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LETTER REVIEWING DRAFT FINAL REMEDIAL INVESTIGATION/ PUBLIC HEALTH AND  
ENVIRONMENTAL ASSESSMENT REPORT INCLUDING COMMENTS LANFILL 3 FORT  
STORY VA  
7/8/1992  
U.S. ENVIRONMENTAL PROTECTION AGENCY

**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION III  
841 Chestnut Building  
Philadelphia, Pennsylvania 19107**

**Date:** July 8, 1992

Ms. Joan Vandervort  
U.S. Army Transportation Center  
Attention: ATZF-EHE (Joan Vandervort)  
Building 1407  
Fort Eustis, Virginia 23604-5000

**Re:** Fort Story, Virginia  
Review of the draft final Remedial Investigation/Public Health  
and Environmental Assessment Report

Dear Ms. Vandervort:

The Environmental Protection Agency has reviewed the draft final *Remedial Investigation/Public Health and Environmental Assessment Report (RI/PHEA)* for Fort Story, Virginia, and we offer the following comments:

**BACKGROUND**

The RI/PHEA reports on two sites within Fort Story, Virginia: Landfill 3, identified in the RI/PHEA as Site 3, Landfill 3; and a pond adjacent to Landfill 3, identified in the RI/PHEA as Site 3A, Pond 3.

Landfill 3 is an approximately five-acre site that operated as a sanitary landfill from 1962 to 1974. It has been reported that primarily residential and construction wastes were disposed of in the landfill; however, it was also reported that empty pesticide containers were disposed of at this location. The landfill operated without a permit and was covered and closed without a formal closure plan. It has not been documented whether the landfill was lined or unlined.

In 1977, the U.S. Army Environmental Hygiene Agency (USAEHA) conducted a study that included the installation of three ground-water monitoring wells. Analytical data gathered from the wells during this study indicated the presence of zinc, lead, chromium, and total organic carbon. Since the concentrations of these metals were only slightly above the National Interim Primary Drinking Water Regulations (NIPDWR), the USAEHA concluded that their presence did not constitute a health risk.

In 1987, USAEHA conducted an environmental operations review (EOR) of Landfill 3 and recommended that the three monitoring wells be resampled and analyzed for organic priority pollutants. Two of the three monitoring wells were determined to be non-functional. The remaining monitoring well was sampled and subsequent analysis did not detect volatile organic compounds (VOCs), pesticides, or polychlorinated biphenyls (PCBs) in that well.

USAEHA installed four additional monitoring wells in 1987. Water level elevations in those wells indicated that, locally, ground water flows in a southwesterly direction, however, it is suspected that the construction of the landfill disturbed ground-water flow, resulting in a flow that moves in a radial direction from the landfill. No seasonal or tidal factors influencing flow were determined.

Ground-water samples were collected from the four monitoring wells and analyzed for VOCs, base neutral acid extractables (BNAs), pesticides, PCBs, metals and inorganics. One VOC, ethylbenzene, was detected in concentrations below the maximum contaminant level (MCL) in one monitoring well. No pesticides or PCBs were detected in any of the samples. Arsenic, cadmium, chromium, iron, manganese, lead, and zinc were all detected at concentrations that exceeded the state or Federal drinking-water quality standard or criteria.

During this investigation, JMM further evaluated Site 3, Landfill 3, by collecting additional environmental data to determine the nature and extent of contamination at the site and by assessing human health and environmental risks posed by any contaminated media and associated exposure pathways at the site.

JMM installed two additional monitoring wells during the RI/PHEA. JMM sampled the two newly installed wells, along with the three wells that had been installed as part of the 1987 USAEHA investigation. JMM's investigation of Site 3, Landfill 3 also included an assessment of surface-water contamination. Three surface-water samples were collected from areas outside the perimeter of Site 3, Landfill 3.

To assess ground-water quality in the vicinity of Landfill 3, ground-water samples were collected for laboratory analysis for PCBs, VOCs, BNAs, pesticides, total metals, dissolved metals, cyanide, and inorganic anions, such as chloride, nitrate as nitrogen, sulfate, and fluoride. No pesticides, PCBs, cyanide, or BNAs were detected in the samples collected during the ground-water sampling activities at Landfill 3. The only VOC detected during sampling was carbon disulfide, which was detected in all five ground-water samples at concentrations ranging from 3.2 micrograms per liter (ug/l) to 33 ug/l. Carbon disulfide commonly is found in landfill leachate and is a product of reductive degradation of detritus. The total metals analyses identified lead and zinc at concentrations that exceeded the potential applicable or relevant and appropriate requirements (ARAR) identified in the RI/PHEA report. The only dissolved metal to be above the potential ARAR was zinc.

Three surface-water samples were collected from areas outside the perimeter of Site 3, Landfill 3 to determine whether the landfill is a source of contaminants in surface runoff. The surface-water samples were analyzed for pesticides, PCBs, VOCs, BNAs, total metals, cyanide, and common anions. DDT, the only pesticide detected, was identified in one sample, at a concentration above the potential ARAR. Toluene, detected at a concentration below the potential ARAR, was the only VOC detected. Phenol and 4 - methylphenol were detected in one sample. The concentration of phenol was above the potential ARAR. No regulatory guidance was available for 4-methylphenol, so the presence of the compound in surface waters was determined to be insignificant in the baseline risk assessment. The total metals analysis identified copper, mercury, lead, and zinc in one or more surface-water samples at concentrations above the potential ARARs.

Results of ground-water and surface-water analysis results identified metals as the primary compounds present in media at the site. Phenol, detected in a surface-water sample, was the only other compound detected above the selected potential ARAR. Concentrations of compounds detected above the selected potential ARARs were not significantly above the potential ARARs. The RI/PHEA concluded that Site 3, Landfill 3 was not a significant source of contamination of site ground water or surface waters at the site and posed no significant threat to human health.

The second site investigated during the RI/PHEA was Site 3A, Pond 3. This site is a pond initially used for recreational fishing. In 1988, the water in the pond was sampled and found to contain concentrations of iron, lead, and zinc greater than the NIPDWR water quality criteria for fresh water. Also, traces of the pesticides DDD and DDE were found in sediments the banks of the pond. These pesticides are degradation products of DDT, which was commonly used for mosquito control in this area.

In 1977, the USAEHA investigated the surface water and sediments in Site 3A, Pond 3 to determine whether the leachate from Landfill 3 was adversely affecting the water quality of the pond. Analysis of surface-water samples collected in Pond 3 indicated concentrations of iron and zinc at levels slightly above the ambient water quality criteria. USAEHA concluded that leachate from Landfill 3 was not adversely affecting water quality in the pond.

The JMM investigation at Pond 3 involved the assessment of surface-water and sediment contamination. JMM collected five sediment samples and three surface-water samples. The samples were analyzed for pesticides, PCBs, VOCs, BNAs, total fuel hydrocarbons (TFH), metals, EP toxicity metals, and cyanide. Analysis for pesticides, PCBs, VOCs, BNAs, TFH, and EP Toxicity metals did not detect target compounds in the five sediment media. Cyanide was detected at a low concentration in one sediment sample.

Three surface-water samples were collected from the pond. The samples were analyzed for pesticides, PCBs, VOCs, BNAs, TFH, metals, cyanide, and inorganics. The analytical data did not identify target compounds in samples submitted for pesticide, PCB, BNA, TFH and cyanide analysis. Lead was detected in one surface-water sample and zinc was detected in all three surface-water samples, both at concentrations below the potential ARAR.

The JMM RI/PHEA concluded that results from sediment and surface-water samples did not indicate that significant contamination is present in site media. The contaminants have potential exposure pathways, but the hazard indices for the site were considered insignificant. The JMM RI/PHEA determined that no significant human health or environmental risks exist at this site, and no further action was recommended. Previous investigations, as well as the current RI, detected no significant contamination in the ground-water and surface-water samples collected. These findings have led to the current recommendation in the RI/PHEA of no further action (NFA) at both the Landfill 3 and Pond 3 site at Fort Story. However, due to problems outlined in the following comments EPA believes that a NFA determination cannot be substantiated for Pond 3 or Landfill 3 at this time.

This technical review includes both general and specific comments and recommendations. Each of the general comments and recommendations is related to an issue that affects the entire report. The specific comments and recommendations are identified by the section and page number of the RI/PHEA report to which they are related. The technical comments reflect shortcomings in the report pertaining both to the presentation of information and to the conclusions derived.

### **GENERAL COMMENTS AND RECOMMENDATIONS**

- Overall, the document is well organized, with sampling and well installation procedures thoroughly documented. However, background information on the contents and configuration of Landfill 3 is dispersed throughout the report and difficult to assimilate. In addition, information from previous investigations conducted by the Army was not thoroughly reported, particularly in reference to previously installed monitoring wells. This information should be consolidated into a section describing the background of the site.
- A primary objective of the site hydrogeological evaluation in the remedial investigation/feasibility study (RI/FS) is to determine the direction, both vertical and horizontal, and rate of ground-water flow, as outlined in EPA's Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA (EPA, 1988a). The information obtained from water level measurements gathered in the vicinity of Landfill 3 is insufficient to support the interpretation that the downgradient direction is southwest of Landfill 3. Additional information should include water level elevations in all available

wells and surface-water bodies. Measurements also should be made to determine tidal effects on water levels at the site and to evaluate the presence of vertical gradients. All of this data should be included in figures showing potentiometric contour lines and a cross-section showing the vertical flow components at the site.

- Insufficient information was provided on the original configuration of the landfill excavation, or on its present state of closure. This information is important in order to determine whether the contents of the landfill are in direct contact with ground water and hence provide a direct pathway for leachate to enter the shallow aquifer system. Any information available on the construction of Landfill 3 should be provided so that an accurate evaluation of the potential threat posed by Landfill 3 to ground water can be determined.
- Control of infiltration into the landfill is of primary importance in inhibiting leachate production. The report mentioned that Landfill 3 has been capped but did not describe the thickness or type of materials used, the present condition of the cap, or the age of the cap. In addition, the presence of a berm around the landfill perimeter was mentioned in the report, but the report included no details about its purpose or construction. The berm actually may enhance infiltration of precipitation into the landfill by trapping surface runoff from the site. Such a condition would result in the generation of additional leachate caused by infiltration into the impoundment. Additional information is necessary to evaluate infiltration controls at the Landfill 3 site.
- Contamination of the total metals sample blank renders the total metals content of the analysis of ground-water samples unreliable. The use of these samples in evaluating metals contamination at both sites, Landfill 3 and Pond 3, is inappropriate. Additional sampling of monitoring wells should be carried out to further evaluate the threat of metals contamination at Landfill 3 and Pond 3. In addition, the validity of the data should be evaluated more thoroughly and should make reference to Laboratory Data Validation Functional Guidelines for Evaluation of Inorganic Analyses (EPA, 1988b).
- Toluene was detected in one sample of ponded surface water adjacent to Landfill 3. This finding indicates the possibility that volatile organic compounds (VOCs) have leaked from the landfill. The landfill cell(s) at Landfill 3 should be field screened for organic vapors to evaluate the presence in the landfill of VOCs that pose a potential threat to ground water.
- The placement and depth of monitoring wells in the vicinity of Landfill 3 should be evaluated with regard to the presence of dense nonaqueous phase contaminants beneath the landfill, or a justification for discounting that threat should be provided. In addition, no justification was given for the placement or depth of the two monitoring wells installed during the RI at Landfill 3 and Pond 3. It is questionable whether these wells were installed downgradient of the Landfill 3 site. Additional clarification is necessary to justify the location and depth of these wells for detecting leachate migration from Landfill 3.
- The recommendation of a no further action for Landfill 3 is inappropriate since the determination of the direction of ground- and surface-water flow and the quality control problems associated with ground-water sample analyses were not addressed.
- Site characterization activities performed during the RI/PHEA did not provide a complete characterization of the existing contamination at the sites of interest. Given the relatively large size of the landfill and the adjacent pond, the number of medium-specific samples would not provide adequate representative estimates of the chemical concentrations at these sites. More samples should be collected, especially for on-site soil and ground water. The number of samples needed should be estimated based on the statistical performance objectives and minimum detectable relative difference (difference between site-related concentrations and background concentrations) (EPA, 1990a). Because

of the limited number of samples collected, this public health evaluation should be considered a preliminary screening assessment, rather than a baseline risk assessment.

- The concept of the baseline risk assessment and how it relates to the site remediation process should be corrected. The report states, that the risk assessment addresses the site baseline conditions. Evaluating the no-action scenario (or alternative) as a basis for the risk assessment is inappropriate because the evaluation of the no-action alternative (in the FS process) and the baseline risk assessment (in the RI process) are two different concepts. The baseline risk assessment provides an evaluation of the potential threat to human health and the environment in the absence of remedial action (EPA, 1988, 1990c), which means that threat posed by the current and potential future level of contamination, to arrive at the most representative and protective risk estimates. In the feasibility study process, each of the remedial action options, including the no-action alternative, is analyzed against the nine evaluation criteria as established by the National Contingency Plan.
- More information on data collection and evaluation should be presented, for example, the types of chemical analyses, health protectiveness of detection limits (EPA, 1990a), rationale for conducting total fuel hydrocarbon analysis for only sediment samples only, and possible laboratory artifacts (acetone, and toluene).
- Specific comments on the baseline risk assessment are purposely general in nature because a baseline risk assessment or ecological risk cannot be calculated with the limited data obtained during the RI/PHEA. EPA made no effort to validate any calculations in the risk assessment because of the inadequacies as outlined in the following specific comments.

### **SPECIFIC COMMENTS AND RECOMMENDATIONS**

The following specific comments and recommendations should be addressed to ensure that the Remedial Investigation/Public Health and Environmental Assessment provides accurate characterization of the site.

#### **Section 1.3, Page 1-2, Paragraph 3.**

The report mentions construction debris present at the Landfill 3 site but does not mention other materials that may have been disposed of there. The additional information on the contents of the landfill provided in Section 5.1 should be included in this section as well as an estimate of the volume of the landfill and its potential for generation of leachate. In addition, a discussion of the compounds and metals detected in ground water, soil, sediment, and surface water should be made, and the relationship between their detection and materials disposed of at the landfill should be established.

#### **Section 1.3, Page 1-2, Paragraph 6.**

Reported total dissolved solids (TDS) content in ground water did not specify whether that value was measured or calculated. The text should clarify whether the TDS measurement was a measured or a calculated value.

#### **Section 1.3, Page 1-2, Paragraph 6.**

The acronym NTU was used without a preliminary definition. All acronyms should be defined in the text upon first use.

Section 1.3, Figure 1-3.

No scale is provided on the site location map. Each map provided in the report should include a scale in appropriate units.

Section 2.1, Page 2-1, Paragraph 1.

The report refers to the installation of three monitoring wells (EMW-7, EMW-8, and EMW-9) during a 1977 investigation, as well as four additional wells (LF-1, LF-2, LF-3, and LF-4) installed in 1987. The construction methods and current conditions of these wells are not discussed. If available, this information should be provided in the report and in the well construction details included in the appropriate appendix.

Section 2.1.1, Page 2-1, Paragraph 2.

The last line of the paragraph states that Appendix A includes measurement of Atterburg limits of geotechnical samples. The measurements were not found in that appendix.

Section 2.1.4, Table 2-2.

Static water-level measurements made during ground-water sampling procedures (5/29/90) were not reported in Table 2-2. Water levels measured during sampling indicate a west gradient component from well LF-2 to LF-1. This finding should be incorporated into a full-scale interpretation of the direction of ground-water flow.

Section 2.4, Page 2-7, Paragraph 1.

The first sentence of the paragraph states that "Three surface water samples were collected from Site 3, where standing water was present in the low-lying area adjacent to the western flank of the landfill." Figure 2-1 indicates that only one sample (SW-201) was collected west of the landfill, while the other two sample locations were north (SW-201) and southeast (SW-203) of the landfill. The actual locations of these sample collection points should be clarified.

Section 2.5, Page 2-7, Paragraph 1.

Five 10-foot-long sediment cores were taken in the bottom sediments of Pond 3. No lithologic descriptions of these cores were provided. This information should be included in the appendices and incorporated into the hydrogeologic characterization of the site. Was the entire 10-foot core sample composited for analysis?

Section 2.8, Page 2-10, Paragraph 1.

The surveying data presented in Table 2-4 do not include data from previously installed monitoring wells (EMW-7, EMW-8, EMW-9, LF-1, LF-2, LF-3, and LF-4) or surface-water measurement points (SW-210, SW-202, and SW-203). These data are critical in determining ground-water flow direction in an area such as this, which likely has low or temporally variable gradients.

Section 3, Pages 3-1 through 3-4.

Insufficient data are presented to evaluate the local surface-water hydrology, including local drainage patterns, discharges, and map references to major surface water bodies. A separate section on surface-water and wetlands hydrology should be included.

Section 3.3.1, Pages 3-2, Paragraph 1.

Wetland areas are described in the report as occurring locally in closed depressions. This is contradictory to a statement made in section 3.3.1.1 that "This wetland is a small segment of the wetland ecosystem that extends into Seashore State Park." Further clarification, both in the description and in Figure 2-1, should be provided.

Section 3.3.2, Page 3-3, Paragraph 1.

Reference is made to the boring log from the U.S. Army Environmental Hygiene Agency monitoring well LF-3. This log, as well as other boring logs from site monitoring wells at the site, should be included in the appendices to the report.

Section 3.3.2, Page 3-3, Paragraph 1.

In reference to monitoring well LF-3, the report refers to " the presence of organic material 8 feet below land surface. This is not expected in a former back bay, lagoonal environment." Lagoonal environments are typically quiescent, which allows undisturbed accumulation of organic material. The text should clarify why the condition described is not to be expected in a former back bay, lagoonal environment.

Section 3.3.3, Page 3-3, Paragraph 2.

The report states that surface-water elevations were used to determine ground-water flow direction. No surface-water elevations are reported and no ground-water or surface-water flow maps are included in the report. Collection and reporting of these data will be necessary to evaluate flow direction at the site.

Section 3.3.3, Page 3-4, Paragraph 1.

The report refers to slug test analysis methods developed by Bouwer and Rice (1976) and Bouwer (1990). Appendix A reports slug test analyses values from three additional methods that were not included as reference: Hvorslev; Cooper, Bredehoeft, and Papadopolous; and Ferris and Knowles. These methods should be listed in the reference section, and their applicability should be discussed in the report. In addition, slug testing is not considered a preferable method for deriving hydraulic parameters from a high-permeability aquifer such as the one at the Fort Story site. The applicability of slug testing in aquifers with high permeability should be reviewed.

Table 4-3, Page 4-8.

Ethylbenzene was found in well LF-1 during 1987 sampling, but was not included in Table 4-3, which summarizes chemical-specific applicable and appropriate and relevant requirements (ARARs) for the site. Ethylbenzene should be included in Table 4-3 along with other pertinent ARARs.

Section 5.2.2, Page 5-7, Paragraph 1.

The report refers to sections 2.5.2 and 2.4.1., which do not exist. The correct section references are 2.5 and 2.4, respectively.

Section 5.2.2.2, Page 5-9, Paragraph 1.

The presence of acetone in one sample from Site 3A, Pond 3 should be evaluated as a potential lab or field contaminant. Trip blank analyses, method blank analyses, or field decontamination procedures

should be reevaluated to provide additional information on which the necessary determination can be based.

Figure 6-1.

In Figure 6-1, it is not clearly indicated why area residents are not considered as potential receptors for contact with ponded surface-water as are site visitors. Wouldn't residents be expected to come in contact with Pond water more frequently than visitors?

Figure 6-2.

In Figure 6-2, it is not clearly indicated why area residents are not considered potential receptors for pond water and sediment contact as are site visitors.

Section 7.4.2, Page 7-4, Paragraph 6.

The use of 10 percent of the detection frequency limit to select contaminants of concern is not valid, because of the RI sample sizes. A total of 3 or 5 samples requires the detection frequency limit to be at least 33 or 20 percent, respectively.

Section 7-5, Page 7-5 through 7-47.

Dose-response evaluation in the toxicity assessment defines the relationship between intake doses--either administered or absorbed, rather than only administered.

Section 7.6.2, Page 7-10 through Page 7-19.

No actual exposures are considered in the discussion of land use; for example, it is possible that trespassing children might play with surface water and thus receive dermal exposure. In addition, children trespassing on the site might potentially inhale any VOCs emitted from the site.

Section 7.6.2, Page 7-10 through 7-19.

Acute and subchronic exposures were mentioned in the text but not actually considered in the report. The omission of any consideration should be supported by an appropriate rationale.

Section 7.6.2.3, Page 7-16, Paragraph 6.

The RI/PHEA states that "no current evidence regarding the level of contamination that might be present within the landfill exists." This statement is unsupported because no data for on-site soil or ground water were collected. Because there is no on-site soil and ground-water data, evaluation of hypothetical on-site residential exposures (residents living on top of the landfill), which usually results in the highest exposures, cannot be performed. Also hypothetical residents living on top of the landfill may be exposed to the pond's surface water and sediment by swimming or consuming fish caught in the pond, in addition to exposure to on-site ground water and soil. This possibility was not evaluated in the report.

Section 7.7.3, Page 7-32 through 43.

Based on off-landfill ground-water data, a cumulative hazard index (HI) of 0.4 was obtained for future hypothetical residents. If on-site ground-water data were collected, this HI would be much higher. The

risk values presented in the report are not representative estimates for the sites of concern because of shortcomings in data collection and exposure assessment.

Section 8.1.1.3, Page 8-2, Paragraph 2.

The report states that " the shallow aquifer is saline and would not yield sufficient quantities of water suitable for domestic use." Data presented elsewhere in the report contradict this statement, in terms of both water quality and the transmissive properties of the aquifer. The ground water at the site is fresh and has a low content of total dissolved solids. Both lithologic descriptions of the aquifer and the slug tests indicate that the aquifer is sufficiently permeable to supply domestic water well needs.

Appendix C.

Several exposure intake equations presented in Appendix C of the report ignore the exposure duration factor. They do not precisely follow EPA standard exposure equations (EPA, 1989, 1990b, 1991b). Intake doses also should be estimated separately for carcinogenic and noncarcinogenic effects.

If you have any questions regarding EPA's review of the draft final *Remedial Investigation/Public Health and Environmental Assessment Report* for Fort Story, Virginia, please feel free to call me at (215) 597-7858,

Sincerely,



Robert Thomson, PE  
Va./W.Va. Federal Facilities (3HW71)

cc: Erica Dameron (VDWM, Richmond)