LANTDIV
Comments to the
Preliminary Draft Feasibility Study

MCB Camp Lejeune

August 14, 1991

Encl. (1)

0401-08/01/91-00692

-00692-4.0 -8/1/91

General Comments:

- The RA & FS need to address the deep aquifer throughout all areas of the HPIA, ~~not~~ including Site 22.

PRELIMINARY DRAFT

~~SUPPLEMENTAL~~ FEASIBILITY STUDY → (Shallow Soils & Deep Aquifer)

FOR

MARINE CORPS BASE CAMP LEJEUNE

Prepared for:

U.S. DEPARTMENT OF THE NAVY

Prepared by:

ENVIRONMENTAL SCIENCE & ENGINEERING, INC.
Gainesville, FL

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1.0 INTRODUCTION

Marine Corps Base (MCB) Camp Lejeune was placed on the National Priorities List (NPL) effective November 4, 1989. On February 13, 1991, the U.S. Department of the Navy (DON), the U.S. Environmental Protection Agency (EPA) Region IV, and the North Carolina Department of Environment, Health, and Natural Resources (DEHNR) entered into a Federal Facilities Agreement (FFA). In partial fulfillment of the FFA, DON was required to conduct a remedial investigation/feasibility study (RI/FS) at the Hadnot Point Industrial Area (HPIA) at MCB Camp Lejeune. Environmental Science & Engineering, Inc. (ESE) performed the RI/FS in three phases under Contract No. N62470-83-C-6106 with the Naval Facilities Engineering Command--Atlantic Division (LANTDIV).

A summary of the three RI phases and their findings is presented in the ESE (1991b) remedial investigation (RI) for HPIA. A supplemental risk assessment (RA) report was then prepared (ESE, 1991c) to summarize and interpret the RI data so that contamination migration and associated risks to public health and welfare and the environment could be assessed. The information obtained from both of these reports will be used to supplement this HPIA feasibility study (FS), which addresses the deep aquifer and the soils at HPIA. An FS report for the shallow groundwater at HPIA was submitted in May 1988.

1.1 OBJECTIVE OF THE FS

The objective of this FS is to develop and evaluate alternative remedial responses to uncontrolled releases of hazardous substances in the deep aquifer and the surficial soils from HPIA resulting from past activities. The FS has been prepared in accordance with the National Oil and Hazardous Substances Contingency Plan (NCP) and the Superfund Amendments and Reauthorization Act of 1986 (SARA).

A transformer storage yard (Area 21) and a fuel tank farm (Area 22) are located within the northern portion of HPIA. Two other areas, the industrial area fly ash dump (Area 24) and the Hadnot Point burn dump (Area 28) lie south and southwest of the site, respectively (see Figure 1-3). These four areas of concern are not included in this FS but will be considered in subsequent separate studies.

This FS focuses only on three additional areas of concern within HPIA. These areas are located in the vicinities of Buildings 1601, 902, and 1202 and are hereafter referred to as Areas 1600, 900, and 1200, respectively. Figure 1-4 shows the approximate locations of these areas.

1.3 TOPOGRAPHY AND SURFACE WATER DRAINAGE

MCB Camp Lejeune is situated on a relatively flat coastal terrain that includes swamps, estuaries, savannas, and forests. Land surface elevations range from mean sea level (msl) to 72 feet above mean sea level (ft-msl). Average elevations for the MCB range from 10 to 40 ft-msl.

The drainage at MCB Camp Lejeune is predominantly toward the New River, although coastal areas drain directly to the Atlantic Ocean via the Intercoastal Waterway. Natural drainage has been altered in developed areas such as HPIA by the installation of drainage ditches, storm sewers, and extensive paving, creating numerous drainage subbasins on the base. Approximately 70 percent of MCB Camp Lejeune is in the broad, flat interstream areas (Atlantic Division, Bureau of Yards and Docks, 1965). Drainage in these areas is poor, and the soils are often wet.

1.5 HYDROLOGY

1.5.1 GENERAL HYDROLOGY

The hydrologic system at Camp Lejeune consists of an unconfined (water table) aquifer and underlying semiconfined aquifers. The unconfined aquifer extends from the water table to the first significant confining layer. In general, the shallow groundwater flows toward the New River. Mention flow direction of the deep aquifer.

1.5.2 HPIA HYDROLOGY

At HPIA, the water table occurs at depths ranging from 6.67 to 23.18 ft-bls, as measured in January and February 1991. Seasonal water-level fluctuations range from 1 to 4 ft (Harned et al., 1989).

The actual shallow groundwater flow trends from southwest in the southern half of HPIA to west-southwest in the northern and central portions of HPIA. Some groundwater mounding occurs in the southern corner of HPIA around monitor wells HPGW2 and HPGW5.

Groundwater flow in the water-table aquifer is predominantly to the southwest in the southern portion of HPIA. In the northern and central portions of HPIA, groundwater flow is to the west-southwest. Some groundwater mounding appears to be present in the southern portion of HPIA. This mounding may generate localized radial flow in the area. Groundwater flow in the lower water-bearing zones trends in generally the same direction (southwest) as that in the surficial.

Horizontal hydraulic gradients in the shallow aquifer at HPIA were determined from the potentiometric surface map. In general, the horizontal hydraulic gradient in the surficial aquifer at HPIA is approximately 0.003 foot per foot

(ft/ft). Specifically, the northern and southern portions of HPIA exhibit a horizontal hydraulic gradient of 0.003 ft/ft. However, the west-central portion of HPIA exhibits a horizontal hydraulic gradient of approximately 0.004 ft/ft (ESE, 1991b). These horizontal hydraulic gradients compare favorably with values previously reported by Harned et al. (1989) and ESE (1988).

Hydraulic gradients were also calculated for the deep and intermediate zones. Because of fewer measured points in these zones, the gradients are calculated from one end of the site to the other between well clusters 4 and 24. The calculated gradient for the intermediate zone was 0.0015 ft/ft and 0.0021 ft/ft for the deep zone. All gradients were calculated using the February 1991 data.

Mention hydraulic conductivity of both aquifers.

1.6 METEOROLOGY

MCB Camp Lejeune, which is located in the North Carolina coastal plain area, is influenced by mild winters and humid summers with elevated temperatures. Rainfall typically averages more than 50 inches a year, and potential evapotranspiration varies from 34 to 36 inches of rainfall equivalent per year [Narkunas, 1980; Water and Air Research (WAR), 1983). The wet seasons generally occur during the winter and summer months. During January, typical temperature ranges are reported from 33 to 53 degrees Fahrenheit (°F), and during July, the temperature ranges are reported from 71 to 88°F (Odell, 1970; WAR, 1983). During the warm seasons, winds are generally from the south-southwest, and during the cooler seasons, they are generally from the north-northwest. The area has a relatively long growing season of 230 days.

1.7 PREVIOUS FIELD INVESTIGATIONS

An Initial Assessment Study (IAS) was conducted in 1983 under the Navy Assessment and Control of Installation Pollutants (NACIP) program at MCB

1. Completion of 30 soil borings at 3 suspected source locations to characterize shallow soil contamination,
2. Installation of 4 intermediate (75 ft) and 4 deep (150 ft) monitor wells, and
3. Sampling of all new and existing HPIA monitor wells (including those previously installed at Areas 21 and 22) and nearby water supply wells.

1.8 SUMMARY OF RA STUDY

The primary objectives of remedial action for HPIA are to manage potential long-term contaminant migration and protect human health and the environment. The quantitative baseline RA report prepared for HPIA summarized and interpreted the RI data so contaminant migration at the areas of concern could be characterized. In addition, the RA assessed actual and/or potential future harm to the public health and welfare and the environment resulting from residual contamination associated with past disposal practices at the sites. The results of the RA are used to identify those media and/or areas within the HPIA that have a potential for adverse human health and environmental impacts and that must, therefore, be included in the FS evaluation.

The RA for HPIA evaluated the human and nonhuman health risks associated with potential exposures to contaminants identified during the supplemental characterization step in the surface soils and deep-intermediate groundwater at Areas 900, 1200, and 1600. The significant exposure pathways evaluated were worker exposure to soils via direct contact (i.e., ingestion and dermal absorption) and ingestion of groundwater. Because the future land management plans at HPIA specify further industrialization of the area, residential exposures were excluded from the risk evaluation.

See General Comments on last sheet of this enclosure.

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Table 3-1. Summary of COCs, Concentrations Detected, and Corresponding Cleanup Guidelines for HPIA Soils (Continued, Page 2 of 2)

Study Area (Boring)	Analyte	Concentration (µg/kg)	Cleanup Guideline (µg/kg)
1200 (HPSB-15)	Benzo(a)anthracene	140	8.09
	Chrysene	170	15.6
	Benzo(b)fluoranthene	140	8.09
	Benzo(k)fluoranthene	150	8.67
	Benzo(a)pyrene	140	8.09
	Indeno(1,2,3-cd)pyrene	82	4.74
1200 (HPSB-20)	Benzo(a)anthracene	Not Detected	8.09
	Chrysene	Not Detected	15.6
	Benzo(b)fluoranthene	Not Detected	8.09
	Benzo(k)fluoranthene	Not Detected	8.67
	Benzo(a)pyrene	Not Detected	8.09
	Indeno(1,2,3-cd)pyrene	Not Detected	4.74

Note: Depth is 0 to 2 ft.
µg/kg = microgram per kilogram.

Source: ESE.

What was found below 2 feet? Soil samples were taken to water table, 4 to 6 feet below ground surface.

This alternative would achieve the risk-based cleanup guidelines developed by the RA and result in near total destruction of the contaminants present in the soils. Therefore, this alternative would result in the greatest reduction in the MTV of the contaminants. The contamination source(s) would be removed and irreversibly destroyed, and no waste residuals ~~requiring long-term~~ management would result. Implementation of this alternative should not encounter any opposition from government agencies or the community.

If the decisionmaker determines, however, that the ultimate goal of remediation at Areas 900 and 1200 is to reduce or limit access to the contaminated soils, the asphalt cap alternative (Alternative 2A) would be the preferred alternative. An asphalt cap would be constructed at each of the areas of concern to prevent infiltration of rainfall and stormwater into the contaminated zone, to limit contaminant mobility, and to prevent human exposure to the contaminated soils.

The asphalt cap would not reduce soil concentrations, but it would isolate the contaminants from environmental influences and limit access to the contaminated soils. Although the toxicity and volume of contaminants would not be reduced, contaminant mobility would be reduced by decreasing the amount of infiltration through the contaminated soils to the unsaturated zone. Furthermore, this alternative is considered to create the least risk to workers during the implementation phase because it involves the least exposure to the contaminated media. Regulatory agency and state acceptance are expected since the risk of worker exposure to the contaminated soils is significantly reduced via this alternative.

I'm not convinced this is an accurate statement.

result in a reduction in the MTV of the contaminants present in the soils at Areas 900 and 1200.

Permits not required per the NCB Camp Lejeune Federal Facilities Agreement Make this correction where it applies.

7.1.4 IMPLEMENTABILITY

No technical limitations are associated with the implementation of any of these alternatives. The incineration alternative (Alternative 1C) would be the most technically complex to implement since it would require ~~special permits,~~ extensive site preparation, and construction prior to remediation. The in situ biodegradation and solidification/stabilization alternatives (Alternatives 1B and 1A, respectively) would require further testing prior to full-scale implementation. The removal and disposal alternative (Alternative 3A) would require characterization sampling and analysis prior to implementation to obtain disposal approval. The asphalt cap and no-action alternatives (Alternatives 2A and 4A, respectively) require no initial setup or testing prior to construction. The necessary equipment, operators, and spare parts are available for all of the alternatives, although they may be more difficult to obtain for the solidification/ stabilization alternative (Alternative 1A).

Approval for implementing any one of the alternatives may be relatively easy; however, regulatory agency and community acceptance may be harder to obtain for those alternatives that do not reduce the risk of exposure and thereby protect human health. Coordination with the appropriate state agencies will be required for air emissions for the incineration alternative (Alternative 1C).

7.1.5 COST

As stated previously, the present-worth and O&M costs for the remedial alternatives under consideration could not be developed for inclusion in this FS because the volume(s) of contaminated soils to be remediated could not be

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Encl. (2)

CTO-0017
FS Evaluation
Technical Review Comments
HPIA, Camp Lejeune

General Comments

1. The FS report dismisses the need to remediate the deep aquifer because the Risk Assessment indicated that the risk was acceptable (i.e., less than 10-6 risk factor). The major assumption in the risk assessment is that the groundwater would not be used as a water supply well for residential purposes. This does not appear to make sense since four water supply wells at HPIA have been shut down due to contamination of volatile organics. Additionally, EPA guidance on remedial actions for contaminated groundwater at superfund sites (December, 1988) indicates that the EPA Groundwater Protection Strategy (EPA, 1984) plays an important role in the remediation of groundwater. The deep aquifer at HPIA would be considered at least a Class IIA designation (or possibly a Class I designation) since it is currently used as a source of drinking water. The implications of EPA's GPS should have been addressed in the FS. The FS needs to explain in more detail the rationale for dismissing the deep aquifer. It appears that the FS addresses groundwater contamination only from the three areas of concern (i.e., Areas 900, 1200, and 1600), which have limited data on the deep aquifer. The deep aquifer on a whole should be addressed.

2. It is not clear why the FS focuses only on Areas 900, 1200, and 1600, and not the other areas (i.e., Areas 21, 22, and 24). The FS (Section 1.2) needs to better explain why the FS only address Areas 900, 1200, and 1600. Indicate that the contamination at these areas are associated with solvents.

3. The FS (and the remedial investigation and risk assessment) should discuss the fact that volatile organics in the soil were only observed at a limited number of sampling locations and at relatively low concentrations in the soil (less than 1 mg/kg total). It is possible that the volatile organics have either leached or volatilized from the soil matrix. The FS addresses PAHs because the of results of the risk assessment. The presence of PAHs may not be site related. This should be explored by comparing other areas of HPIA with the samples collected at the areas of concern. Could we "write off" PAHs by indicating levels of PAHs found are consistent with PAH levels typically found in "clean" environments

since solvents are known to have been disposed of at HPIA, the FS, RI, &/or RA need to present a justification for finding only non-volatiles.

4. The FS, as it stands, is not likely to be useful in providing sufficient information to determine the most feasible alternative for soil. Primarily, volume estimates cannot be calculated with much accuracy due to the limited data points. Additionally, the data is representative of only the top two feet of soil. Capital and annual cost estimates could not be estimated due to this lack of information. At best, each area of concern has only two to three soil data points. It is not

Possibly some or samples could be considered "background" samples

a sampling indicated high levels of VOCs yet soil samples showed very low levels of VOCs. Explain what this means in one or more of the reports (RI, RA, &/or FS).

certain whether the source of groundwater contamination at these areas has been identified, or determined not to be present due to the leaching/volatilization. At best, the FS serves as a preliminary screening document for remediation of PAHs.

5. References are provided at the end of the report. However, statements made throughout the report about the feasibility of technologies/alternatives (i.e., effectiveness, implementability, and cost) are not referenced. Statements implying that in-situ bioremediation will reduce the levels of PAHs to below the clean-up level need to be referenced. Another example is the elimination of composting as a technology; no reference is provided to support this decision. Add references to these remarks in the text of the FS.

6. It is mentioned throughout the text that there are no ARARs for soils. Did ESE consider the impacts of the RCRA Land Disposal Restrictions (this would apply to offsite landfilling). The impacts, if any, of the LDRs need to be discussed.

7. The FS states that more sampling and analysis will be required, but no information is presented with respect to what areas, how many soil samples, depths of samples, or analytical parameters. Include this information in the FS.

8. The FS states that volumes of soil to be remediated will be determined at the time of excavation by additional sampling. The PAH levels may be so low that acres of Camp Lejeune may be excavated using this approach. The point is that the source of soil contamination may need other criteria which are more definable such as stained soils, or physical boundaries (e.g., to the roadway). Background levels of PAHs may be as high if not higher that what was detected in the borings. This comment applies if remediation of PAHs are still considered.

SPECIFIC COMMENTS

1. Page 1-12. The FS should describe the locations of the water supply wells. It is unknown to the reader (without the RI or RA report) whether the supply wells are located near the areas of concern, or just within the HPIA.

2. Page 2-12. Response objective Number 1, as stated. is not an objective.

3. Table 3-1. Explain in the FS why the clean-up levels differ for each area of concern.

4. Page 3-9. The general response actions listed under "treatment" are actually technologies and the technologies associated with the modes of treatment are actually process

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options.

5. Table 3-3, 3-4, and 3-5. References should be included for each statement made under the "comment" column to defend the screening decision.

6. Table 3-3. The low levels of PAHs, which are about 2 mg/kg at best, may not be able to be treated much lower with in-situ biodegradation. In general, in-situ biodegradation may not be effective because the levels of PAHs are not that high for the micro-organisms to survive.

7. Table 4-1 (and Section 4.0). With respect to capping, the proposed asphalt cap most likely contains higher levels of PAHs than the soil. Was a soil cover considered? A soil cover (with planted grass) would reduce or eliminate exposure to the surface soil. A soil cover would not eliminate infiltration, but PAHs are not likely to mobilize to the water table given the low concentrations observed (PAHs were not detected in either the shallow or deep aquifers).

Possibly we should consider a soil cover vs asphalt cap.

8. Table 4-2. No discussion other than Table 4-2 was given for retaining or eliminating alternatives from further analysis. The text, or table, should briefly explain why certain alternatives were eliminated.

9. Table 4-2. Alternative 1B bench-scale costs appear to be low. Also, provide references for the cost information in this table. This would provide more credibility to the FS.

10. Section 4.0. Was an onsite landfill (at some other location at Camp Lejeune) considered?

11. Section 4.0 Solidification is an alternative that may be effective on the soil, but based on the data, what is there to stabilize. The objective of preventing exposure can be met by capping. Also, stabilization may not be implementable at the site area. There may not be enough space and the water table may render this technology non-implementable. The FS should address whether the water table would be a factor.

12. Page 5-8, line 6. The word "sediment" needs to be changed to "settlement".

13. Page 7-9. The preferred alternative for remediating the soil (i.e., incineration) is not cost effective and may not be accepted by the community. If remediation is warranted, other technologies such as low-temperature thermal stripping or composting may be just as effective on the low levels of PAHs and is more cost effective.