg/d. Please consult the IRIS database for further information. Note that the RBCs for manganese will need to be recalculated.

23. Dermal contact from groundwater is usually only considered for children, while adults are usually assumed to shower only. Note that both children and adults are assumed to shower in the risk assessment. This assumption may lead to an overestimation of risk for the child.

24. Please consult the Regional Guidance on "Dermal Exposure from Soil" for the appropriate absorption factors to use for volatile organic compounds (attached).

25. The following input errors were noted in the Foster and Chrostowski Shower Model:

    shower flow rate-- 20 l/min, not 10 l/min
    shower stall volume--2.9 $m^3$, not 6 $m^3$
    water viscosity--1.005 cp, not 0.01005 cp

26. Sample Calculations for the 95%UCL and the W-test should be presented in the Appendix.

27. Risks from surface and subsurface soil are not additive, since they represent the same exposure route.

28. Potential risk(s) from exposure to contaminants discharged from groundwater into surface water were not evaluated.

**Feasibility Study:**

29. This document presents risk-based remediation goals for groundwater that are based on an assumed industrial exposure pathway; whereby, the total acceptable risk approaches a cancer risk of 1E-04. In addition, the document points out that nearby surface waters may be impacted by contaminants discharged from groundwater but neglects to consider this medium in the remedial action objectives. Clearly further risk management discussions are needed in order to better define the remedial action objectives for this site.

This concludes EPA's preliminary comments concerning the review of the Navy's draft *Remedial Investigation Report, Baseline Risk Assessment, and Feasibility Study* for the L-20 Site. If you have any questions concerning the above, please feel free to call me at (215) 597-1110.

Sincerely,

Robert Thomson

Robert Thomson, PE
Superfund Federal Facilities (3HW50)

cc: Dianne Bailey (NAVBASE, Code N-4)
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Bill McKenty (USEPA, 3HW41)
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