06.04-9/8/94-0366

FINAL

RECORD OF DECISION FOR OPERABLE UNIT NO. 1 (SITES 21, 24, and 78)

MARINE CORPS BASE, CAMP LEJEUNE, NORTH CAROLINA

CONTRACT TASK ORDER 0177

SEPTEMBER 8, 1994

Prepared For:

DEPARTMENT OF THE NAVY
ATLANTIC DIVISION
NAVAL FACILITIES
ENGINEERING COMMAND
Norfolk, Virginia

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LIST OF ACRONYMS AND ABBREVIATIONS

AOC	area of concern
ARAR	applicable or relevant and appropriate requirement
Baker	Baker Environmental, Inc.
BTEX	benzene, toluene, ethylbenzene, xylenes
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
cis-1,2-DCE	cis-1,2-dichloroethene
COC	contaminant of concern
1,1-DCE	1,1-dichloroethene
1,2-DCE	1,2-dichloroethene
DON	Department of the Navy
FS	feasibility study
gpm	gallons per minute
HI	hazard index
HPIA	Hadnot Point Industrial Area
IAS	initial assessment study
ICR	incremental cancer risk
IRA	interim remedial action
IRP	Installation Restoration Program
MCB	Marine Corps Base
MCL	maximum contaminant level
NC DEHNR	North Carolina Department of Environment, Health, and Natural Resources
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPW	net present worth
O&M	operation and maintenance
OU	operable unit
PAH	polynuclear aromatic hydrocarbon
PCB	polychlorinated biphenyl
PCE	tetrachloroethene
PRAP	proposed remedial action plan

RA	risk assessment
RAA	remedial action alternative
RCRA	Resource Conservation Recovery Act
RI	remedial investigation
ROD	record of decision
SARA	Superfund Amendments and Reauthorization Act
STP	sewage treatment plant
SVOC	semivolatile organic compound
T-1,2-DCE	trans-1,2-dichloroethene
TCE	trichloroethene
TCL	Target Compound List
TCLP	Toxicity Characteristics Leaching Procedure
TSCA	Toxic Substance Control Act
USEPA	United States Environmental Protection Agency
UST	underground storage tank
VOC	volatile organic compound

DECLARATION

Site Name and Location

Operable Unit No. 1 (Sites 21, 24, and 78)
Marine Corps Base
Camp Lejeune, North Carolina

Statement of Basis and Purpose

This decision document presents the selected remedy for Operable Unit (OU) No. 1 (Sites 21, 24, and 78) at Marine Corps Base (MCB), Camp Lejeune, North Carolina. The selected remedy specified in this document was chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA), and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision is based on the Administrative Record for the operable unit.

The Department of the Navy (DON) and the Marine Corps have obtained concurrence from the North Carolina Department of Environment, Health and Natural Resources (NC DEHNR) and the United States Environmental Protection Agency (USEPA) Region IV on the selected remedy.

Assessment of the Sites

Actual or threatened releases of hazardous substances from this operable unit consisting of three sites, if not addressed by implementing the response action selected in this Record of Decision (ROD), may present a current or potential threat to public health, welfare, or the environment.

Description of Selected Remedy

The selected remedy for OU No. 1 is the final action to be conducted at the three sites. Separate from this final action, an interim remedial action (IRA) will be implemented to contain two plumes of contaminated groundwater in the surficial aquifer at Site 78. Under the IRA, contaminated groundwater will be extracted and treated on site within one of two groundwater treatment systems. The treated water will be discharged to the Hadnot Point

Sewage Treatment Plant (STP). The design of the IRA has been completed and implementation is planned for 1994. The selected final remedial action included in this ROD addresses the principal threats remaining at the operable unit by treating contaminated groundwater and soils.

The principal threats include the potential ingestion of contaminated groundwater within OU No. 1, and the potential exposure to contaminated soil from limited areas within Site 21 and Site 78. The primary goals of the selected remedy are: (1) to prevent current or future exposure to the contaminated groundwater and contaminated soils, (2) to remediate groundwater contamination for future potential use of the aquifer, and (3) to treat or remove contaminated soils from designated areas of concern (AOCs).

The major components of the selected remedy, not including the IRA, for OU No. 1 include:

- Collecting additional contaminated groundwater in the surficial aquifer through a series of extraction wells installed within two plume areas with the highest contaminant levels.

- Treating the extracted groundwater for organics and inorganics removal via the treatment systems included under the IRA for OU No. 1.

- Restricting the use of nearby water supply wells which are currently inactive/closed, and restricting the installation of any new water supply wells within the operable unit area.

- Implementing a long-term groundwater monitoring program to monitor the effectiveness of the groundwater remedy and to monitor nearby potable water supply wells.

- Excavating approximately 1,050 cubic yards of soil primarily contaminated with polychlorinated biphenyls (PCBs) and pesticides for off-site disposal.

Statutory Determinations

This remedial action is protective of human health and the environment, complies with Federal and State requirements that are legally applicable or relevant and appropriate to the

remedial action or provides adequate justification for not complying with the requirements, and is cost-effective. In addition, this remedial action utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable and satisfies the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element. A five-year review will be necessary for this remedial action to ensure complete groundwater remediation.

[redacted]

Signature (Commanding General, MCB Camp Lejeune)

15 Sept 94
Date

1.0 SITE LOCATION AND DESCRIPTION

Marine Corps Base (MCB), Camp Lejeune is a training base for the United States Marine Corps, located in Onslow County, North Carolina. The Base covers approximately 236 square miles and includes 14 miles of coastline. MCB, Camp Lejeune is bounded to the southeast by the Atlantic Ocean, to the northeast by State Route 24, and to the west by U.S. Route 17. The town of Jacksonville, North Carolina is located north of the Base.

The study area, operable unit (OU) No. 1, is one of 13 operable units within MCB Camp Lejeune. An "operable unit," as defined by the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), is a discrete action that comprises an incremental step toward comprehensively addressing site problems. The cleanup of a site can be divided into a number of operable units depending on the complexity of the problems associated with the site. Operable units may address geographical portions of a site, specific site problems, or initial phases of an action. With respect to MCB, Camp Lejeune, operable units were developed to combine one or more individual sites where Installation Restoration Program (IRP) activities are or will be implemented. The sites which are combined into a operable unit share a common element. As the case with OU No. 1, Sites 21, 24, and 78 are geographically close.

OU No. 1 covers an area of approximately 690 acres. OU No. 1 is located approximately one mile east of the New River and two miles south of State Route 24 (see Figure 1). The operable unit is bordered by Holcomb Boulevard to the northwest, Sneads Ferry Road to the northeast, Main Service Road to the southwest, and woodlands and Cogdels Creek to the southeast.

Site 21, which is identified as Transformer Storage Lot 140, is located within the northwest section of Site 78. The site is bordered by Ash Street to the southwest, Center Road to the southeast, and a wooded area to the northwest. Figure 2 presents a site plan of Site 21. A dirt road surrounds most of the site along with surface drainage ditches. The southern and central portions of the site (approximately 220 feet by 900 feet) include several fenced-in areas, while the northern section (approximately 500 feet long) is an open area. A water tower is located in the fenced portion of the site. Surface cover within the site consists of gravel, sandy soil, and concrete with a few vegetated areas. In the northern portion of the site, a small area, slightly depressed in elevation, is evident. This may have been the reported former transformer oil disposal pit.

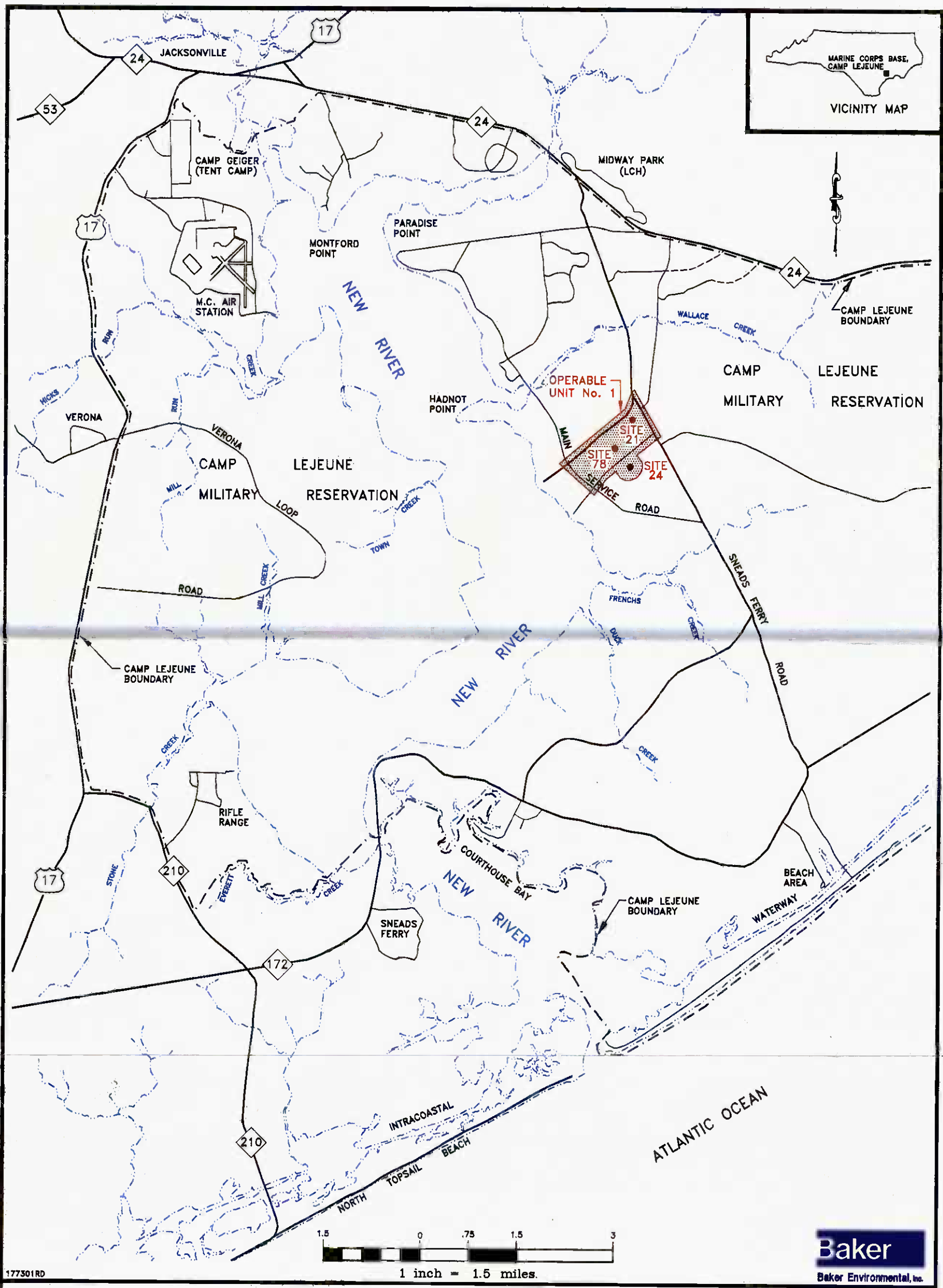
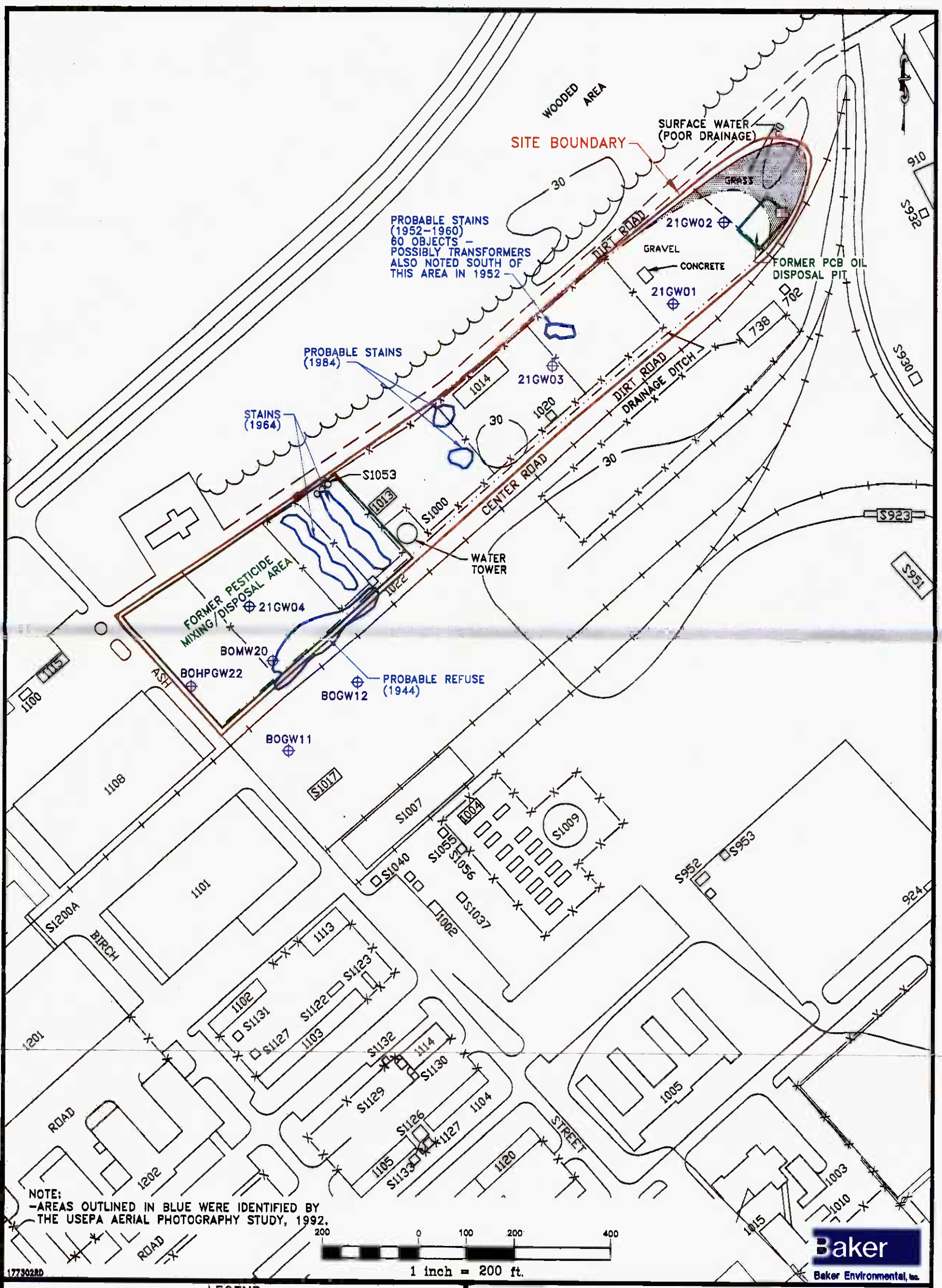


FIGURE 1
LOCATION MAP–OPERABLE UNIT No. 1
SITES 21, 24 AND 78
RECORD OF DECISION CTO–0177
MARINE CORPS BASE, CAMP LEJEUNE
NORTH CAROLINA



NOTE:
-AREAS OUTLINED IN BLUE WERE IDENTIFIED BY THE USEPA AERIAL PHOTOGRAPHY STUDY, 1992.

177902RD

Baker Environmental, Inc.

LEGEND

21GW01 SHALLOW MONITORING WELL

SOURCE: LANTDIV, FEBRUARY 1992

FIGURE 2
SITE MAP
SITE 21: TRANSFORMER STORAGE LOT 140
RECORD OF DECISION CTO-0177

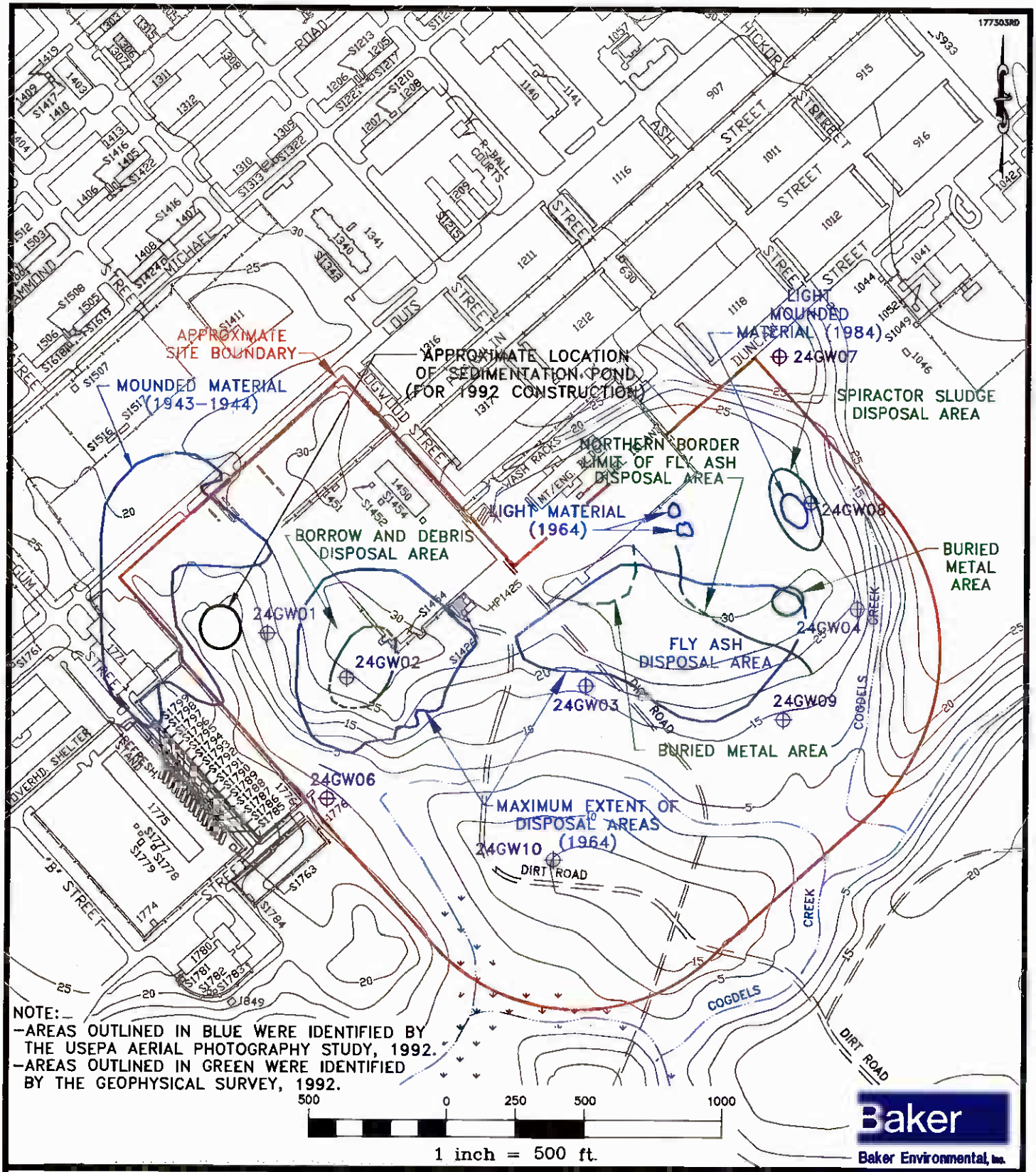
MARINE CORPS BASE, CAMP LEJEUNE
NORTH CAROLINA

The southern portion of the site is periodically utilized for storage by Marine Corps Reserve units. Currently this portion of the site is being used for storage of military vehicles.

A few potential areas of concern exist within Site 21, as shown on Figure 2. The two primary areas of concern are the Former Pesticide Mixing/Disposal Area and the Former PCB Transformer Disposal Area. As shown on Figure 2, the Former Pesticide Mixing/Disposal Area is located in the southwestern portion of the site, and the Former Transformer PCB Disposal Area is located in the northeastern portion of the site. With the exception of a low depressed area at the northern portion of the site, there are no visual signs of waste disposal throughout the site.

Site 24, which is referred to as the Industrial Fly Ash Dump, is located adjacent to the southeast portion of Site 78. Specifically, the site is located south and east of the intersection of Birch and Duncan Streets and extends south toward Cogdels Creek. Figure 3 presents a site plan of Site 24, with suspected areas of former disposal shown. The site is primarily a wooded area, approximately 100 acres in size, that is somewhat overgrown. The site is hilly and unpaved with site drainage toward Cogdels Creek. Dirt roads are interspersed throughout, which lead to the suspected disposal areas. The roads are periodically utilized for military vehicle maneuvers. Several areas indicating past disposal activities are evident throughout the site (i.e., surficial deposits of fly ash and mounding). Site 24 is not currently used for the disposal of wastes.

Site 78, which is referred to as the Hadnot Point Industrial Area or HPIA, is located adjacent to the northwest portion of Site 24 and houses the industrial area of MCB, Camp Lejeune. This area is comprised of maintenance shops, warehouses, painting shops, printing shops, auto body shops, and other similar industrial facilities. In general, the HPIA is defined as the area bounded by Holcomb Boulevard to the northwest, Sneads Ferry Road to the northeast, Duncan Street to the southeast, and Main Service Road to the southwest. Figure 4 presents a plan view of Site 78 and the approximate site boundary. The site boundaries for Sites 21 and 24 are also shown on this figure. The location of the Hadnot Point Fuel Farm (Site 22) is shown although it is not a part of the operable unit addressed in this Record of Decision (ROD). Site 78 covers approximately 590 acres. The majority of the site area is paved (e.g., roadways, parking lots, loading dock areas, and storage lots), however, there are many small lawn areas associated with individual buildings within the site and along lengthy stretches of roadways. In addition, there are several acres of woods in the southern portion of the site. Recreational ballfields and a parade ground are located in the southwest corner of the site.



NOTE:
–AREAS OUTLINED IN BLUE WERE IDENTIFIED BY THE USEPA AERIAL PHOTOGRAPHY STUDY, 1992.
–AREAS OUTLINED IN GREEN WERE IDENTIFIED BY THE GEOPHYSICAL SURVEY, 1992.

Baker
Baker Environmental, Inc.

LEGEND

24GW01 SHALLOW MONITORING WELL

SOURCE: LANTDIV, FEB. 1992

FIGURE 3
SITE MAP
SITE 24: INDUSTRIAL FLY ASH DUMP
RECORD OF DECISION CTO-0177

MARINE CORPS BASE, CAMP LEJEUNE
NORTH CAROLINA

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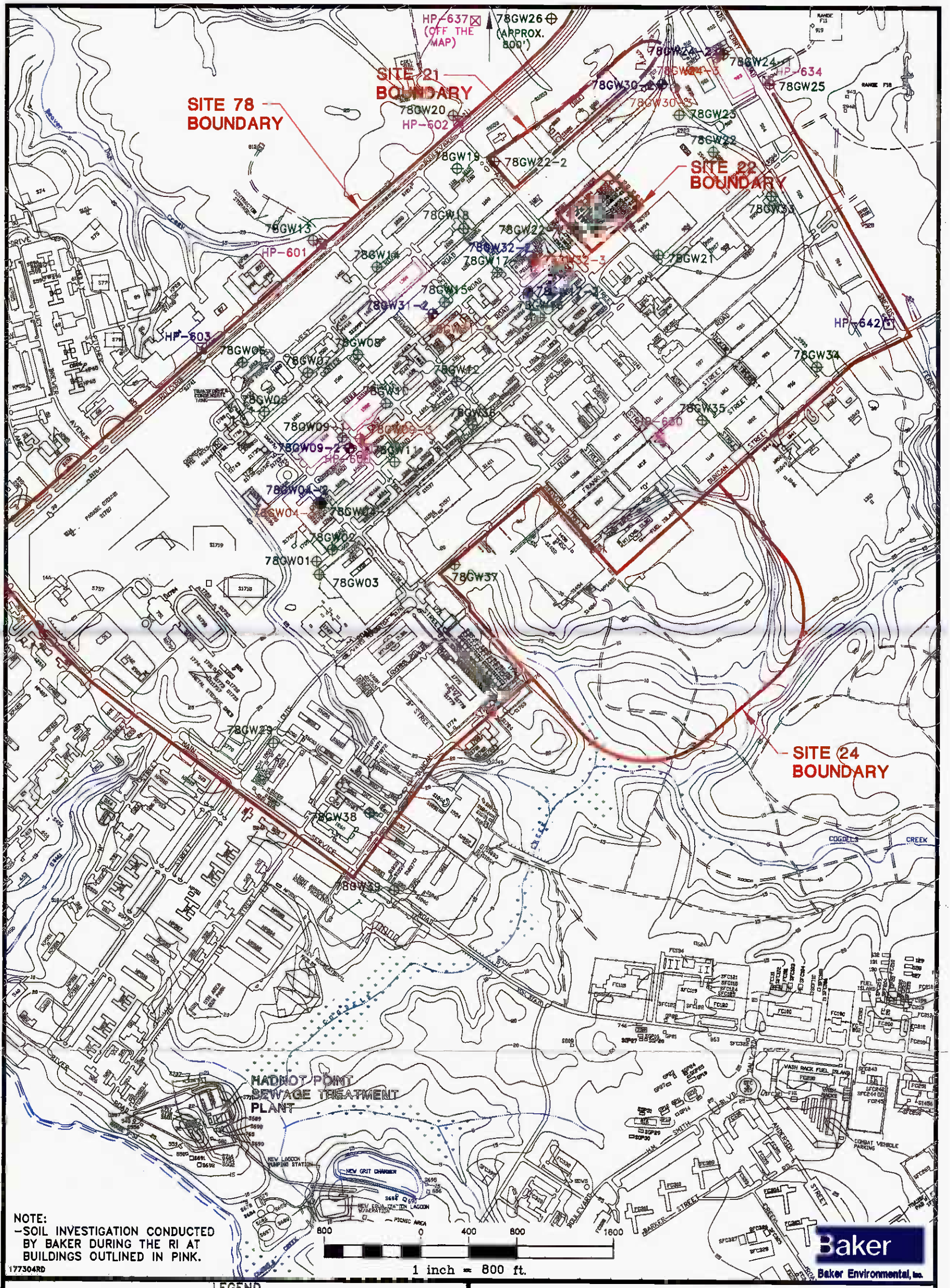


NOTE:
-SOIL INVESTIGATION CONDUCTED BY BAKER DURING THE RI AT BUILDINGS OUTLINED IN PINK.

177304RD

Baker
Baker Environmental, Inc.

LEGEND

78GW02	SHALLOW MONITORING WELL	HP-603	WATER SUPPLY WELL (ACTIVE)
78GW04-2	INTERMEDIATE MONITORING WELL	HP-601	WATER SUPPLY WELL (INACTIVE)
78GW04-3	DEEP MONITORING WELL		

SOURCE: LANTDIV, FEBRUARY 1992

FIGURE 4
SITE MAP
SITE 78: HPIA
RECORD OF DECISION CTO-0177

MARINE CORPS BASE, CAMP LEJEUNE
NORTH CAROLINA

2.0 SITE HISTORY AND ENFORCEMENT ACTIVITIES

This section of the ROD provides background information on each of the three sites' history and enforcement actions taken to date. Specifically, the land use history of each of the sites and the previous investigations which have been conducted are briefly discussed below.

Site History

Site 21

Site 21 has had a history of pesticide usage and reported transformer oil disposal. One portion of the site was used as a pesticide mixing area and as a cleaning area for pesticide application equipment from 1958 to 1977. This area, the Former Pesticide Mixing/Disposal Area, appears to be located throughout the southern portion of the site. Chemicals reportedly stored at this site included diazinon, chlordane, lindane, DDT, malathion (46% solution), mirex, 2,4-D, silvex, dalapon and dursban. In 1977, before these mixing/cleaning activities were moved to a different location, overland discharge of washout fluids was estimated to be approximately 350 gallons per week. It is not clear for how long this discharge of washout fluids occurred. The Former Transformer Oil Disposal Pit was located in the northeastern portion of the site. The pit was reportedly used as a disposal area for transformer oil during a one year period between 1950 and 1951. The pit reportedly measured 25 to 30 feet long by 6 feet wide by 8 feet deep. Sand was occasionally placed in the pit when oil was found standing in the bottom of the pit. The total quantity of oil disposed in this pit is unknown. A small area, slightly depressed in elevation, which may be the former oil pit, is evident in the northern portion of Site 21.

Site 24

Site 24 was used for the disposal of fly ash, cinders, solvents, used paint stripping compounds, sewage sludge, and water treatment spiractor sludge from the late 1940s to 1980. Spiractor sludge from the wastewater treatment plant and sewage sludge from the sewage treatment plant were reportedly disposed at this site since the late 1940s. Construction debris was reportedly disposed at the site in the 1960s. During 1972 to 1979, fly ash and cinders were dumped on the ground surface, and solvents used to clean out boilers were poured onto these piles. Furniture stripping wastes were also reported to be disposed in this area. Due to these past waste disposal activities, there are five primary areas of concern within Site 24: the

Spiractor Sludge Disposal Area; the Fly Ash Disposal Area; the Borrow and Debris Disposal Area; and two Buried Metal Areas.

Site 78

With respect to Site 78, the HPIA was the first developed area at MCB, Camp Lejeune. It was comprised of approximately 75 buildings and facilities including: maintenance shops, gas stations, administrative offices, commissaries, snack bars, warehouses, and storage yards. Due to the industrial nature of the site, many spills and leaks have occurred over the years. Most of these spills and leaks have consisted of petroleum-related products and solvents from underground storage tanks (USTs), drums, and uncontained waste storage areas. It appears that several general building areas within Site 78 may be potential source areas of contamination.

Previous Investigations

Initial Assessment Study

In 1983 an Initial Assessment Study (IAS) was conducted at MCB, Camp Lejeune which identified a number of areas within the facility, including Sites 21 and 24, as potential sources of contamination. Site 78 was later added to the list of sites to be further evaluated. As a result of this study, the DON initiated further investigations at these sites.

Confirmation Study

During 1984 through 1987, Confirmation Studies at OU No. 1 were conducted which focused on potential source areas identified in the IAS. The results of the Confirmation Study conducted for Site 21 indicated that the soil within the site may be contaminated with pesticides and possibly polychlorinated biphenyls (PCBs). Groundwater at Site 21 did not appear to be impacted. The results of the Confirmation Study conducted for Site 24 indicated that several metals were present in the groundwater. Metals were also detected in the surface water and sediment samples collected from Cogdels Creek. The Confirmation Study results for Site 78 indicated that the shallow groundwater near the Hadnot Point Fuel Farm (Site 22) was contaminated with fuel-related volatile organic compounds (VOCs) such as benzene and toluene. In addition, VOCs such as trichloroethene (TCE), benzene, trans-1,2-dichloroethene

(T-1,2-DCE), and tetrachloroethylene (PCE) were detected in nearby water supply wells. As a result, four supply wells were immediately shut down by Camp Lejeune utilities staff.

The groundwater results from Site 78 triggered additional investigations under the Confirmation Study. The results from these additional investigations indicated that there were several primary potential source areas for waste solvent and fuel-related material throughout Site 78. Groundwater samples indicated that three primary zones of contamination were present in the shallow portion of the aquifer, centered in the vicinity of Building 902 (northeast area of the site), Site 22, and Building 1601 (southwest area of the site).

Groundwater Study at Hadnot Point Fuel Farm

A groundwater study was conducted at the Hadnot Point Fuel Farm (Site 22) as part of the MCB, Camp Lejeune UST Program. Although this study was conducted for Site 22 and not Site 78, the results are applicable to Site 78 given the proximity of the sites (Figure 4). The fuel farm consisted of several USTs which had contained either diesel fuel, leaded gasoline, unleaded gasoline, or kerosene. The study concluded that fuel losses of gasoline/fuels had occurred predominantly through leaks in the transfer lines or valves. Laboratory analyses indicate that the floating product has contributed significant levels of dissolved petroleum compounds including benzene, toluene, ethylbenzene, xylene (BTEX) into the groundwater. Trace levels of non-petroleum VOCs including TCE and PCE were also detected within the fuel farm area. Based on these results, a product recovery/groundwater treatment system was designed for the fuel farm. The system began operation in the latter part of 1991.

Supplemental Characterization Step

A Supplemental Characterization Step was performed in 1990 and 1991 for Site 78 to further evaluate the extent of contamination in the deep portion of the aquifer at the site and to characterize the contamination within the shallow soils at suspected source locations. The soil sample results from this study detected VOCs and a few semivolatile organic compounds (SVOCs) near Building 902. Fuel-related VOCs were detected near Building 1202. Pesticides were detected near Buildings 1103 and 1601. PCBs and pesticides were identified near Building 1300. The results of the shallow groundwater sampling yielded similar results as with the previous studies. The results from the intermediate and deep monitoring wells

indicated that BTEX constituents were detected downgradient of the fuel farm and at other areas of the site.

Remedial Investigation for the Shallow Soils and Castle Hayne Aquifer

A Remedial Investigation (RI) was conducted in 1991 to investigate shallow soils and the deeper portions of the aquifer (the Castle Hayne aquifer) at Site 78. This RI did not involve any additional field investigations. The RI was conducted using data from the previous Confirmation Study and Supplemental Characterization Step. The RI report concluded that while TCE and other VOCs were the primary concern during the soil gas survey, these compounds were detected in only a few of the soil samples collected. The only TCE detected in soils appeared to be associated with an UST at Building 902, which reportedly was used to store spent solvents. The detected SVOCs were fuel related and fit with the use of the area (Building 1202) for vehicle repairs and maintenance. Many of the metals detected were found in all samples analyzed and therefore, may be indicative of the naturally occurring soil matrix and associated clays.

Interim Remedial Action Remedial Investigation and Feasibility Study for the Surficial Aquifer

Baker Environmental, Inc. (Baker) conducted an IRA RI and IRA Feasibility Study (FS) for the surficial aquifer at Site 78. The RI report used the data from previous investigations only; no additional field studies were conducted. The IRA RI report concluded that three contaminant plumes were identified within the surficial aquifer at Site 78; however, one plume was associated with the Hadnot Point Fuel Farm (Site 22) which is being remediated under a separate investigative program. The second plume was located east of Cedar Street and extended from the vicinity of the 902/903 Building area to the tank farm. The plume exhibited solvent contamination (e.g., TCE) and low levels of fuel-related contamination (e.g., BTEX). The third plume was believed to originate in the vicinity of Buildings 1502, 1601, and 1602. This plume was contaminated with the same constituents as the second plume with the addition of lead.

As part of the IRA RI, a qualitative risk assessment (RA) was performed to identify receptors and exposure pathways, quantify exposure levels, and evaluate human and/or environmental risk. The qualitative RA concluded that benzene and TCE could impact human health if

shallow groundwater were to migrate into the deep aquifer (used as a source of potable water), or if the surficial aquifer were to be utilized in the future as a potable water source.

Based on the results of the IRA RI for the surficial aquifer, Baker prepared an IRA FS Report. The IRA FS developed and evaluated several IRA alternatives for the impacted shallow groundwater. The preferred alternative as presented in the Proposed Remedial Action Plan (PRAP) for OU No. 1 involved two on-site pump and treat systems to contain the two fuel/solvent-contaminated plumes at the site. Following extraction, the groundwater was to be treated on site via air stripping, carbon adsorption, and metals removal, then discharged to the Hadnot Point Sewage Treatment Plant (STP). This IRA alternative was accepted by the United States Environmental Protection Agency (USEPA), the North Carolina Department of Environment, Health, and Natural Resources (NC DEHNR), and the public. The extraction/treatment systems have been designed and construction will be initiated in 1994.

Remedial Investigation for OU No. 1

An RI for OU No. 1 was initiated by Baker in 1993. The RI field investigations commenced in April 1993 and continued through December 1993. The field program initiated at OU No. 1 consisted of a soil gas survey; a preliminary site survey; a soil investigation which included drilling and sampling; a groundwater investigation which included well installation and sampling; test pit sampling; and a surface water/sediment investigation. A human health RA and ecological RA were also conducted as part of this RI. The results of the RI are summarized in Section 5.0 - Site Characteristics and Section 6.0 - Summary of Site Risks of this document.

3.0 HIGHLIGHTS OF COMMUNITY PARTICIPATION

The Final RI Report for OU No. 1 at MCB, Camp Lejeune, North Carolina was released to the public on June 24, 1994. The Final FS Report and the Final PRAP were released to the public on July 25, 1994. These documents were made available to the public at an information repository maintained at the Onslow County Public Library and at Camp Lejeune, Building 67, Room 237. The notice of availability of the PRAP and RI/FS documents was published in the "Jacksonville Daily News" during the period July 21 to 27, 1994. A public comment period was held from July 27, 1994, to August 27, 1994. In addition, a public meeting was held on July 27, 1994. At this meeting, representatives from DON/Marine Corps discussed the remedial action alternatives (RAAs) currently under consideration and

addressed community concerns. Response to the comments received during the comment period is included in the Responsiveness Summary (Section 11.0), which is part of this ROD.

This decision document presents the Final RAAs for OU No. 1 at MCB, Camp Lejeune, North Carolina, chosen in accordance with the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA), and, to the extent practicable, the NCP. The selected decision for OU No. 1 is based on the Administrative Record.

4.0 SCOPE AND ROLE OF THE OPERABLE UNIT

The proposed remedial action identified in this ROD is the overall final cleanup strategy for the entire operable unit in that it remediates both media of concern: groundwater and soil. The contaminated groundwater plumes will be remediated along with contaminated soils. An IRA will be implemented to contain two plumes of contamination in the surficial aquifer at Site 78. Under this IRA, contaminated groundwater will be extracted and treated on site within one of two groundwater treatment systems. The treated water will be discharged to the Hadnot Point STP. Design for this IRA has been completed and implementation is planned for 1994. Implementation of the proposed remedial action in conjunction with the IRA will reduce the potential for the migration of contamination, which in turn will reduce risks to human health and to the environment. Documents on the IRA are located at the information repository maintained at the Onslow County Public Library and at MCB, Camp Lejeune.

Surface water and sediment will not be addressed under this action for the following reasons:

- The overall risk to human health posed by either Cogdels Creek or Beaver Dam Creek is acceptable.

- Potential adverse impacts to terrestrial organisms at OU No. 1 appear to be low.

- There are no known spawning and nursery areas for resident fish species within Cogdels or Beaver Dam Creeks, therefore, there is no potential for decreased viability of fish spawning or nursing.

5.0 SITE CHARACTERISTICS

This section of the ROD presents an overview of the nature and extent of contamination at OU No. 1 with respect to known or suspected sources of contamination, types of contamination, and affected media. Based on the results of the RI, there are several potential sources of contamination throughout OU No. 1. The nature and extent of the contamination identified at three sites and the two nearby surface water bodies, Cogdels and Beaver Dam Creek, are itemized below.

Site 21 - Transformer Storage Lot 140

Soils

Pesticides and PCBs were the dominant contaminants detected in soils at Site 21. The majority of the pesticides were detected in surface soils collected in the vicinity of the Former Pesticide Mixing/Disposal Area. Detected concentrations of pesticides ranged from 4.6 micrograms per kilogram (µg/kg) to 34,000 µg/kg. The pesticides were detected in an area covering approximately 150,000 square feet.

PCBs, specifically PCB-1260, were present primarily in surface soils in the vicinity of the Former PCB Transformer Disposal Area (approximately 20,000 square feet). PCBs were also detected in two other areas of the site. The maximum detected concentration was 4,600 µg/kg.

VOCs and SVOCs were not extensively found in Site 21 soils.

Groundwater

VOCs in the groundwater at Site 21 were primarily detected in the northeastern portion of the site. Concentrations of TCE, benzene, toluene, ethylbenzene, and total xylenes (BTEX) were detected at this area above Federal and/or State standards. Based on the distribution of groundwater contaminants at this site, the groundwater contamination is most likely related to Site 78, specifically the edge of a contaminated groundwater plume located near the 901/903 Series buildings (note that Site 21 is located within Site 78). Pesticides and PCBs, which were found extensively in site soils, were not detected in the groundwater at Site 21.

Metals were the most prevalent contaminants in shallow groundwater at Site 21. Concentrations of arsenic, cadmium, chromium, beryllium, lead, nickel and manganese were found above Federal drinking water standards and/or North Carolina groundwater standards in seven of the eight wells sampled. It is important to note that elevated metal concentrations have been detected in shallow groundwater throughout MCB, Camp Lejeune.

Surface Water and Sediments

Surface water present at the site (only in the northern section of the site) did not appear to be contaminated. Pesticides and PCBs were the dominant contaminants present in sediments collected from the drainage ditch surrounding Site 21. The highest pesticide levels were detected at locations downgradient of the suspected pesticide mixing area, along the southwestern portion of the site (along approximately 600 feet of the drainage ditch). The concentrations of the pesticides detected in this area ranged from 20 µg/kg to 3,500 µg/kg. PCBs were detected near the Former PCB Transformer Disposal Area. The detected PCB concentrations ranged from 43 µg/kg to 120 µg/kg.

Site 24 - Industrial Fly Ash Dump

Soils

Analytical results indicated that pesticides and metals were the predominant contaminants detected in the soils at Site 24. The low pesticide levels detected at the site appear to be the result of historical pest control spraying activities rather than disposal due to their relatively low concentrations and widespread detections (the highest detected pesticide concentration was 350 µg/kg). The highest concentrations of metals in surface and subsurface soils were detected within the Fly Ash Disposal Area and one of the Buried Metal Areas (an area covering approximately 180,000 square feet). Arsenic, beryllium, copper, chromium, lead, and manganese were detected at levels above base-specific background levels. Some of these metals concentrations were comparable to those detected at Sites 21 and 78.

Test pit samples, which were collected in the vicinity of the Buried Metal Areas and the Fly Ash Disposal Area, were tested for leachability via Resource Conservation Recovery Act (RCRA) Toxicity Characteristics Leaching Procedure (TCLP). The samples tested yielded results below the TCLP regulatory levels indicating that the soils are not RCRA characteristically hazardous. Additionally, the soils classified as nonhazardous under RCRA

for ignitability, corrosivity, and reactivity. Low levels of TCE, pesticides, and several metals were detected in some of the test pit samples.

Groundwater

The analytical findings indicated that metals were the predominant contaminants detected in the shallow groundwater at Site 24. The metals that were detected above the Federal drinking water standards and/or State groundwater standards included: arsenic, chromium, lead, manganese, cadmium, mercury, and nickel. The metals concentrations detected in the shallow groundwater at Site 24 were similar to the metals concentrations detected at Site 21 and Site 78.

The pesticide, heptachlor epoxide, was detected in the shallow groundwater at Site 24 near the Spiractor Sludge Disposal Area and south of the Fly Ash Disposal Area. Although the concentrations of heptachlor epoxide appeared to be low, they exceeded the State groundwater standard. It is relevant to note that low levels of heptachlor epoxide (5.0 µg/kg) was detected in only one soil sample collected at the site.

Site 78 - HPIA

Soils

Soil samples were collected around six building areas within Site 78. The buildings were selected based on previous investigation findings and from the results of the geophysical survey conducted within Site 78 to locate suspected USTs. The soil around the suspected UST at Building 903 was primarily contaminated with SVOCs. The detected SVOC concentrations in the surface and subsurface soil samples ranged from 74 µg/kg to 2,600 µg/kg. The extent of the contamination appeared to be limited to the suspected UST area.

Pesticides and SVOCs were the primary contaminants detected in the soil samples collected around Building 1103. (Pesticides were detected in this area during a previous study.) Detected pesticide concentrations ranged from 9.7 µg/kg to 19,000 µg/kg. Detected SVOC concentrations ranged from 46 µg/kg to 1,700 µg/kg. The impacted area appeared to be limited, less than 2,000 square feet.

Although PCBs were expected to be found in the soils near Building 1300, only one detection was found. The PCB concentration (100 µg/kg) does not appear to present a contamination problem at this building area.

Pesticides were the primary contaminants detected in the soils around Building 1502. Detected pesticide concentrations ranged from 6.2 µg/kg to 16,000 µg/kg. A limited area (approximately 400 square feet) at the northeastern side of the building had the highest level of pesticide contamination. These pesticide levels are higher than typical levels, but disposal is not documented.

The soils sampled near Buildings 1601 and 1608 did not appear to be impacted.

Groundwater

The analytical findings indicated that shallow groundwater at Site 78 was impacted by organics and metals. The primary organic contaminants were VOCs, including: BTEX, PCE, TCE, vinyl chloride, 1,1-dichloroethene (1,1-DCE), cis-1,2-dichloroethene (cis-1,2-DCE), T-1,2-DCE, and 1,2-dichloropropane. The highest concentrations of these compounds were detected in wells located near the northeastern portion of Site 78 in the vicinity of the 901/903 buildings and in the southwestern portion of the site near Buildings 1601 and 1709. There was no particular area which exhibited excessive metals contamination since the entire site (as with Sites 21 and 24) appeared to be impacted.

The intermediate wells sampled at Site 78 exhibited low levels of VOCs and only a few metals which exceeded Federal and/or State standards. Benzene, TCE, 1,2-DCE, vinyl chloride, and dichloromethane were the most prevalent VOCs detected. The highest VOC concentrations were found in the northeastern and southern portions of the site. Several SVOCs, including naphthalene, acenaphthene, and carbazole were detected in one well in the northern portion of Site 78. Beryllium, cadmium, lead, manganese, and nickel concentrations in the northeastern portion of the site exceeded the Federal and/or State groundwater standards.

Benzene, 1,2-DCE, cis-1,2-DCE, T-1,2-DCE, and TCE were the only organics detected in the deep wells sampled at Site 78. Benzene was detected near Buildings 903, 1301, and 1709. The other volatiles were detected near Building 903, in between Buildings 1103 and 1301, and near Building 1709.

Contamination levels in the shallow groundwater appear to have decreased over time. An increase in contamination levels in some of the deeper wells has been noted.

Cogdels Creek and the New River

Copper, lead, and zinc were detected throughout Cogdels Creek and the New River at concentrations above Federal and/or State surface water standards. No trends were detected. The highest concentrations were detected near the Hadnot Point STP.

The most prevalent contaminants found in Cogdels Creek and New River sediments were polynuclear aromatic hydrocarbon (PAH) compounds, pesticides (particularly 4,4'-DDD), and several inorganics (e.g., lead and zinc). No trends or source areas were identified.

Beaver Dam Creek

The only contaminants that were present in Beaver Dam Creek surface water were inorganics. The inorganics that exceeded Federal and/or State surface water standards included copper, lead, and zinc. No trends or source areas could be identified.

The most prevalent contaminants found in Beaver Dam Creek sediments were PAHs, pesticides, and inorganics (lead was the only inorganic to exceed sediment screening values). No trends or source areas could be identified.

6.0 SUMMARY OF SITE RISKS

As part of the RI, a baseline human health RA and an ecological RA were conducted to evaluate the current or future potential risks to human health and the environment resulting from the presence of contaminants identified at OU No. 1. A summary of the key findings from both of these studies is presented below.

Human Health Risk Assessment

The human health RA was conducted for several environmental media including soil (surface and subsurface), groundwater, surface water, and sediments. Contaminants of concern (COCs) for each of these media were selected based on prevalence, mobility, persistence, and toxicity. Table 1 lists the potential COCs which were evaluated in the RA for each media. For

TABLE 1

SUMMARY OF CONTAMINANTS OF CONCERN EVALUATED IN THE HUMAN HEALTH RISK ASSESSMENT
RECORD OF DECISION - CTO-0177
MCB CAMP LEJEUNE, NORTH CAROLINA

	Soil			Groundwater	Surface Water		Sediment	
Contaminant of Concern	21	24	78	OU No. 1	CC/NR	BDC	CC/NR	BDC
Volatiles								
Benzene				●				
1,2-Dichloroethene (total)				●				
Tetrachloroethene				●				
Ethylbenzene				●				
Total Xylenes				●				
Trichloroethene				●	●			
Vinyl Chloride				●				
Toluene				●				
Semivolatiles								
Chrysene	●	●					●	●
Fluoranthene	●						●	●
Pyrene	●	●					●	●
Phenanthrene		●					●	●
Benzo(a)anthracene	●						●	
Benzo(b)fluoranthene	●	●					●	
Benzo(k)fluoranthene	●						●	
Benzo(a)pyrene	●						●	
Benzo(g,h,i)perylene							●	
Indeno(1,2,3-cd)pyrene	●						●	
Phenol				●				
Pesticides and PCBs								
4,4'-DDD	●	●					●	●
4,4'-DDE	●	●					●	●
4,4'-DDT	●	●					●	●
Dieldrin		●						
Heptachlor Epoxide				●				
Total Chlordane	●	●					●	●
Total PCBs	●	●						

TABLE 1 (Continued)

SUMMARY OF CONTAMINANTS OF CONCERN EVALUATED IN THE
HUMAN HEALTH RISK ASSESSMENT
RECORD OF DECISION - CTO-0177
MCB CAMP LEJEUNE, NORTH CAROLINA

	Soil			Groundwater	Surface Water		Sediment	
Contaminant of Concern	21	24	78	OU No. 1	CC/NR	BDC	CC/NR	BDC
Inorganics								
Arsenic	●	●		●	●	●	●	●
Barium				●	●	●	●	●
Beryllium		●		●	●	●	●	●
Cadmium						●	●	
Chromium	●	●		●	●	●	●	●
Copper				●	●	●		
Lead				●	●	●		
Manganese	●	●		●	●	●	●	●
Mercury				●				
Nickel				●				
Selenium						●		
Vanadium	●	●		●	●	●	●	●
Zinc	●	●		●	●	●	●	●

Notes: CC/NR = Cogdels Creek and New River
BDC = Beaver Dam Creek

soil, the potential COCs included pesticides, PCBs, and inorganics. For groundwater, the potential COCs included VOCs, one SVOC (phenol), and inorganics. Surface water COCs included one VOC (TCE) and inorganics. Sediment COCs included PAHs, pesticides, and inorganics.

The exposure routes evaluated in the RA included: ingestion, dermal contact, and particulate inhalation of surface soils; ingestion and dermal contact of subsurface soils; future potential ingestion, dermal contact, and inhalation of VOCs in groundwater; and ingestion and dermal contact of surface water and sediments. Several exposed populations were evaluated in the RA with respect to both current and future potential land use scenarios for the operable unit. For surface soil and groundwater, current military personnel and future on-site residents (adults and children) were retained as potentially exposed populations. Site construction workers were retained as potentially exposed populations for subsurface soils. Future potential adult and adolescent residents were retained for surface water and sediment exposures.

As part of the RA, incremental cancer risks (ICRs) and hazard indices (HIs) were calculated for each of the exposure routes and potentially exposed populations. An ICR refers to the cancer risk that is over and above the background cancer risk in unexposed individuals. For example, an ICR of 1.0E-04 means that one additional person out of ten thousand may be at risk of developing cancer due to excessive exposure to site contaminants if no actions are conducted. The HI refers to noncarcinogenic effects and is a ratio of the level of exposure to an acceptable level for all COCs. A HI greater than or equal to unity (i.e., 1.0) indicates that there may be a concern for noncarcinogenic health effects. A summary of the site risks in terms of ICRs and HIs calculated for OU No. 1 are presented on Table 2.

With respect to OU No. 1, all of the exposure routes/exposure populations evaluated had ICRs within the USEPA's acceptable risk range of 1.0E-04 to 1.0E-06 except for groundwater. The ICRs which were found above this acceptable range are summarized as follows and are highlighted on Table 2. Groundwater at OU No. 1 had calculated ICRs of 7E-04 and 2E-03 for future on-site resident children, and future on-site resident adults, respectively.

The HIs were below 1.0 except for groundwater. The calculated HI values for groundwater were 29 and 13 for future on-site resident children and future on-site resident adults, respectively.

TABLE 2

SUMMARY OF SITE RISKS
RECORD OF DECISION - CTO-0177
MCB CAMP LEJEUNE, NORTH CAROLINA

Receptors	Groundwater OU No. 1		Soil				Surface Water				Sediment			
			Site 21		Site 24		Beaver Dam Creek		Cogdels Creek		Beaver Dam Creek		Cogdels Creek	
	ICR (1)	HI (2)	ICR	HI	ICR	HI	ICR	HI	ICR	HI	ICR	HI	ICR	HI
Current Military Personnel	NA (3)	NA	6E-06	0.19	8E-07	0.03	NA	NA	NA	NA	NA	NA	NA	NA
Future Child Resident	7E-04	29	NA	NA	1E-05	0.3	1E-06	0.08	4E-07	0.01	4E-07	0.01	4E-07	0.04
Future Adult Resident	2E-03	13	NA	NA	4E-06	0.03	1E-06	0.02	6E-07	<0.01	5E-07	<0.01	5E-07	<0.01
Future Construction Worker	NA	NA	1E-07	0.01	1E-09	0.02	NA	NA	NA	NA	NA	NA	NA	NA

(1) ICR = incremental lifetime cancer risk
(2) HI = hazard index
(3) NA = not applicable

Note: The shaded areas identify the ICRs and HIs which are above the acceptable levels.

As shown on Table 2, the only ICRs and HIs above the acceptable levels are related to future residential land use. Based on the MCB, Camp Lejeune Master Plan, OU No. 1 is to remain as an industrial area in the future. No residential developments are planned for any of the site areas. Therefore, the RA presents a conservative risk estimate.

It is important to note that actual or threatened releases of hazardous substances from OU No. 1, if not addressed by the preferred alternative or one of the other active measures considered, may present a current or potential threat to public health, welfare, or the environment.

Ecological Risk Assessment

An ecological RA was conducted at OU No. 1 in conjunction with the RI. The objectives of this RA were to determine if past reported disposal activities are adversely impacting the ecological integrity of Cogdels Creek and Beaver Dam Creek; and to evaluate the potential effects on sensitive environments at the operable unit such as wetlands, protected species, and fish nursery areas.

The ecological RA was conducted for several environmental media including surface water, sediments, and soil. Table 3 lists the COCs which were identified and assessed in the ecological RA for each media. Surface water COCs included one VOC (TCE), and inorganics. Sediment COCs included PAHs, pesticides, and inorganics. For soil, the potential COCs included PAHs, pesticides, PCBs, and inorganics.

The aquatic environment was assessed in the ecological RA. Based on the potential habitat, and other physical characteristics, the most significant populations of aquatic organisms at OU No. 1 were in Cogdels Creek and Beaver Dam Creek since the surface water in the drainage ditch at Site 21 was either shallow or nonexistent, and intermittent in flow.

Chromium, copper, lead, and zinc were the only COCs detected in the surface water in Cogdels Creek at concentrations that exceeded any of the water quality standards. These same four constituents, along with silver, several PAHs and pesticides were detected in sediments at concentrations that potentially may decrease the viability of aquatic life. The PAH and pesticide concentrations may be related to past disposal practices. However, the pesticide concentration in Cogdels Creek may also be due to the widespread pesticide spraying that has occurred at MCB, Camp Lejeune.

TABLE 3

SUMMARY OF CONTAMINANTS OF CONCERN EVALUATED IN THE ECOLOGICAL RISK ASSESSMENT
RECORD OF DECISION - CTO-0177
MCB CAMP LEJEUNE, NORTH CAROLINA

	Surface Water		Sediments		Surface Soils		
Contaminant of Concern	CC/NR	BDC	CC/NR	BDC	Site 21	Site 24	Site 78
Volatiles							
Trichloroethene	•						
Semivolatiles							
Phenanthrene			•	•	•	•	•
Anthracene							•
Carbazole							•
Fluoranthene			•	•	•		•
Pyrene			•	•	•	•	•
Benzo(a)anthracene			•		•		•
Chrysene			•	•	•	•	•
Benzo(b)fluoranthene			•		•	•	•
Benzo(k)fluoranthene					•		•
Benzo(a)pyrene			•		•		•
Indeno(1,2,3-cd)pyrene			•		•		•
Benzo(g,h,i)perylene			•		•		•
Pesticides							
4,4'-DDE			•	•	•	•	•
4,4'-DDD			•	•	•	•	•
4,4'-DDT			•	•	•	•	•
Dieldrin						•	•
alpha-Chlordane			•	•	•	•	•
gamma-Chlordane			•	•	•	•	
PCBs							
Aroclor - 1254						•	
Aroclor - 1260					•	•	

Notes: CC/NR = Cogdels Creek and New River
BDC = Beaver Dam Creek

TABLE 3 (Continued)

SUMMARY OF CONTAMINANTS OF CONCERN EVALUATED IN THE ECOLOGICAL RISK ASSESSMENT
RECORD OF DECISION - CTO-0177
MCB CAMP LEJEUNE, NORTH CAROLINA

Contaminant of Concern	Surface Water		Sediments		Surface Soils		
	CC/NR	BDC	CC/NR	BDC	Site 21	Site 24	Site 78
Inorganics							
Aluminum	●	●	●	●	●	●	●
Arsenic	●	●	●	●	●	●	●
Barium	●	●	●	●		●	●
Beryllium	●		●	●	●	●	●
Cadmium			●				●
Chromium	●		●	●	●	●	●
Cobalt			●	●		●	
Copper	●	●	●	●	●	●	●
Iron	●	●	●	●	●	●	●
Lead	●	●	●	●	●	●	●
Manganese	●	●	●	●	●	●	●
Mercury						●	
Nickel						●	
Selenium			●	●	●	●	●
Silver			●				
Thallium						●	
Vanadium	●	●	●	●	●	●	●
Zinc	●	●	●	●	●	●	●

Notes: CC/NR = Cogdels Creek and New River
BDC = Beaver Dam Creek

Copper and zinc were the only COCs detected in surface water at Beaver Dam Creek that exceeded any of the water quality standards. Lead, several PAHs and several pesticides were detected in sediment samples from Beaver Dam Creek.

Overall, pesticides appear to be the most significant site related COCs that have the potential for decreasing the viability of aquatic organisms at OU No.1. There is some aquatic life inhabiting Cogdels Creek and Beaver Dam Creek including fish, tadpoles, and benthic macroinvertebrates. In addition, some terrestrial invertebrates probably inhabit the undeveloped areas within OU No.1. Pesticides are not only potentially toxic to aquatic life through a direct exposure pathway, but as indicated by their high bioconcentration factor value, they have a high potential to bioconcentrate pesticides in organisms. Therefore, other fauna that feed upon these organisms will be exposed to pesticides via this indirect exposure pathway.

The terrestrial environment was assessed in the ecological RA. Based on the soil toxicity data for plants and terrestrial invertebrates (earthworms), lead and chromium were detected in concentrations that potentially may decrease the viability of terrestrial invertebrates and floral species at Site 21. Lead and chromium, along with beryllium, copper, mercury, and vanadium were detected in concentrations that potentially may decrease the viability of terrestrial invertebrates and floral species at Site 24. At Site 78, lead and chromium were once again detected in concentrations that potentially may decrease the viability of terrestrial invertebrates and floral species, along with beryllium and zinc. Other terrestrial organisms (e.g., rabbits, birds, deer) may be exposed to contaminants in the surface soils and surface water by ingestion. Overall, pesticides appear to be the most significant site-related COCs that have the potential for decreasing the viability of terrestrial organisms at OU No. 1. Potential adverse impacts to these threatened or endangered species from contaminants at OU No. 1 appear to be low.

No wetlands were identified within OU No. 1 from available wetland maps, although some wetland areas border the tributaries to Cogdels Creek.

There are no known spawning and nursery areas for resident fish species within Cogdels Creek or Beaver Dam Creek. Therefore, there is no potential for decreased viability of fish spawning or nursing in Cogdels Creek or Beaver Dam Creek.

With respect to surface water and groundwater, fish, crab, benthic macroinvertebrates, birds, and other aquatic and terrestrial life were evaluated as potentially exposed populations. Bottom feeding fish and crabs, benthic macroinvertebrates, aquatic vegetation, and other aquatic life were evaluated with respect to sediment exposure. For soil, terrestrial species were evaluated as the potentially exposed population.

It is important to note that actual or threatened releases of hazardous substances from OU No. 1, if not addressed by the preferred alternative or one of the other active measures considered, may present a current or potential threat to public health, welfare, or the environment.

7.0 DESCRIPTION OF ALTERNATIVES

Several Remedial Action Alternatives (RAAs) have been developed to address the contaminated groundwater and/or soils at various areas of concern (AOCs) within OU No. 1. The AOCs were identified based on a comparison of the media-specific contaminant concentrations detected at the operable unit to the media-specific remediation levels developed in the FS. The AOCs identified for OU No. 1 include:

- VOC-contaminated plume located near the 900-Series Building area within Site 78 (referred to as Groundwater AOC 1).

- Three small areas of groundwater contamination (PCE only) located throughout Site 78 (Groundwater AOCs 2, 4, and 8).

- A fuel-contaminated plume located near the Hadnot Point Fuel Farm (Groundwater AOC 3).

- A VOC-contaminated plume located near the 1600 and 1700 Series Building area of Site 78 (Groundwater AOC 5).

- Two areas of groundwater contamination located within Site 24 (heptachlor epoxide only) (Groundwater AOCs 6 and 7).

- Northern portion of Site 21 with elevated levels of PCBs in soil (Soil AOC 1).

- Southwest portion of Site 21 with elevated PCB concentrations in surface soil (Soil AOC 2).

- Southwest portion of Site 21 with elevated pesticides concentrations in surface soil (Soil AOC 3).

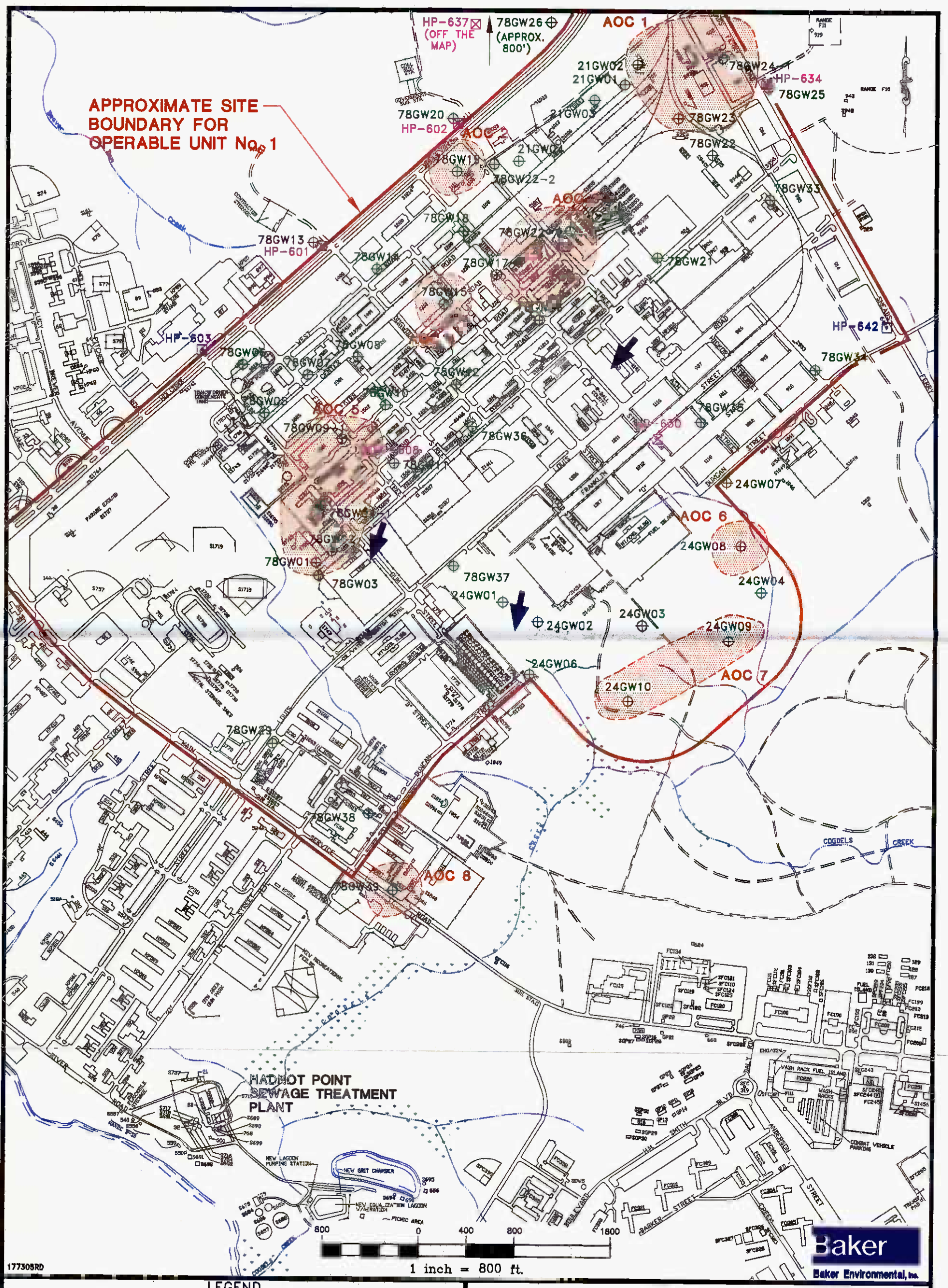
- Northeastern edge of Building 1502 within Site 78 with elevated levels of pesticides in surface soil (Soil AOC 4).

Figures 5 and 6 show the general location of the above-mentioned AOCs for groundwater and soil, respectively.

Based on the AOCs identified above, five groundwater RAAs and four soil RAAs were developed and evaluated in the FS.

It is important to note that the groundwater RAAs only include remediation of the groundwater from Groundwater AOCs 1 and 5. No additional remedial actions, other than long-term monitoring, will be performed for Groundwater AOCs 2, 3, 4, 6, 7, and 8 under any of the Groundwater RAAs. This decision for most of the AOCs was based on the low contaminant concentrations, the lack of a source area, the technical impracticality of remediation, and the lack of human health or environmental exposure. For example, PCE at a concentration of 1.0 µg/L was the only contaminant found above the remediation levels at Groundwater AOCs 2, 4, and 8. The State groundwater standard for PCE is 0.7 µg/L and the Federal drinking water standard is 5.0 µg/L. Since the detected level of PCE was below the Federal standard and only slightly above the State standard, additional monitoring of these areas appears to be the most appropriate measure at this time. If the monitoring indicates that the groundwater at these areas is deteriorating, additional measures will be taken. Once the remediation levels have been obtained for these areas, monitoring will no longer be necessary.

With respect to Groundwater AOCs 6 and 7, only one contaminant, heptachlor epoxide, was detected in the groundwater samples. The detected concentrations of this contaminant were 0.083 µg/L at 24GW08, 0.13 µg/L at 24GW09, and 0.078 µg/L at 24GW10. The State groundwater standard for heptachlor epoxide is 0.038 µg/L and the Federal drinking water standard is 0.20 µg/L. The detected levels were all below the Federal standard, but exceeded the State standard. There is no known source for this pesticide or any known history of the



LEGEND

- 78GW02 — SHALLOW MONITORING WELL
- ESTIMATED DIRECTION OF GROUDWATER FLOW
- APPROXIMATE AREA OF GROUNDWATER CONTAMINATION EXCEEDING REMEDIATION LEVELS FOR ORGANICS (SHALLOW MONITORING WELLS)
- AOC 8 — AREA OF CONCERN
- HP-603 — WATER SUPPLY WELL (ACTIVE)
- HP-601 — WATER SUPPLY WELL (INACTIVE)

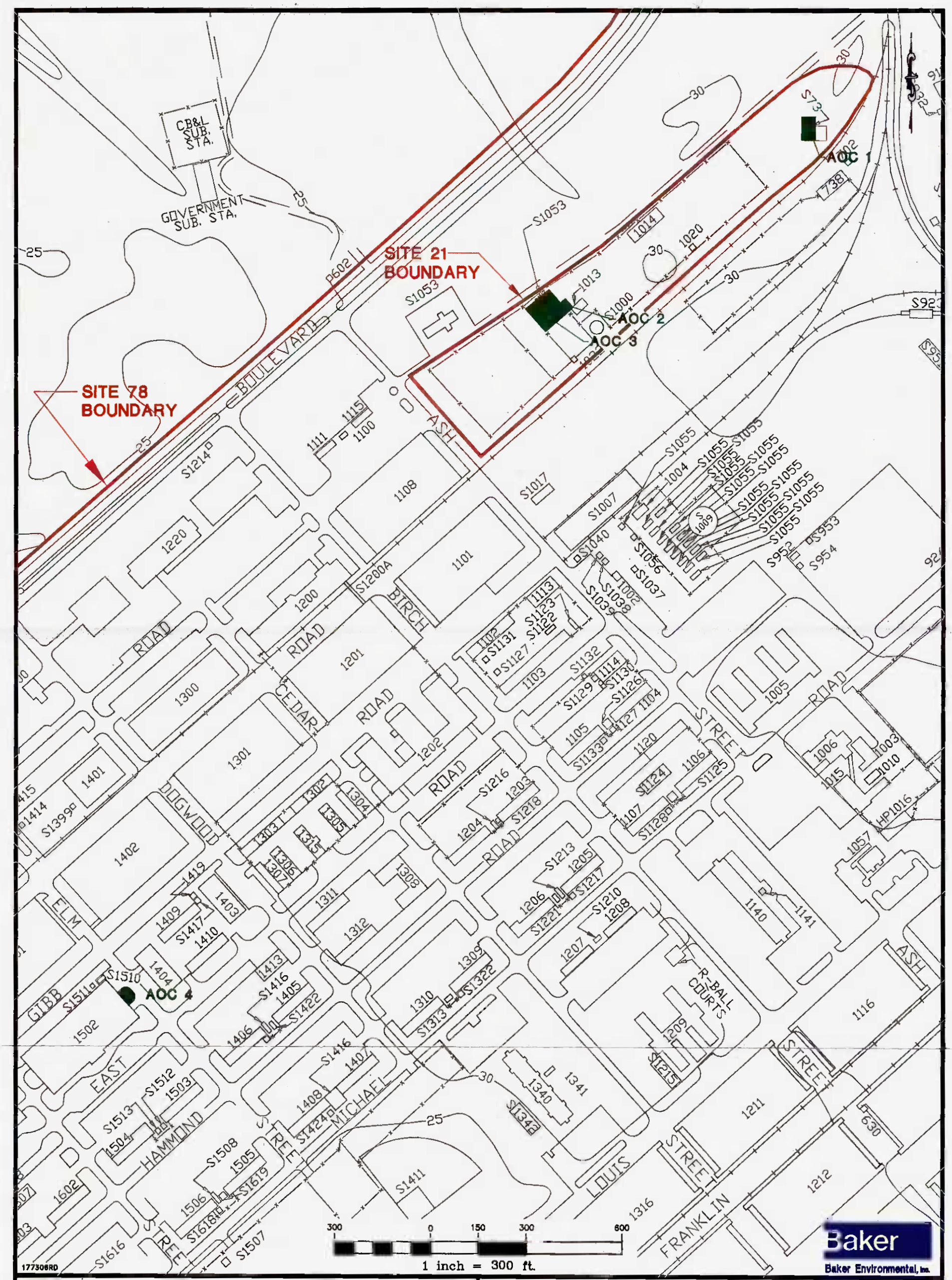
SOURCE: LANTDIV, FEBRUARY 1992

FIGURE 5
GROUNDWATER AREAS OF CONCERN AT OPERABLE UNIT No. 1 RECORD OF DECISION CTO-0177

MARINE CORPS BASE, CAMP LEJEUNE
NORTH CAROLINA

Baker Environmental, Inc.

0031TTR3V



Baker Environmental, Inc.

LEGEND

AOC 1 ● APPROXIMATE LOCATION OF SOIL EXCEEDING REMEDIATION LEVELS.

SOURCE: LANTDIV, OCT. 1991

FIGURE 6
APPROXIMATE LOCATION OF SOIL AREAS OF CONCERN
OPERABLE UNIT NO. 1
RECORD OF DECISION CTO-0177
MARINE CORPS BASE, CAMP LEJEUNE
NORTH CAROLINA

disposal of this contaminant. As with Groundwater AOCs 2, 4, and 8, additional monitoring of Groundwater AOCs 6 and 7 appears to be the most appropriate measure at this time. If monitoring indicates that the groundwater at these areas is deteriorating, additional measures will be taken. Once the remediation levels have been obtained at these two areas, monitoring will no longer be necessary.

No additional actions will be implemented at Groundwater AOC 3 since this is the area of the Hadnot Point Fuel Farm (Site 22). A fuel recovery system/groundwater treatment is currently operating at this area. Investigations/remediations related to the Fuel Farm are being handled under the UST Program not CERCLA. Therefore, only monitoring will be conducted near this area.

A brief overview of each of the RAAs per media is included below. All costs and implementation times are estimated.

Groundwater RAAs

The following groundwater RAAs were developed and evaluated for OU No. 1:

- RAA No. 1 No Action
- RAA No. 2 Institutional Controls
- RAA No. 3 Source Control (Interim Action Treatment System Extension)
- RAA No. 4 Source Control (Air Sparging)
- RAA No. 5 Source Control and Vertical Containment

Common Elements - All of the Groundwater RAAs will have a few common components. Specifically, the components of the IRA to be implemented at Site 78 will be included under all of the Groundwater RAAs. RAA Nos. 2 through 5 have several common remedial elements between them including aquifer-use restrictions, deed restrictions, and long-term monitoring of existing monitoring wells. Each of the common elements are briefly discussed below.

The IRA includes the installation of two groundwater pump and treat systems within Site 78, a long-term groundwater monitoring program, and institutional controls. The primary objective of the IRA is to contain the migration of two shallow groundwater plumes located within Site 78. In terms of the FS for the entire operable unit, the IRA will contain the shallow groundwater contamination from Groundwater AOCs 1 and 5.

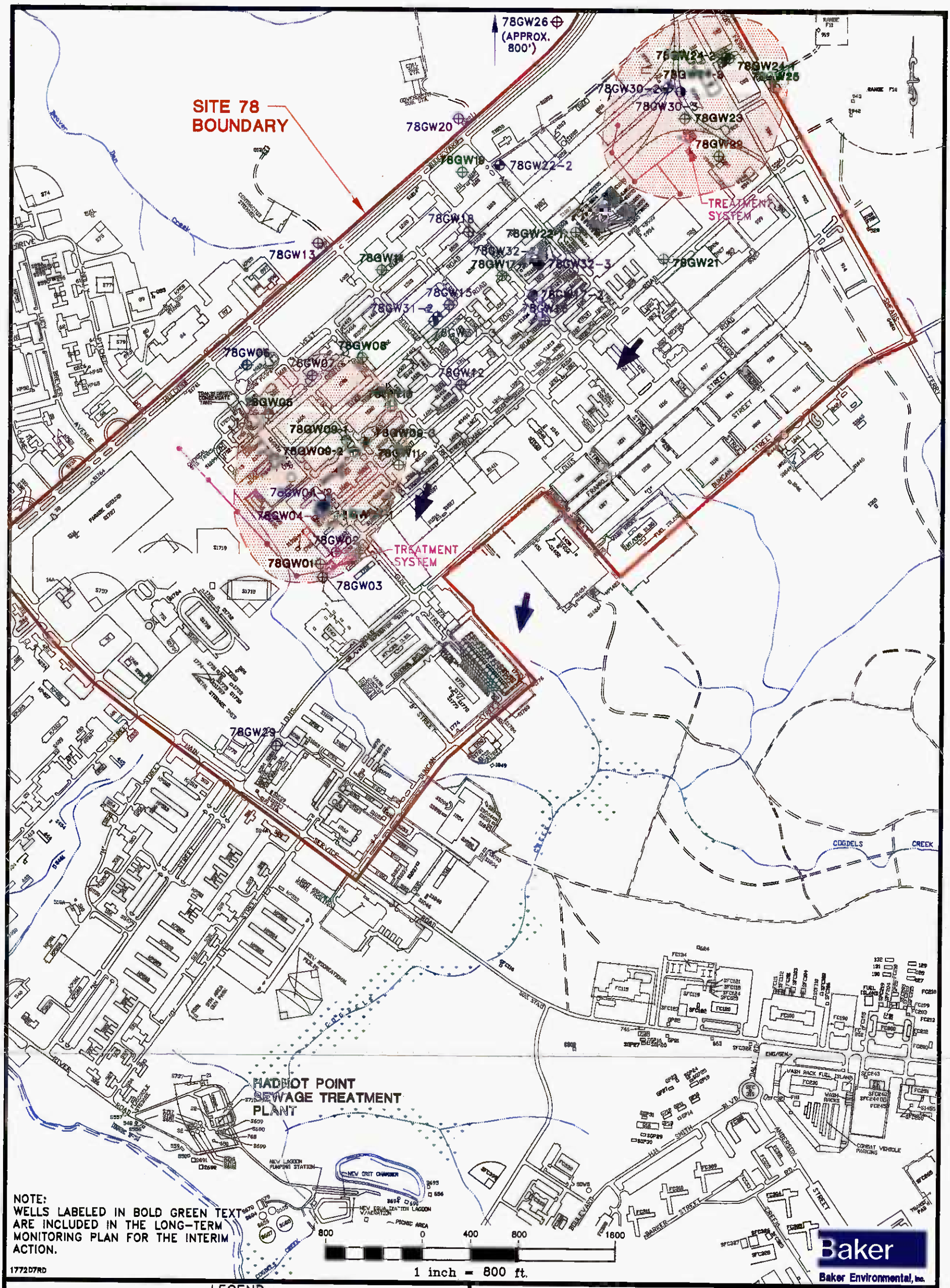
The IRA groundwater treatment systems will include air stripping, carbon adsorption, oil/water separation, and metals removal. One treatment system is to be located within the northeast contaminated plume (Groundwater AOC 1). Four extraction wells will be initially installed near the downgradient edge of this plume. The second treatment system is to be located within the southwest contaminated plume (Groundwater AOC 5). Five extraction wells will be initially installed along the downgradient edge of this second plume. Approximately three to five gallons of groundwater per minute are anticipated to be extracted from each well. Each of the treatment units will be designed to handle a maximum influent of 80 gallons per minute (gpm).

In addition to the pump and treat systems, the IRA will include a long-term groundwater monitoring program. Under this program, 20 existing monitoring wells will be sampled for the contaminants of concern (i.e., VOCs and inorganics) on a quarterly basis. As shown on Figure 7 in green text and listed below, the wells to be monitored include 16 shallow monitoring wells, two intermediate wells, and two deep wells.

Shallow Wells	Intermediate Wells	Deep Wells
78GW01	78GW09-2	78GW09-3
78GW04-1	78GW24-2	78GW24-3
78GW05		
78GW08		
78GW09-1		
78GW10		
78GW11		
78GW14		
78GW17-1		
78GW19		
78GW21		
78GW22		
78GW22-1		
78GW23		
78GW24-1		
78GW25		

The institutional controls under the interim action include placing aquifer-use restrictions on the shallow aquifer and keeping the closed water supply wells out of service.

Under RAA Nos. 2 through 5, aquifer-use restrictions will be remain on water supply wells HP-601, HP-602, HP-608, HP-634, and HP-637. Deed restrictions restricting the placement of additional water supply wells within the entire OU No. 1 will also be included with these four RAAs.



LEGEND

- 78GW02 — SHALLOW MONITORING WELL
- 78GW04-2 — INTERMEDIATE MONITORING
- 78GW04-3 — DEEP MONITORING WELL
- APPROXIMATE AREA OF SHALLOW GROUNDWATER CONTAMINATION EXCEEDING REMEDIATION LEVELS (BASED ON 1991 ESE DATA)
- ESTIMATED DIRECTION OF GROUNDWATER FLOW
- TREATMENT SYSTEM
- EXTRACTION WELLS AND PIPING

SOURCE: LANTDIV, FEBRUARY 1992

FIGURE 7
INTERIM REMEDIAL ACTION TO BE IMPLEMENTED FOR THE SURFICIAL AQUIFER AT SITE 78
RECORD OF DECISION CTO-0177
MARINE CORPS BASE, CAMP LEJEUNE
NORTH CAROLINA

003606-IT01V

In addition to the twenty wells included under the long-term monitoring program for the IRA for Site 78, an additional five shallow monitoring wells and the nearby water supply wells will also be included under a long-term monitoring program for the groundwater RAA Nos. 2, 3, 4, and 5. The five shallow monitoring wells will include: 78GW15, 78GW39, 24GW08, 24GW09, and 24GW10. Several of these wells are associated with the newly identified Groundwater AOCs. Both active and inactive water supply wells will be monitored. The active supply wells include HP-603, and HP-642. The inactive supply wells to be monitored include HP-601, HP-602, HP-608, HP-630, HP-634, and HP-637. Additional wells may be added to the monitoring program, if necessary.

For the monitoring wells included in the long-term program but not included under the IRA, samples will be collected on a semiannually basis for five years and analyzed for Target Compound List (TCL) VOCs, Target Analyte List (TAL) inorganics, total dissolved solids (TDS) and total suspended solids (TSS). As required, after five years the operable unit will be re-evaluated to determine the effectiveness of the implemented remedial action. Based on the the semiannual groundwater data and the data from the IRA, a less frequent sampling program may be implemented (such as annually), or it may be determined that sampling is no longer required at certain areas. In time, the results of the monitoring program may indicate that one or more of the currently inactive water supply wells can be considered for use.

The Groundwater RAAs will only include active remediation of the groundwater from Groundwater AOCs 1 and 5. No additional remedial actions, other than the long-term monitoring, will be performed for Groundwater AOCs 2, 3, 4, 6, 7, and 8 under any of the Groundwater RAAs. As previously discussed, this decision for most of the AOCs was based on the contaminant concentrations and since no apparent source(s) were identified (e.g., PCE was the only contaminant detected at three of the Groundwater AOCs at levels above the State groundwater standard). If the monitoring indicates that the groundwater at these areas is deteriorating, additional measures will be taken. This will be evaluated every five years. Once the remediation levels have been obtained for these areas, monitoring will no longer be necessary.

No additional actions will be implemented at Groundwater AOC 3 since this is the area of the Hadnot Point Fuel Farm (Site 22). A fuel recovery system/groundwater treatment is currently operating at this area. Investigations/remediations related to the Fuel Farm are being handled under the UST Program, not CERCLA. Therefore, only monitoring will be conducted near this area.

A description of the remaining remedial actions associated with each alternative as well as the estimated cost and timeframe to implement the alternative follows:

- **RAA No. 1: No Action**

  Capital Cost: $0
  Annual Operation and Maintenance (O&M) Costs: $0
  Net Present Worth (NPW): $0
  Months to Implement: None

  The No Action RAA is required under CERCLA to be evaluated through the nine point evaluation criteria summarized on Table 4. This RAA provides a baseline for comparison. Under this RAA, no further action at the operable unit will be implemented (note that the IRA to contain the migration of two shallow plumes and prevent exposure to groundwater contamination would still be implemented under this RAA).

- **RAA No. 2: Institutional Controls**

  Capital Cost: $0
  Annual O&M Costs: $26,000 for Years 1 through 5, $13,000 for Years 6 through 30
  NPW: $260,000
  Months to Implement: 3-6

  Under RAA No. 2, no additional remedial actions will be performed to reduce the toxicity, mobility, or volume of the contaminants at OU No. 1. This RAA will include only the common institutional controls of monitoring, ordinances or directives preventing the operation of nearby supply wells, and access restrictions for prohibiting construction of potable supply wells.

- **RAA No. 3: Source Control (Interim Remedial Action Treatment System Extension)**

  Capital Cost: $180,000
  Annual O&M Costs: $30,000 for Years 1 through 5, $15,000 for Years 6 through 30
  NPW: $460,000
  Months to Implement: 10

  In general, RAA No. 3 is a source control alternative with the primary objective to remediate the source(s) of shallow groundwater contamination. Under this alternative three additional shallow extraction wells will be installed at areas

TABLE 4
GLOSSARY OF EVALUATION CRITERIA

- **Overall Protection of Human Health and Environment** - addresses whether or not an alternative provides adequate protection and describes how risks posed through each pathway are eliminated, reduced, or controlled through treatment engineering controls or institutional controls.

- **Compliance with ARARs** - addresses whether or not an alternative will meet all of the applicable or relevant and appropriate requirements (ARARs) or other Federal and State environmental statutes.

- **Long-term Effectiveness and Permanence** - refers to the magnitude of residual risk and the ability of an alternative to maintain reliable protection of human health and the environment over time once cleanup goals have been met.

- **Reduction of Toxicity, Mobility, or Volume through Treatment** - entails the anticipated performance of the treatment options that may be employed in an alternative.

- **Short-term Effectiveness** - refers to the speed with which the alternative achieves protection, as well as the remedy's potential to create adverse impacts on human health and the environment that may result during the construction and implementation period.

- **Implementability** - entails the technical and administrative feasibility of an alternative, including the availability of materials and services needed to implement the chosen solution.

- **Cost** - includes capital and operation and maintenance costs. For comparative purposes, presents present worth values.

- **USEPA/State Acceptance** - Evaluates the technical and administrative issues and concerns the USEPA and State have regarding each of the alternatives. This criterion is addressed in the ROD once comments on the RI/FS report and PRAP have been received.

- **Community Acceptance** - Evaluates the issues and concerns the public may have regarding each of the alternatives. This criterion is addressed in the ROD once the comments on the RI/FS reports and the PRAP have been received.

exhibiting the highest VOC contamination. The contaminated groundwater will be pumped to the interim action groundwater treatment systems. Two of the extraction wells will be installed near existing monitoring wells 78GW24-1 and 78GW23 within Groundwater AOC 1. The third extraction well will be installed near existing monitoring well 78GW09-1 within Groundwater AOC 5. The extraction wells will be designed the same as for the interim action wells (i.e., 6-inch minimum diameter, approximately 35 feet deep). Based on site geology, it is anticipated that the wells will produce three to five gpm of water.

No extraction wells will be placed in the deeper portions of the aquifer under this alternative. It is believed that once the contaminants in the source of deep groundwater contamination (i.e., the shallow aquifer) are removed and treated, the contaminant levels in the deeper portions of the aquifer will be reduced in time. Deeper extraction wells could actually draw the existing shallow contamination down into the deeper portions of the aquifer, and thereby increase the vertical extent of the contaminant plume. The deeper aquifer will be monitored to determine the effectiveness of the RAA.

- **RAA No. 4: Source Control (Air Sparging)**

Capital Cost: $230,000
Annual O&M Costs: $110,000 for Years 1 through 5
NPW: $690,000
Months to Implement: 12

In general, RAA No. 4 is a source control alternative with the primary objective to remediate the highly contaminated shallow aquifer, which is the source of deep groundwater contamination. Under this alternative, two in situ air sparging/soil venting treatment systems will be installed at areas of the highest VOC contamination. One of the units will be installed near existing monitoring well 78GW24-1 (Groundwater AOC 1). The other treatment system will be installed near existing monitoring well 78GW09-1 (Groundwater AOC 5).

The treatment systems will be designed to primarily treat the shallow (source) contamination. It is believed that once the source of contamination (the shallow aquifer) is remediated, the contaminant levels in the deeper portions of the aquifer will be reduced in time.

- **RAA No. 5: Source Control and Vertical Containment**

  Capital Cost: $310,000
  Annual O&M Costs: $32,000 for Years 1 through 5, $16,000 for Years 6 through 30
  NPW: $615,000
  Months to Implement: 15

  In general, RAA No. 5 is a source control and vertical containment alternative with the primary objectives to remediate the source(s) of groundwater contamination and to mitigate the vertical migration of the contamination. The source control component of this alternative is the same as with RAA No. 3. In such, three additional shallow extraction wells will be installed at areas of the highest VOC contamination and connected to the interim action groundwater treatment systems. Two of the extraction wells will be installed near existing monitoring wells 78GW24-1 and 78GW23 within Groundwater AOC 1. The third extraction well will be installed near existing monitoring well 78GW09-1 within Groundwater AOC 5. The extraction wells will be designed the same as for the IRA wells (i.e., 6-inch minimum diameter, approximately 35 feet deep). Based on site geology, it is anticipated that the wells will produce a flow of approximately three to five gpm.

  The vertical containment component of this alternative includes the installation of two extraction wells at the areas of the highest VOC contamination in the deeper portions of the aquifer at OU No. 1. One of the wells will be installed near existing monitoring well 78GW24-3 within Groundwater AOC 1. The second extraction well will be installed near existing monitoring wells 78GW4-2 and 78GW4-3 within Groundwater AOC 5. The extraction wells will be 6-inch minimum diameter and installed at approximately 75 feet below ground surface.

Soil RAAs

The following Soil RAAs were developed and evaluated for OU No. 1:

- RAA No. 1 No Action
- RAA No. 2 Capping
- RAA No. 3 On-Site Treatment
- RAA No. 4 Off-Site Treatment/Disposal

A description of each alternative as well as the estimated cost and timeframe to implement the alternative follows:

- **RAA No. 1: No Action**

  Capital Cost: $0
  Annual O&M Costs: $0
  NPW: $0
  Months to Implement: None

  The No Action RAA is required under CERCLA to establish a baseline for comparison. Under this RAA, no further action at the operable unit will be implemented to prevent exposure to contaminated soil.

- **RAA No. 2: Capping**

  Capital Cost: $260,000
  Annual O&M Costs: $60,000 for 30 years
  NPW: $1.2 million
  Months to Implement: 6

  In general, Soil RAA No. 2 includes the installation of an asphalt or concrete cap over the contaminated soil areas within Site 21 and Site 78. The thickness of the cap will be approximately four to eight inches. To ensure the integrity of the capping system, periodic maintenance (e.g., applying a sealant over asphalt) will be required. In order to monitor the effectiveness of the cap (i.e., the prevention of migration of the COCs), groundwater sampling will be conducted semiannually. Groundwater samples will be collected from six monitoring wells: 21GW01, 21GW02, 21GW03, 21GW04, 78GW09-1, and 78GW10. The capped areas will be fenced to restrict access to the capped areas and reduce damage to the caps. New fencing may not be required for Soil AOC 3. This RAA will require approximately 900 linear feet of new chain-link fence to be installed. The fence will be of sufficient height and construction so as to limit access to the area. In addition, "No Trespassing" signs will be posted along the fences to further deter access. Routine maintenance and repairs of the fence, as necessary, are also included under this RAA. In addition to the fence, deed restrictions restricting the use of the area in and around the capped areas will be implemented. Any soil excavated during potential future construction activities will require appropriate disposal in accordance with applicable Federal and State regulations.

The objectives of this RAA are to prevent the potential for direct contact with the soils, and to prevent the potential for the horizontal or vertical migration of contaminants via storm water infiltration.

- **RAA No. 3: On-Site Treatment**

  Capital Cost: $650,000 (incineration); $1.4 million (dechlorination)
  Annual O&M Costs: $0
  NPW: $650,000 (incineration); $1.4 million (dechlorination)
  Months to Implement: 8-12

  RAA No. 3 includes the excavation of up to 1,050 cubic yards of contaminated soil from Soil AOCs 1 through 4 and treatment on site via either chemical dechlorination, or incineration. Following treatment, any residual soils will be removed from the treatment unit, analyzed, and if permitted (based on final treatment levels), used as backfill at the site. If not permitted, the treated soils will be properly disposed off site. The excavated areas will be graded to conform to the surrounding terrain. Clean fill may be added to the excavated areas as necessary to bring the areas up to grade. The excavated areas will be revegetated.

- **RAA No. 4: Off-Site Treatment/Disposal**

  Capital Cost: $480,000 (disposal); $1.3 million (treatment)
  Annual O&M Costs: $0
  NPW: $480,000 (disposal); $1.3 million (treatment)
  Months to Implement: 8-12

  Soil RAA No. 4 includes the excavation of soil from all of the Soil AOCs (1,050 cubic yards) and off-site treatment and/or disposal. The treatment/disposal facility will have to be permitted to accept low levels (i.e., less than 50 parts per million) of PCBs and pesticides.

8.0 SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

A detailed analysis was performed on the Groundwater and Soil RAAs using the nine evaluation criteria in order to select a site remedy. Tables 5 and 6 present a summary of this detailed analysis for Groundwater RAAs and Soil RAAs, respectively. A brief summary of each RAA's strengths and weaknesses with respect to the evaluation criteria follows. A glossary of the evaluation criteria has previously been noted on Table 4.

TABLE 5

SUMMARY OF DETAILED ANALYSIS - GROUNDWATER RAAs
RECORD OF DECISION CTO-0177
MCB CAMP LEJEUNE, NORTH CAROLINA

Evaluation Criteria	RAA No. 1 No Action	RAA No. 2 Institutional Controls	RAA No. 3 Source Control (Interim Remedial Action Treatment System Extension)	RAA No. 4 Source Control (Air Sparging)	RAA No. 5 Source Control and Vertical Containment
OVERALL PROTECTIVENESS					
• Human Health Protection	Potential risks associated with groundwater exposure are mitigated due to the interim remedial action and long-term monitoring program.	Potential risks associated with groundwater exposure are mitigated due to the interim remedial action and long-term monitoring program.	Although treatment is employed, aquifer is not usable until remediation levels are met. The alternative is protective of public health by implementing institutional controls (i.e., monitoring and restrictions on potable supply wells).	Although treatment is employed, aquifer is not usable until remediation levels are met. The alternative is protective of public health by implementing institutional controls (i.e., monitoring and restrictions on potable supply wells).	Although treatment is employed, aquifer is not usable until remediation levels are met. The alternative is protective of public health by implementing institutional controls (i.e., monitoring and restrictions on potable supply wells).
• Environmental Protection	Migration of contamination is reduced via the interim remedial action.	Migration of contamination is reduced via the interim remedial action.	Migration of contaminated groundwater is reduced by pump and treat.	Migration of contaminated groundwater is reduced by in situ treatment.	Migration of contaminated groundwater is reduced by pump and treat.
COMPLIANCE WITH ARARS					
• Chemical-Specific ARARs	Will exceed Federal and/or NC groundwater quality ARARs.	Will exceed Federal and/or NC groundwater quality ARARs.	Since organics and total metals above State and Federal standards will remain untreated in some portions of the operable unit, a Corrective Action Plan will need to be prepared in accordance with Title 15A NCAC 2L.0106(k) and (l). These portions are outside of the primary VOC plumes. All other chemical-specific ARARs will be met over time.	Since organics and total metals above State and Federal standards will remain untreated in some portions of the operable unit, a Corrective Action Plan will need to be prepared in accordance with Title 15A NCAC 2L.0106(k) and (l). These portions are outside of the primary VOC plumes. All other chemical-specific ARARs will be met over time.	Since organics and total metals above State and Federal standards will remain untreated in some portions of the operable unit, a Corrective Action Plan will need to be prepared in accordance with Title 15A NCAC 2L.0106(k) and (l). These portions are outside of the primary VOC plumes. All other chemical-specific ARARs will be met over time.
• Location-Specific ARARs	Not applicable.	Not applicable.	Will meet location-specific ARARs.	Will meet location-specific ARARs.	Will meet location-specific ARARs.
• Action-Specific ARARs	Not applicable.	Not applicable.	Will meet action-specific ARARs.	Will meet action-specific ARARs.	Will meet action-specific ARARs.

TABLE 5 (Continued)

SUMMARY OF DETAILED ANALYSIS - GROUNDWATER RAAs
RECORD OF DECISION CTO-0177
MCB CAMP LEJEUNE, NORTH CAROLINA

Evaluation Criteria	RAA No. 1 No Action	RAA No. 2 Institutional Controls	RAA No. 3 Source Control (Interim Remedial Action Treatment System Extension)	RAA No. 4 Source Control (Air Sparging)	RAA No. 5 Source Control and Vertical Containment
LONG-TERM EFFECTIVENESS AND PERMANENCE					
• Magnitude of Residual Risk	Risk reduced via the interim remedial action.	Risk reduced via the interim remedial action.	Shallow groundwater in the operable unit that will not be addressed pose no current risk since the shallow aquifer is not utilized for potable supply. Future use of the shallow aquifer is unlikely due to poor transmissivity. The long term effectiveness of pump and treat is unknown. Contaminant levels may decrease in time, but could potentially increase if the extraction/treatment system is shut down. Institutional controls will prevent residual risk.	Shallow groundwater in the operable unit that will not be addressed pose no current risk since the shallow aquifer is not utilized for potable supply. Future use of the shallow aquifer is unlikely due to poor transmissivity. The long term effectiveness of pump and treat is unknown. Contaminant levels may decrease in time, but could potentially increase if the extraction/treatment system is shut down. Institutional controls will prevent residual risk.	Shallow groundwater in the operable unit that will not be addressed pose no current risk since the shallow aquifer is not utilized for potable supply. Future use of the shallow aquifer is unlikely due to poor transmissivity. The long term effectiveness of pump and treat is unknown. Contaminant levels may decrease in time, but could potentially increase if the extraction/treatment system is shut down. Institutional controls will prevent residual risk.
• Adequacy and Reliability of Controls	Not applicable - no additional controls.	Additional monitoring is adequate to determine effectiveness of alternative.	Institutional controls are reliable to prevent potential human health exposure. Periodic operation and maintenance and monitoring will ensure that the treatment system is effective.	Institutional controls are reliable to prevent potential human health exposure. Periodic operation and maintenance and monitoring will ensure that the treatment system is effective.	Institutional controls are reliable to prevent potential human health exposure. Periodic operation and maintenance and monitoring will ensure that the treatment system is effective.
• Need for 5-year Review	Review would be required to ensure adequate protection of human health and the environment is maintained.	Review would be required to ensure adequate protection of human health and the environment is maintained.	Review not needed once remediation levels are met.	Review not needed once remediation levels are met.	Review not needed once remediation levels are met.

TABLE 5 (Continued)

SUMMARY OF DETAILED ANALYSIS - GROUNDWATER RAAs
RECORD OF DECISION CTO-0177
MCB CAMP LEJEUNE, NORTH CAROLINA

Evaluation Criteria	RAA No. 1 No Action	RAA No. 2 Institutional Controls	RAA No. 3 Source Control (Interim Remedial Action Treatment System Extension)	RAA No. 4 Source Control (Air Sparging)	RAA No. 5 Source Control and Vertical Containment
REDUCTION OF TOXICITY, MOBILITY, OR VOLUME THROUGH TREATMENT					
• Treatment Process Used	No additional treatment other than the IRA treatment system. The IRA treatment train consisting of air striping, activated carbon, and metals removal.	No additional treatment other than the IRA treatment system. The IRA treatment train consisting of air striping, activated carbon, and metals removal.	Treatment train for metals removal, air stripping, and activated carbon.	In addition to IRA treatment train, includes air sparging and soil vapor extraction.	Treatment train for metals removal, air stripping, and activated carbon.
• Amount Destroyed or Treated	Contaminants in groundwater at the outer edges of two plumes.	Contaminants in groundwater at the outer edges of two plumes.	Majority of contaminants in groundwater plumes.	Majority of contaminants in groundwater.	Majority of contaminant in groundwater plumes.
• Reduction of Toxicity, Mobility or Volume	Reduced volume and toxicity of contaminated groundwater via the IRA.	Reduced volume and toxicity of contaminated groundwater via the IRA.	Reduced volume and toxicity of contaminated groundwater.	Reduced volume and toxicity of contaminated groundwater.	The mobility of the VOC contamination in the shallow aquifer may be increased due to operating extraction wells in the deeper zones.
• Residuals Remaining After Treatment	Source areas will be a continuing source of contamination.	Source areas will be a continuing source of contamination.	Potentially minimal residuals after goals are met.	Potentially minimal residuals after goals are met.	Potentially minimal residuals after goals are met.
• Statutory Preference for Treatment	Satisfied via the IRA.	Satisfied via the IRA.	Satisfied.	Satisfied.	Satisfied.
SHORT-TERM EFFECTIVENESS					
• Community Protection	Risks to community not increased by remedy implementation.	Risks to community not increased by remedy implementation.	Minimal, if any, risks during extraction and treatment.	Possible migration of toxic vapors, should be controlled with the soil vapor extraction systems.	Minimal, if any, risks during extraction and treatment.
• Worker Protection	No significant risk to workers.	No significant risk to workers.	Protection required during treatment.	Protection required during treatment.	Protection required during treatment.

TABLE 5 (Continued)

SUMMARY OF DETAILED ANALYSIS - GROUNDWATER RAAs
RECORD OF DECISION CTO-0177
MCB CAMP LEJEUNE, NORTH CAROLINA

Evaluation Criteria	RAA No. 1 No Action	RAA No. 2 Institutional Controls	RAA No. 3 Source Control (Interim Remedial Action Treatment System Extension)	RAA No. 4 Source Control (Air Sparging)	RAA No. 5 Source Control and Vertical Containment
• Environmental Impacts	Continued impacts from existing conditions.	Continued impacts from existing conditions.	Aquifer drawdown during extraction. This is not expected to be an environmental concern.	Possible migration of toxic vapors, should be controlled with the soil vapor extraction systems.	Aquifer drawdown during extraction. This is not expected to be an environmental concern. Potential vertical migration of contaminants may occur via remediation of the Castle Hayne aquifer.
• Time Until Action is Complete	Estimated 30 years.	Estimated 30 years.	Estimated 30 years.	Estimated 5 years.	Estimated 30 years.
IMPLEMENTABILITY				• Will require a pilot study.	
• Ability to Construct and Operate; Reliability	No construction or operation activities.	No construction or operation activities.	No significant difficulties are anticipated to construct or operate the system. Construction within a highly-developed area like the HPIA will pose minor problems due to infrastructure. Extensive coordination with Base Public Works/Planning Department will be required.	No significant difficulties are anticipated to construct or operate the system. Construction within a highly-developed area like the HPIA will pose minor problems due to infrastructure. Extensive coordination with Base Public Works/Planning Department will be required.	No significant difficulties are anticipated to construct or operate the system. Construction within a highly-developed area like the HPIA will pose minor problems due to infrastructure. Extensive coordination with Base Public Works/Planning Department will be required.
• Ability to Monitor Effectiveness	No monitoring. Failure to detect contamination will result in potential ingestion of contaminated groundwater.	Proposed monitoring will give notice of failure before significant exposure occurs.	Adequate system monitoring.	Adequate system monitoring.	Adequate system monitoring.
• Availability of Services and Capacities; Equipment	None required.	None required.	Services and materials are available.	Services and materials are available.	Services and materials are available.
COSTS NPW	$0	$260,000	$460,000	$690,000	$615,000

TABLE 6

SUMMARY OF DETAILED ANALYSIS - SOIL RAAs
RECORD OF DECISION CTO-0177
MCB CAMP LEJEUNE, NORTH CAROLINA

Evaluation Criteria	RAA No. 1 No Action	RAA No. 2 Capping	RAA No. 3 On-Site Treatment	RAA No. 4 Off-Site Treatment/Disposal
OVERALL PROTECTIVENESS				
• Human Health Protection	No reduction in risk.	Would reduce potential for human exposure.	Reduces overall risk to human health.	Reduces overall risk to human health.
• Environmental Protection	No reduction in risk to ecological receptors.	Would reduce potential for exposure and migration.	Reduces overall risk to ecological receptors.	Reduces overall risk to ecological receptors.
COMPLIANCE WITH ARARs				
• Chemical-Specific ARARs	Will exceed ARARs.	Will exceed ARARs.	Will meet contaminant-specific ARARs.	Will meet ARARs.
• Location-Specific ARARs	Not applicable.	Will meet location-specific ARARs.	Will meet location-specific ARARs.	Will meet location-specific ARARs.
• Action-Specific ARARs	Not applicable.	Will meet action-specific ARARs.	Will meet action-specific ARARs.	Will meet action-specific ARARs.
LONG-TERM EFFECTIVENESS AND PERMANENCE				
• Magnitude of Residual Risk	Source has not been removed. Potential risks not reduced.	Contaminated soils are not removed from the site, but potential risk due to exposure to COCs are reduced as long as the cap is maintained.	Soil AOCs will be remediated. Remaining contaminants do not present an unacceptable human health or environmental risk.	Contaminated soil is removed from the site. No residual wastes will remain onsite.
• Adequacy and Reliability of Controls	Not applicable - no controls.	Multilayered cap controls contaminated soil - can be a reliable option if maintained properly.	Soil will be treated to meet risk-based action levels. Treated soil will be analyzed to ensure that remediation levels are met.	No residual wastes will remain onsite. Wastes will be treated offsite and disposed of in a suitable landfill.
• Need for 5-year Review	Review would be required to ensure adequate protection of human health and the environment is maintained.	Review would be required to ensure adequate protection of human health and the environment is maintained.	Review not needed unless the treatment process last longer than five years.	Review not needed since contaminated soil removed.

TABLE 6 (Continued)

SUMMARY OF DETAILED ANALYSIS - SOIL RAAs
RECORD OF DECISION CTO-0177
MCB CAMP LEJEUNE, NORTH CAROLINA

Evaluation Criteria	RAA No. 1 No Action	RAA No. 2 Capping	RAA No. 3 On-Site Treatment	RAA No. 4 Off-Site Treatment/Disposal
REDUCTION OF TOXICITY, MOBILITY, OR VOLUME THROUGH TREATMENT				
• Treatment Process Used	None.	None.	Chemical dechlorination, or incineration.	Off-site treatment.
• Amount Destroyed or Treated	None.	None.	Majority of soil COCs.	Majority of soil COCs.
• Reduction of Toxicity, Mobility or Volume	None.	No reduction in toxicity or volume. However; capping will mitigate contaminant migration.	Reduction in toxicity, mobility and volume of contaminated soil.	Reduction in toxicity, mobility and volume of contaminated soil.
• Residuals Remaining After Treatment	Not applicable - no treatment.	Contaminated soil is capped.	Residuals remaining on site will be below remediation goals.	No residuals will remain onsite.
• Statutory Preference for Treatment	Not satisfied.	Not satisfied.	Satisfied.	Satisfied.
SHORT-TERM EFFECTIVENESS				
• Community Protection	Risks to community not increased by remedy implementation.	Temporary potential risks during soil grading and cap installation activities.	Limited potential risks during soil excavation and treatment activities.	Limited potential risks during soil excavation and transport activities.
• Worker Protection	No significant risks to workers.	Temporary potential risks during soil grading and cap installation activities.	Potential risks during soil excavation and treatment activities.	Potential risks during excavation and transportation activities.
• Environmental Impacts	Continued impacts from existing conditions.	No additional environmental impacts.	Air quality and odors - but treatment system will be designed to meet standards.	No additional environmental impacts.
• Time Until Action is Complete	Not applicable.	Less than one year. Monitor for 30 years.	Less than one year.	Less than one year.

TABLE 6 (Continued)

SUMMARY OF DETAILED ANALYSIS - SOIL RAAs
RECORD OF DECISION CTO-0177
MCB CAMP LEJEUNE, NORTH CAROLINA

Evaluation Criteria	RAA No. 1 No Action	RAA No. 2 Capping	RAA No. 3 On-Site Treatment	RAA No. 4 Off-Site Treatment/Disposal
IMPLEMENTABILITY				
• Ability to Construct and Operate	No construction or operation activities.	Simple to construct and maintain. Requires materials handling procedures.	Requires soil excavation activities. Requires assembly of treatment systems.	Requires soil excavation activities. No other on-site operations.
• Ability to Monitor Effectiveness	No monitoring included.	Cap maintenance and groundwater monitoring will adequately monitor effectiveness.	Adequate system monitoring.	No monitoring other than confirmation soil sampling.
• Availability of Services and Capacities; Equipment	None required.	No special services or equipment required. Cap materials should be readily available.	Qualified vendors available to perform on-site treatment.	Off-site treatment and disposal facilities should have adequate capacity.
COSTS NPW	$0	$1.2 million	$650,000 (incineration) $1.4 million (dechlorination)	$480,000 (disposal) $1.3 million (treatment)

Groundwater RAA Comparative Analysis

Overall Protection of Human Health and the Environment

All of the groundwater RAAs evaluated in the detailed evaluation will provide adequate protection of human health and the environment. At a minimum, all of the RAAs will contain the horizontal migration of the shallow contamination within Groundwater AOCs 1 and 5. The No Action RAA will provide protection through the implementation of the IRA. In addition, all of the RAAs except RAA No. 1 will provide protection via applying aquifer-use and deed restrictions. RAA Nos. 3, 4, and 5 provide additional protection since the primary sources of contamination are remediated.

Although, initially RAA No. 5 appears to present a more complete remediation plan (i.e., remediating both the surficial and the deeper portions of the aquifer), it may not provide the most protection to human health and the environment. Since the primary source of groundwater contamination is in the surficial aquifer, the operation of "deep" extraction wells could cause increased migration of the shallow VOCs into the deeper portion of the aquifer.

Compliance with ARARs

Groundwater RAA Nos. 1 and 2 may not be able to meet the chemical-specific ARARs since these two RAAs are containment options and do not specifically remediate the source(s) of contamination. Groundwater RAA Nos. 3, 4, and 5 should be able to meet their respective Federal and State ARARs except for the chemical-specific ARARs associated with total metals and some organics in limited areas of the operable unit. A Corrective Action Plan (CAP) will be prepared (under separate cover) in accordance with Title 15A NCAC 2L.0106(k) and (l) for these exceptions. Due to the complex nature of groundwater contamination, the time to reach the remediation levels cannot be determined.

Note that both inorganic and organic contaminants above State and/or Federal Standards will not be remediated in some portions of the operable unit due to the impracticality of remediation, and/or the lack of human health and ecological exposure to the contaminants. All of the Groundwater RAAs will met the location-specific and action-specific ARARs.

Long-Term Effectiveness and Permanence

Risks will be reduced under all of the RAAs through the implementation of the IRA, institutional controls, and/or other forms of treatment. In time, RAA Nos. 3, 4, and 5 will be effective, but the permanent effectiveness of a pump and treat system is unknown. Contaminant levels will initially decrease until equilibrium is reached; however, once pumping is terminated, contaminant levels could increase. All of the RAAs include treatment of the COCs in the groundwater aquifer. All of the RAAs will require a five year evaluation review to determine their effectiveness. This review may not be needed for RAAs No. 3, 4, and 5 once the remediation levels are met and maintained.

Reduction of Toxicity, Mobility, or Volume Through Treatment

All of the RAAs will provide reduction of toxicity, and/or volume of contaminants in the groundwater aquifer via treatment. All of the RAAs will utilize the IRA treatment systems consisting of air stripping, carbon adsorption, oil/water separation, and metals removal. RAA No. 4 will include air sparging/soil venting, a relatively new remedial technology. RAA Nos. 3 and 4 should provide for the greatest extent of contaminant reduction and will reduce contaminant mobility. RAA No. 5 may actually increase the mobility of the VOC contamination in the surficial aquifer since this alternative includes the installation and operation of deeper extraction wells. All of the RAAs will satisfy the statutory preference for treatment.

Short-Term Effectiveness

Risks to community and workers will not be increased with the implementation of RAA Nos. 1 and 2 since no additional site activities will be included (except for additional groundwater sampling for RAA No. 2). Under RAA Nos. 3 and 5, risks to the community and workers will be slightly increased due to the temporary increase in dust production and volatilization during the installation of the piping for the groundwater extraction and/or treatment systems. Additional aquifer drawdown will occur under RAA Nos. 3 and 5. This drawdown is not anticipated to affect Beaver Dam or Cogdels Creek. The discharge of the treated effluent to the Hadnot Point STP and ultimately to the New River is not expected to increase risks to the environment. Under RAA No. 4, there is a potential for the migration of contaminated vapors to off-site areas. This is due to the fact the it is difficult to anticipate and control the movement of the vapors generated during in situ air sparging.

With respect to the time required to meet the remedial response objectives, for all of the RAAs, once implemented, it is expected that the alternatives will immediately reduce the levels of the contaminants in the groundwater. The time to reach the remedial response objectives will vary. It is estimated that RAA Nos. 1, 2, 3, and 5 will be implemented for at least 30 years and RAA No. 4 for 5 years.

Implementability

No additional construction, operation, or administrative activities other than the ones associated with the IRA are associated with RAA No. 1. The only additional site activities associated with RAA No. 2 are groundwater sampling activities, which can be easily performed. The implementation of RAA Nos. 3 and 5 will require the installation of additional extraction wells and connection to the IRA treatment systems. RAA No. 3 will require the installation of three additional extraction wells (shallow) and their associated piping. RAA No. 5 will require the installation of three additional shallow extraction wells and two deeper extraction wells and their associated piping. RAA No. 4 may be the most difficult alternative to implement (primarily since the other "additional treatment" alternatives will only require connection to an existing treatment system). RAA No. 4 will require a pilot study to determine the effectiveness of air sparging/soil vapor extraction at Site 78.

Cost

In terms of the NPW, the No Action Alternative (RAA No. 1) would be the least expensive RAA to implement, followed by RAA No. 2, RAA No. 3, RAA No. 5, and then RAA No. 4. The estimated NPW values in increasing order are $0 (RAA No. 1), $260,000 (RAA No. 2), $460,000 (RAA No. 3), $615,000 (RAA No. 5), and $690,000 (RAA No. 4).

Soil RAA Comparative Analysis

Overall Protection of Human Health and the Environment

All of the Soil RAAs, with the exception of the No Action RAA (No.1), provide some type of protection to human health and the environment. RAA No. 2 (Capping) provides protection in the form of reducing the potential for direct contact with the contaminated soil and reducing

the mobility of the contaminated soil. RAA Nos. 3 and 4 provide protection through removing and/or treating the contaminated soils.

Compliance with ARARs

All of the RAAs should meet all of the chemical-, action-, and location-specific ARARs. The (risk-based) remediation levels for the soil COCs will not be met with RAA Nos. 1 and 2.

Long-Term Effectiveness and Permanence

RAA No. 1 is not an effective or permanent alternative. RAA No. 2 will provide long-term effectiveness as long as the caps are maintained. RAA Nos. 3 and 4 provide the highest degree of long-term effectiveness and permanence since the contaminated soils are removed and/or treated.

RAA Nos. 1 and 2 will require a 5-year review. RAA No. 3 will only require a 5-year review if the duration of the treatment process is greater than five years. RAA No. 4 will not require the 5-year review.

Reduction of Toxicity, Mobility, or Volume Through Treatment

No form of treatment is included under RAA Nos. 1 and 2. Even though RAA No. 2 does not implement any form of treatment, the contaminated soils will be capped. Treatment is included under the other two RAAs. Therefore, these "treatment" RAAs will reduce the toxicity, mobility, and/or volume of the COCs through treatment.

RAA Nos. 1 and 2 do not satisfy the statutory preference for treatment, whereas the other two RAAs do satisfy the preference.

Short-Term Effectiveness

Risks to community and workers are not increased with the implementation of RAA No. 1, but current potential human health risks from existing conditions will continue to exist. Under RAA Nos. 2, 3, and 4, risks to the community and workers will be temporarily increased during soil grading and/or excavation activities. Risks will also be increased temporarily

during the installation of the caps/covers (RAA No. 2). With respect to RAA No. 3, risks will be increased during the operation of the treatment options.

Implementability

With respect to implementability, RAA No. 1 would be the easiest alternative to implement since there are no activities associated with it. RAA No. 2 should be the next easiest to implement since the primary construction activities only require common earth construction equipment. RAA No. 4 may be more difficult to implement due to the unknown availability/capacity of an appropriate treatment and/or disposal facility. The implementability of RAA No. 3 is dependent on the availability of mobile treatment units.

Cost

No costs are associated with RAA No. 1. The estimated NPW of the other Soil RAAs, in increasing order are: $480,000 (RAA No. 4 - off-site disposal); $650,000 (RAA No. 3 - incineration); $1.2 million (RAA No. 2 - capping); $1.3 million (RAA No. 4 - off-site treatment); and $1.4 million (RAA No. 3 - chemical dechlorination).

9.0 SELECTED REMEDY

This section of the ROD focuses on the selected remedy for OU No. 1. The major treatment components, engineering controls, and institutional controls of the remedy will be discussed along with the estimated costs to implement the remedial action. In addition, the remediation levels to be attained at the conclusion of the remedial action will be discussed.

Remedy Description

The selected remedy for OU No. 1 is a combination of Groundwater RAA No. 3 [Source Control (Interim Remedial Action Treatment System Extension)] and Soil RAA No. 4 (Off-Site Disposal). Overall, the major components of the selected remedy include:

- Collecting additional contaminated groundwater in the surficial aquifer by installing three additional extraction wells within the areas with the highest contaminant levels. The three extraction wells will be installed to a depth of approximately 35 feet and pumped at a rate of three to five gpm.

- Restricting the use on nearby water supply wells which are currently inactive/closed (HP-601, HP-602, HP-608, HP-630, HP-634, and HP-637), and restricting the installation of any new water supply wells within the operable unit area.

- Implementing a long-term groundwater monitoring program to monitor the effectiveness of the groundwater remedy and to monitor the nearby water supply wells. In addition to the twenty wells included under the monitoring program for the IRA for Site 78, five shallow monitoring wells and eight local supply wells will be included in the long-term monitoring program for OU No. 1. The additional wells to be sampled include 78GW15, 78GW39, 24GW08, 24GW09, 24GW10, HP-601, HP-602, HP-603, HP-608, HP-630, HP-634, HP-637, and HP-642. Additional wells may be added to the monitoring program, if necessary.

- Groundwater samples will be collected on a semiannual basis for five years and analyzed for TCL VOCs, TAL metals, TDS, and TSS. After five years, the data will be evaluated to determine the effectiveness of the remediation. A less frequent sampling program (such as annually) may be implemented, or it may be determined that sampling is no longer required from certain areas. In time, the results of the monitoring program may indicate that one or more of the currently inactive water supply wells can be activated.

- Excavating approximately 1,050 cubic yards of PCB- and pesticide-contaminated soils for off-site disposal. A possible off-site landfill which may be capable of receiving these soils is located in Pinewood, South Carolina, approximately 200 miles away from the operable unit.

The proposed locations of the major components of the selected remedy are presented on Figures 8 and 9.

Estimated Costs

The estimated capital costs associated with the selected remedy is approximately $659,000. Annual O&M costs of approximately $30,000 are projected for the sampling of the monitoring wells and supply wells for the first 5 years. The annual O&M costs will be reduced to approximately $15,000 for years 6 through 30. Assuming an annual percentage rate of 5 percent, these costs equate to a NPW of approximately $1.0 million. Table 7 presents a summary of this cost estimate for the major components of the selected remedy.

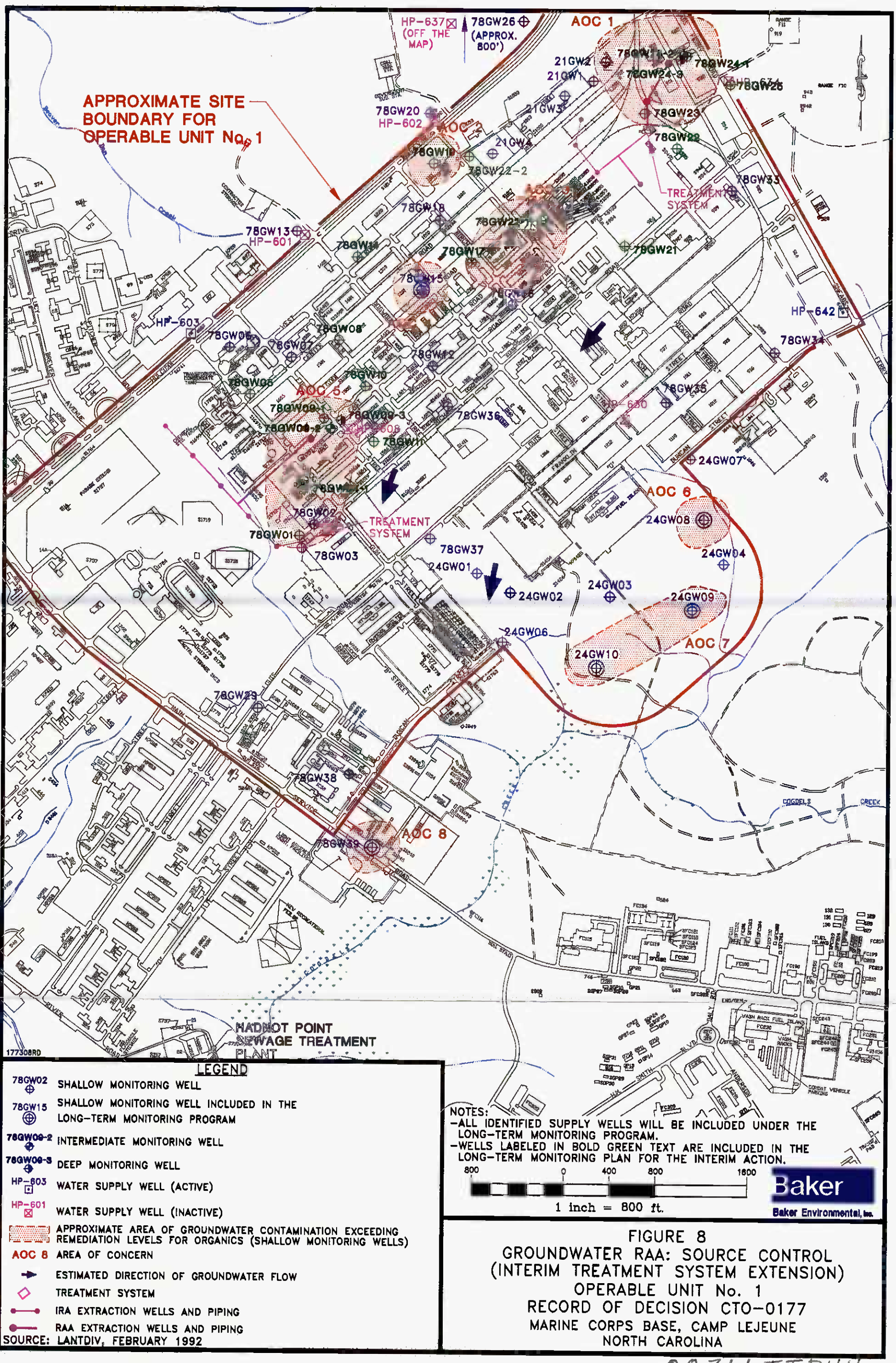
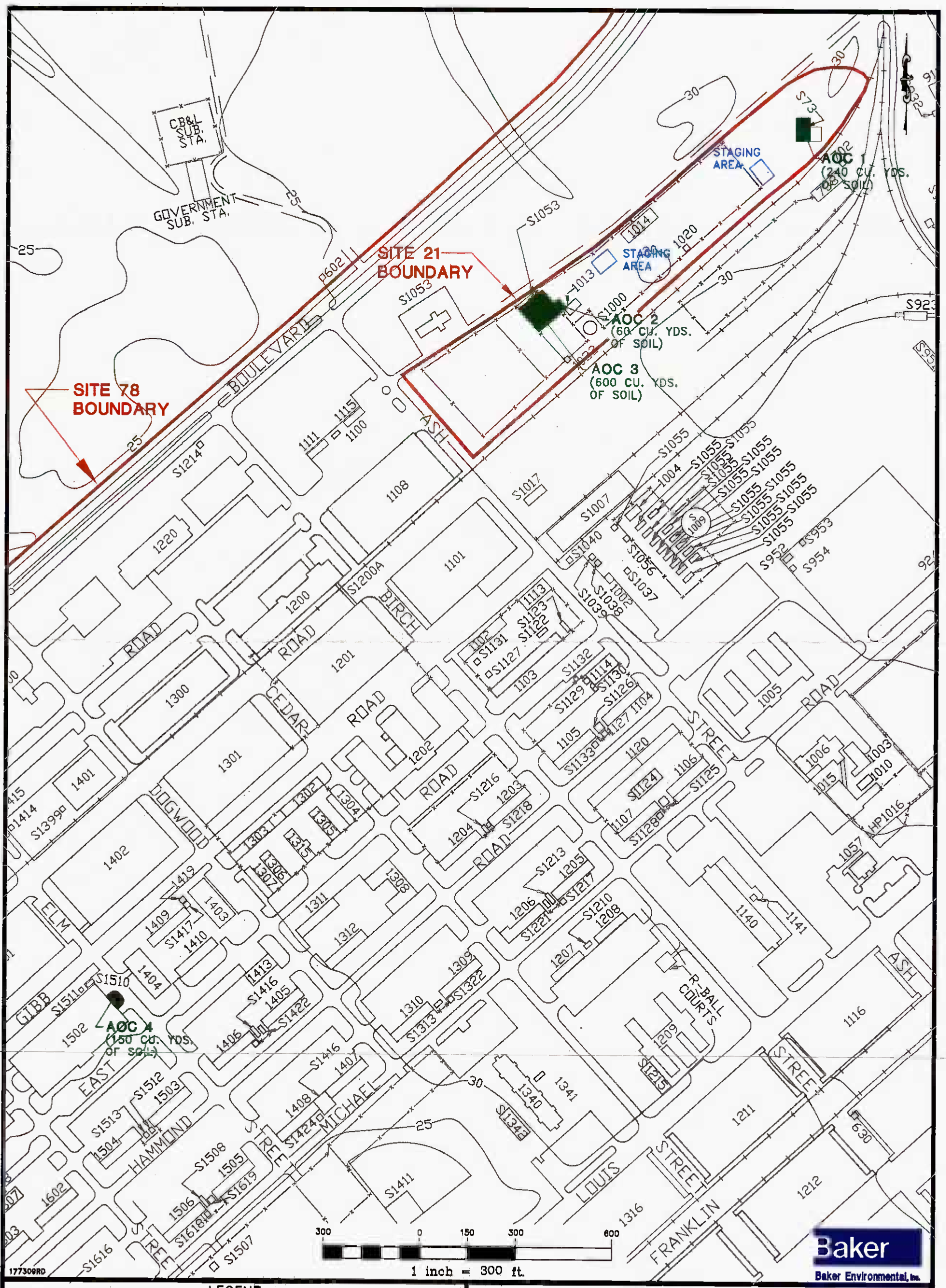


FIGURE 8
GROUNDWATER RAA: SOURCE CONTROL
(INTERIM TREATMENT SYSTEM EXTENSION)
OPERABLE UNIT No. 1
RECORD OF DECISION CTO-0177
MARINE CORPS BASE, CAMP LEJEUNE
NORTH CAROLINA

00366TTRUV



Baker Environmental, Inc.

LEGEND

AOC 1 ● APPROXIMATE LOCATION OF SOIL EXCEEDING REMEDIATION LEVELS. EXCAVATION TO TAKE PLACE WITHIN THIS AREA

SOURCE: LANTDIV, OCT. 1991

FIGURE 9
PREFFERED SOIL RAA : OFF-SITE TREATMENT/DISPOSAL
OPERABLE UNIT NO. 1
RECORD OF DECISION CTO-0177
MARINE CORPS BASE, CAMP LEJEUNE
NORTH CAROLINA

TABLE 7

ESTIMATED COST SUMMARY FOR THE SELECTED REMEDY
RECORD OF DECISION - CTO-0177
MCB CAMP LEJEUNE, NORTH CAROLINA

Cost Component	Estimated Cost
Capital Costs:	
• **Groundwater Remediation**	
Mobilization	$25,000
Extraction Well System	89,000
Treatment System*	0
Discharge System*	0
Demobilization	17,000
Pilot Studies	7,000
	138,000
Engineering and Contingencies	39,000
	$177,000
• **Soil Remediation**	
Site Preparation	$75,000
Off-Site Landfilling	260,000
Site Restoration	22,000
Demobilization	15,000
	$372,000
Engineering and Contingencies	110,000
	$482,000
Operation and Maintenance Costs:	
• **Groundwater Remediation**	
Groundwater Monitoring [Years 1 through 5]	$30,000
Groundwater Monitoring [Years 6 through 30]	15,000
TOTAL CAPITAL COST	$659,000
TOTAL OPERATION AND MAINTENANCE COSTS	$30,000 (Years 1-5) $15,000 (Years 6-30)
TOTAL NET PRESENT WORTH (Using 5% discount rate)	$1.0 million

* Costs for the groundwater treatment and discharge systems are included in the Interim Remedial Action for OU No. 1.

Remediation Levels

The selected remedy will be operated until the remediation levels developed in the FS are met. The remediation levels for the groundwater COCs and the soil COCs are listed on Table 8. Where applicable, the groundwater remediation levels were based on Federal Maximum Contaminant Levels (MCLs) and North Carolina groundwater standards. In the absence of the above-mentioned criteria, a risk-based remediation level (based on an ICR of 1.0E-4 and an HI of 1.0) was developed. For soil, the USEPA Region III risk-based soil screening criteria for industrial soils were used.

For groundwater, the monitoring results of the groundwater plumes will determine when the remedial action has met the remediation levels. Confirmation soil sampling results during excavation activities will be used to determine that soil exceeding the remediation levels has been removed from the site.

USEPA/State Acceptance

USEPA Region IV and the NC DEHNR have reviewed the PRAP for OU No. 1. Both agencies have concurred with the selected remedy outlined in this ROD.

A Corrective Action Plan (CAP) will be submitted (under separate cover) to the NC DEHNR to justify not remediating the limited areas of groundwater with PCE and heptachlor epoxide concentrations slightly exceeding the State groundwater standards. In addition, the CAP will provide justification for not remediating of groundwater throughout the OU due to elevated total metals since the total metals are not elevated due to disposal activities.

Community Acceptance

The selected remedy for OU No. 1 was provided to the community during the public comment period and during the public meeting (refer to Section 3.0 of this document). The limited number of community-generated comments and the nature of these comments (refer to Section 11.0 of this document), indicate that the selected remedy has achieved community acceptance.

TABLE 8

REMEDIATION LEVELS FOR CONTAMINANTS OF CONCERN
RECORD OF DECISION CTO-0177
MCB CAMP LEJEUNE, NORTH CAROLINA

Media	Contaminant of Potential Concern	Remediation Goal	Unit (1)
Groundwater	Benzene	1.0	µg/L
	1,2-Dichloroethene (total)	70	µg/L
	Ethylbenzene	29	µg/L
	Heptachlor Epoxide	0.2	µg/L
	Tetrachloroethene	0.7	µg/L
	Toluene	1,000	µg/L
	Trichloroethene	2.8	µg/L
	Vinyl Chloride	0.015	µg/L
	Xylenes (total)	400	µg/L
	Arsenic	50	µg/L
	Barium	1,000	µg/L
	Beryllium	4	µg/L
	Chromium	50	µg/L
	Manganese	50	µg/L
	Vanadium	110	µg/L
Soil	PCBs (total)	370	µg/kg
	4,4'-DDD	12,000	µg/kg
	4,4'-DDT	8,400	µg/kg
	Chlordane (total)	2,200	µg/kg

(1) µg/L = microgram per liter
µg/kg = microgram per kilogram

10.0 STATUTORY DETERMINATIONS

A selected remedy must satisfy the statutory requirements of CERCLA Section 121 which include: (1) be protective of human health and the environment, (2) comply with ARARs (or justify noncompliance), (3) be cost-effective, (4) utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable, and (5) satisfy the preference for treatment that reduces toxicity, mobility, or volume as a principal element, or provide an explanation as to why this preference is not satisfied. The evaluation of how the selected remedy for OU No. 1 satisfies these requirements is presented below.

Protection of Human Health and the Environment

The selected remedy provides protection to human health and the environment through additional extraction and treatment of groundwater, implementation of groundwater-related institutional controls, and the excavation and removal of PCB- and pesticide-contaminated soils. The institutional controls, which include aquifer use restrictions, well placement restrictions, and groundwater monitoring, will reduce the potential for ingestion of contaminated groundwater. By removing and disposing the PCB- and pesticide-contaminated soils off site, the potential risks associated with exposure to these contaminants is eliminated.

Compliance With Applicable or Relevant and Appropriate Requirements

The selected remedy will either comply with the majority of the ARARs or will be justified for not complying with them. The site-specific ARARs applicable to OU No. 1 are summarized on Tables 9, 10, and 11 with respect to chemical-specific, location-specific, and action-specific ARARs. The justification for not complying for a few of the chemical-specific ARARs is described below.

- The metals (total), which were detected in the shallow groundwater at OU No. 1 above the Federal MCLs and/or the State groundwater standards, will not be addressed. There is no known source of this contamination, and no "pattern" which could be associated with a metals contaminant plume or plumes. In addition, total metal concentrations are sporadically elevated throughout MCB, Camp Lejeune (even in background wells), and therefore may be due to natural conditions of soil or to geologic conditions. From an engineering standpoint, it would not be practicable to try to

TABLE 9
CHEMICAL-SPECIFIC ARARs AND TBCs FOR OU NO. 1
RECORD OF DECISION CTO - 0177
MCB CAMP LEJEUNE, NORTH CAROLINA

ARAR /TBC Citation	Requirement/Description	Consideration as an ARAR or TBC
FEDERAL/CONTAMINANT-SPECIFIC		
Safe Drinking Water Act a. Maximum Contaminant Levels (MCLs) 40 CFR 141.11-141.16 b. Maximum Contaminant Level Goals (MCLGs) 40 CFR 141.50-141.51	Standards for protection of drinking water sources serving at least 25 persons. MCLs consider health factors, as well as economic and technical feasibility of removing a contaminant; MCLGs do not consider the technical feasibility of contaminant removal. For a given contaminant, the more stringent of MCLs or MCLGs is applicable unless the MCLG is zero, in which case the MCL applies.	Relevant and appropriate in developing remediation levels for contaminated groundwater used as a potable water supply. The Castle Hayne aquifer is a potable water supply.
Reference Doses (RfDs), EPA Office of Research and Development	Presents non-enforceable toxicity data for specific chemicals for use in public health assessments to characterize risks due to exposure to contaminants.	TBC requirement for the public health risk assessment.
Carcinogenic Potency Factors, EPA Environmental Criteria and Assessment Office; EPA Carcinogen Assessment Group	Presents non-enforceable toxicity data for specific chemicals for use in public health assessments to compute the individual incremental cancer risk resulting from exposure to carcinogens.	TBC requirement for the public health risk assessment.
Health Advisories, EPA Office of Drinking Water	Non-enforceable guidelines for chemicals that may intermittently be encountered in public water supply systems. Available for short- or long-term exposure for a child and/or adult.	TBC requirement for the public health risk assessment.
National Emissions Standards for Hazardous Air Pollutants (NESHAPs) (40 CFR Part 61)	Standards promulgated under the Clean Air Act for significant sources of hazardous pollutants, such as vinyl chloride, benzene, trichloroethylene, dichlorobenzene, asbestos, and other hazardous substances. Considered for any source that has the potential to emit 10 tons of any hazardous air pollutant or 25 tons of a combination of hazardous air pollutants per year.	Remedial actions (e.g., air stripping) may result in release of hazardous air pollutants. The treatment design may elect to control equipment air emissions using the same or similar methods.

TABLE 9 (Continued)
CHEMICAL-SPECIFIC ARARs AND TBCs FOR OU NO. 1
RECORD OF DECISION CTO - 0177
MCB CAMP LEJEUNE, NORTH CAROLINA

ARAR/TBC Citation	Requirement/Description	Consideration as an ARAR or TBC
National Ambient Air Quality Standards (40 CFR 50)	Standards for the following six criteria pollutants: particulate matter; sulfur dioxide; carbon monoxide; ozone; nitrogen dioxide; and lead. The attainment and maintenance of these standards are required to protect the public health and welfare.	Relevant and appropriate requirements for remedial actions requiring discharge to the atmosphere.
EPA Ambient Water Quality Criteria (Section 304(a)(1) of the Clean Water Act)	Non-enforceable criterion for water quality for the protection of human health from exposure to contaminants in drinking water and from ingestion of aquatic biota and for the protection of fresh-water and salt-water aquatic life.	TBC requirement for groundwater treatment.
STATE/CONTAMINANT-SPECIFIC		
State of North Carolina Department of Environment, Health, and Natural Resources Division of Environmental Management 15A NCAC 2B.0200 - Classifications and Water Quality Standards Applicable to Surface Waters of North Carolina	Surface water quality standards based on water use and criteria class of surface water.	Relevant and appropriate for remedial actions requiring discharge to surface water.
North Carolina Anti-Degradation Policy for Surface Water (Water Quality Standards Title 15A, Chapter 2, Subchapter 2B)	Provides for an anti-degradation policy for surface water quality. Pursuant to this policy, the requirements of 40 CFR 131.12 are adopted by reference in accordance with General Statute 150B-14(b).	This policy is a TBC requirement for remedial actions requiring discharge to surface water.
North Carolina Groundwater Standards Applicable Statewide (NCAC Title 15A Chapter 2 Subchapter 2L	Establishes maximum contaminant concentrations to protect groundwater. These standards are mandatory.	Relevant and appropriate for remedial actions requiring discharge to groundwater.

TABLE 9 (Continued)
CHEMICAL-SPECIFIC ARARs AND TBCs FOR OU NO. 1
RECORD OF DECISION CTO - 0177
MCB CAMP LEJEUNE, NORTH CAROLINA

ARAR/TBC Citation	Requirement/Description	Consideration as an ARAR or TBC
North Carolina DEHNR Regulations	Standards for protection of health of consumers using public drinking water supplies. Establishes MCLs for given contaminants.	Relevant and appropriate in developing remediation levels for contaminated groundwater used as a potable water supply.
North Carolina DEHNR Toxic Air Pollutant Rule Statutory Authority G.S. 143-215.107(a)(1),(3),(4),(5); 143-B-282	A facility shall not emit any toxic air pollutants (as listed in Rule .1104) that may cause or contribute beyond the premises (contiguous property boundary) to any significant ambient air concentration that may adversely affect human health.	Potentially relevant and appropriate for remedial actions requiring discharge to the atmosphere.
North Carolina DEHNR Regulations for Hazardous (15A NCAC 13A) and Solid Waste (15A NCAC 13B)	Standards and requirements for management and disposal of hazardous and solid waste.	Potentially relevant and appropriate for remedial actions requiring management and disposal of hazardous and/or solid waste.

ARAR = Applicable or Relevant and Appropriate Requirement.
TBC = To Be Considered Criteria

TABLE 10

LOCATION-SPECIFIC ARARs AND TBCs FOR OU NO. 1
RECORD OF DECISION CTO - 0177
MCB CAMP LEJEUNE, NORTH CAROLINA

ARAR/TBC Citation	Requirement/Description	Consideration as an ARAR or TBC
FEDERAL AND STATE/ LOCATION-SPECIFIC		
Fish and Wildlife Coordination Act 16 USC 661-666	Requires action to protect fish and wildlife from actions modifying streams or areas affecting streams.	Beaver Dam and Cogdels Creek are located near and within the operable unit boundaries. If remedial actions are implemented that modify these creeks, this will be an applicable ARAR.
Federal Endangered Species Act 16 USC 1531, 50 CFR 200, and 50 CFR 402	Requires action to avoid jeopardizing the continued existence of listed endangered species or modification of their habitat.	Many protected species have been cited near and on MCB, Camp Lejeune such as the American alligator, the Bachmans sparrow, the Black skimmer, the Green turtle, the Loggerhead turtle, the piping plover, the Red-cockaded woodpecker, and the rough-leaf loosestrife. Therefore, this will be considered as an ARAR.
North Carolina Endangered Species Act GS 113-331 to 113-337	Per the North Carolina Wildlife Resources Commission. Similar to the Federal Endangered Species Act, but also includes State special concern species, State significantly rare species, and the State watch list.	Since the American alligator has been sighted in nearby surface water features, this will be considered as an ARAR.
Executive Order 11990 on Protection of Wetlands Executive Order Number 11990 and 40 CFR 6	Establishes special requirements for Federal agencies to avoid the adverse impacts associated with the destruction or loss of wetlands and to avoid support of new construction in wetlands if a practicable alternative exists.	Based on a review of Wetland Inventory Maps, portions of Cogdels Creek are wetlands. Therefore, this will be an applicable ARAR.

TABLE 10 (Continued)

LOCATION-SPECIFIC ARARs AND TBCs FOR OU NO. 1
RECORD OF DECISION CTO - 0177
MCB CAMP LEJEUNE, NORTH CAROLINA

ARAR/TBC Citation	Requirement/Description	Consideration as an ARAR or TBC
Executive Order 11988 on Floodplain Management Executive Order Number 11988, and 40 CFR 6	Establishes special requirements for Federal agencies to evaluate the adverse impacts associated with direct and indirect development of a floodplain.	Based on the Federal Emergency Management Agency's Flood Insurance Rate Map for Onslow County, the site is primarily within a minimal flooding zone (outside the 500-year floodplain). The creek is within the 100-year floodplain (FEMA, 1987). Therefore, this may be an ARAR for the operable unit.
RCRA Location Requirements 40 CFR 264.18	Limitations on where on-site storage, treatment, or disposal of RCRA hazardous waste may occur.	These requirements may be applicable if the remedial actions for the operable unit includes the on-site storage, treatment, or disposal of RCRA hazardous waste. Therefore, these requirements may be an applicable ARAR for the operable unit.

ARAR = Applicable or Relevant and Appropriate Requirement.
TBC = To Be Considered Criteria

TABLE 11

ACTION-SPECIFIC ARARs AND TBCs
RECORD OF DECISION CTO - 0177
MCB CAMP LEJEUNE, NORTH CAROLINA

ARAR/TBC Citation	Requirement/Description	Consideration as an ARAR or TBC
FEDERAL AND STATE/ACTION-SPECIFIC		
DOT Rules for Hazardous Materials Transportation (49 CFR Parts 107 and 171.1-500)	Regulates the transport of hazardous waste materials including packaging, shipping, and placarding.	Applicable for any action requiring off-site transportation of hazardous materials.
Resource Conservation and Recovery Act (RCRA) Subtitle C		
Identification and Listing of Hazardous Waste (40 CFR Part 261)	Regulations concerning determination of whether or not a waste is hazardous based on characteristics or listing.	Primary site contaminants are not considered to be listed wastes. However, contaminated media may be considered hazardous by characteristic.
Treatment, Storage, and Disposal of Hazardous Waste (40 CFR Parts 262-265, and 266)	Regulates the treatment, storage, and disposal of hazardous waste.	During remediation, treatment, storage, and disposal activities may occur. Materials may be classified as hazardous wastes.
RCRA Subtitle D	Regulates the treatment, storage, and disposal of solid waste and materials designated by the State as special waste.	Applicable to remedial actions involving treatment, storage, or disposal of materials classified as solid and/or special waste.

TABLE 11 (Continued)

ACTION-SPECIFIC ARARs AND TBCs
RECORD OF DECISION CTO - 0177
MCB CAMP LEJEUNE, NORTH CAROLINA

ARAR/TBC Citation	Requirement/Description	Consideration as an ARAR or TBC
RCRA Land Disposal Restrictions (LDRs) Requirements (40 CFR Part 268)	Restricts certain listed or characteristic hazardous waste from placement or disposal on land (includes injection wells) without treatment. Provides treatment standards and Best Demonstrated Available Technology (BAT).	LDRs may prohibit or govern the implementation of certain remedial alternatives. Extraction and treatment and/or movement of RCRA hazardous waste may trigger LDR requirements for the waste. Reinjection of treated groundwater into or above an underground source of drinking water may be exempt from LDRs given the treatment of the groundwater meets exemption requirements.
Control of Air Emissions from Superfund Air Strippers at Superfund Ground Water Sites (OSWER Directive 9355.0-28)	Guidance that establishes criteria as to whether air emission controls are necessary for air strippers. A maximum 3 lbs/hr or 15 lbs/day or 10 tons/yr of VOC emissions is allowable; air pollution controls are recommended for any emissions in excess of these quantities.	TBC requirement for remedial actions that include air stripping.
General Pretreatment Regulations for Existing and New Sources of Pollutants (40 CFR Part 403)	Regulations promulgated under the Clean Water Act. Includes provisions for effluent discharge to Publicly Owned Treatment Works (POTW). Discharge of pollutants that pass through or interfere with the POTW, contaminate sludge, or endanger health/safety of POTW workers is prohibited. These regulations should be used in conjunction with local POTW pretreatment program requirements.	Applicable for remedial actions involving discharge to a sanitary sewer.

TABLE 11 (Continued)

ACTION-SPECIFIC ARARs AND TBCs
RECORD OF DECISION CTO - 0177
MCB CAMP LEJEUNE, NORTH CAROLINA

ARAR/TBC Citation	Requirement/Description	Consideration as an ARAR or TBC
Toxic Substance Control Act (TSCA) 40 CFR 761	Establishes regulations for handling PCBs.	Relevant and appropriate for the handling of the contaminated soil at Site 21.
North Carolina Water Pollution Control Regulations (Title 15, Chapter 2, Section .0100)	Regulates point-source discharges through the North Carolina permitting program. Permit requirements include compliance with corresponding water quality standards, establishment of a discharge monitoring system, and completion of regular discharge monitoring records.	May be applicable for actions requiring discharge to a surface water body.
Protection of Archaeological Resources (32 CFR Parts 229 and 229.4; 43 CFR Parts 107 and 171.1-5)	Develops procedures for the protection of archaeological resources.	Applicable to any excavation on site. If archaeological resources are encountered during soil excavation, they must be reviewed by Federal and State archaeologists.
North Carolina Sedimentation Pollution Control Act of 1973 (Chapter 113A)	Regulates stormwater management and erosion/ sedimentation control practices that must be followed during land disturbing activities.	Applicable for remedial actions involving land disturbing activities (i.e., excavation of soil and sediment).

remediate the metal contamination throughout the operable unit. This contamination will be remediated in a limited specific area of concern. Therefore, the justification for not remediating the inorganic contaminants in the groundwater is based on technical impracticability, lack of an apparent source, and the lack of a human health and ecological exposure pathway. It is important to note that the results from the long-term groundwater monitoring program will be used to confirm that the elevated total metals are not due to activities at OU No. 1.

- The pesticide, heptachlor epoxide, which was detected above the State groundwater standard in a limited area within Site 24, will not be addressed. There is no known source of contamination, and the extent of contamination is limited to one shallow monitoring well. From an engineering and public health standpoint, it would not be practicable to remediate this contamination. As part of the long-term monitoring program, the shallow well will be sampled to monitor the level of the pesticide. If the concentrations continually increase, further action may be implemented.

- The surface water contamination (primarily metals) exceeded surface water criteria. There is no known source of the contamination related to former disposal activities. Metal concentrations in surface water bodies near OU No. 1 are similar to metal concentrations in other streams within MCB, Camp Lejeune. In addition, both surface waters receive stormwater runoff from the entire HPIA. Remediation of these streams would not be practical due to this situation. Based on the risk assessment evaluation, the contaminants concentrations will not cause an unacceptable risk to human health. The results of the ecological risk assessment indicate only potential adverse impacts. Therefore, the justification for not remediating the surface water is primarily based on technical impracticability and lack of an unacceptable human health or ecological risk.

Cost-Effectiveness

The selected remedy affords overall effectiveness proportional to its costs. With respect to the groundwater-related remedial actions, the selected remedy is the most cost-effective of the "treatment" alternatives. The only Groundwater RAAs that are more cost-effective than the selected remedy are the Institutional Controls and the No Action RAAs. With respect to the soil-related remedial actions, the selected remedy is the most cost-effective RAA, with the exception of the No Action RAA.

Utilization of Permanent Solutions and Alternative Treatment Technologies

The selected remedy represents a permanent solution with respect to the principal threats posed by the groundwater and soil contamination. Therefore, this remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable. The groundwater treatment system represents a permanent solution. The contaminated soils will be removed from the site, therefore the option is permanent.

Preference for Treatment as a Principal Element

By treating the extracted groundwater, the selected remedy addresses the principal threat posed by the operable unit through the use of treatment technologies. Therefore, the statutory preference for remedies that employ treatment as a principal element is satisfied.

11.0 RESPONSIVENESS SUMMARY

The selected remedy for OU No. 1 is a combination of Groundwater RAA No. 3 (Source Control - IRA Treatment System Extension) and Soil RAA No. 4 (Off-Site Disposal). Written comments were received from the NC DEHNR during the public comment period. Based on the comments received from the audience at the public meeting of July 27, 1994, the public appears to support the preferred alternative. In addition, the USEPA Region IV and the NC DEHNR are in support of the preferred alternative. Members of the community who attended the public meeting on July 27, 1994, did not appear to have any opposition to the preferred alternative.

Background On Community Involvement

A record review of the MCB, Camp Lejeune files indicates that the community involvement centers mainly on a social nature, including the community outreach programs and base/community clubs. The file search did not locate written Installation Restoration Program (IRP) concerns of the community. A review of historic newspaper articles indicated that the community is interested in the local drinking and groundwater quality, as well as that of the New River, but that there are no expressed interests or concerns specific to the environmental sites (including Sites 21, 24, or 78). Two local environmental groups, the Stump Sound Environmental Advocates and the Southeastern Watermen's Association, have posed questions to the base and local officials in the past regarding other environmental

issues. These groups were sought as interview participants prior to the development of the Camp Lejeune, IRP, Community Relations Plan. Neither group was available for the interviews.

Community relations activities to date are summarized below:

- Conducted additional community relations interviews, February through March 1990. A total of 41 interviews were conducted with a wide range of persons including base personnel, residents, local officials, and off-base residents.

- Prepared a Community Relations Plan, September 1990.

- Conducted additional community relations interviews, August 1993. Nineteen persons were interviewed, representing local business, civic groups, on- and off-base residents, military and civilian interests.

- Prepared a Final Community Relations Plan, February 1994.

- Established two information repositories.

- Established the Administrative Record for all of the sites at the base.

- Released the PRAP for OU No. 1 for public review in the repositories, July 1994.

- Released public notice announcing public comment and document availability of the PRAP, July 21-22, 1994.

- Held a Technical Review Committee meeting, July 26, 1994, to review the PRAP and solicit comments.

- Held a public meeting on July 27, 1994, to solicit comments and provide information. Approximately 10 people attended. A copy of the transcript from the meeting is included as Appendix A of this ROD.

Summary of Comments Received During the Public Comment Period and Agency Responses

As previously mentioned, written comments were only received from the NC DEHNR during the public comment period. In addition, several questions/comments were generated at the July 27, 1994, public meeting. The public meeting was held to discuss the DON/Marine Corps' preferred alternative. A few of the questions pertained to matters that are not specifically related to the preferred alternative (e.g., a member of the audience inquired as to the depth of groundwater at the site). These types of questions and answers will not be addressed as part of this Responsiveness Summary; however, specific answers to these questions are documented in the transcript to the public meeting which is contained in Appendix A. The transcript has also been included in the Administrative Record. A summary of comments pertaining to the proposed alternatives and site investigations is presented below.

Interim Remedial Action Remediation System

One member from the audience asked what is actually being done when the plume is being "contained". This comment was referring to the interim remedial action that is currently being designed/constructed for the shallow aquifer at Site 78.

DON/Marine Corps Response: It was explained that wells will be installed at the outer limits of the plume and then pumped at a rate of approximately 5 gallons per minutes. The placement of the wells will prevent the contamination from migrating any further.

Underground Storage Tanks

One member from the audience wanted to know if there are still any underground storage tanks with solvents in them that are continuing to cause the groundwater contamination.

DON/Marine Corps Response: There may have been one underground storage tank that was used for spent solvents (near Building 903). It is believed that the tank has been removed (although there is conflicting information regarding the tank removal). There are other existing underground storage tanks located within Site 78 that store fuel. It is not believed that the existing tanks are associated with the contaminated groundwater plumes at the Building 903 or Building 1601 areas. Soil samples collected from these areas revealed very low levels of solvents, which may indicate that the spills happened many years ago.

Metals Contamination

1. One member from the audience wanted an explanation regarding where metals could come from.

   DON/Marine Corps Response: It was explained that the metals (lead, chromium, manganese, etc.) can come from the soil itself, naturally occurring. The metals can show up in the groundwater samples because of several reasons. For example, suspended solids, which naturally contain the metals, pass through the slots in the well screen and are pulled up with the samples. A comparison of "total" metal results to "filtered" metal results will typically show a significant difference. The filtered samples screen away the fines in the sample which can contain metals, bacteria, or whatever else may collect in the well. Filtered samples contain very low levels of metals when compared to unfiltered samples.

   With respect to OU No. 1, the shallow aquifer indicated a total metals problem, but the deep aquifer did not (with a very few exceptions). The geology of the shallow aquifer is comprised of loosely compacted silts and sands; whereas the geology of the deep aquifer is comprised of very tightly compacted silts and sands. Therefore, suspended material would be (and are) expected to be found in the shallow wells and not the deeper ones.

2. One member from the audience wanted to know if the State had done a general study for the area prior to this study.

   DON/Marine Corps Response: The group was informed that the State has not performed any general studies but the DON has. It was mentioned that the DON recently conducted a preliminary study about 2 months ago looking at the metal concentrations detected at approximately 21 sites throughout MCB, Camp Lejeune. The results of this study indicated that elevated total metals were detected throughout the base and even in background wells.

Intermediate and Deeper Groundwater

1. One member from the audience wanted to know if the concentrations found in the intermediate and deeper groundwater aquifers were based on previous study results.

DON/Marine Corps Response: The response to this question was that the wells were sampled several times. A drastic decrease in contaminant concentration between the shallow and the intermediate groundwater has been evident in each sampling event. The concentrations have been even lower in the deeper portion of the aquifer.

It was also explained that there was a pattern of decreasing concentrations over time in the intermediate and deep groundwater until the last sampling event - the concentrations were slightly higher than the previous one.

2. One member from the audience wanted to know where the water in the deep aquifer would migrate to.

DON/Marine Corps Response: The response to this question was that the water would be heading towards the New River. Some portions of the Castle Hayne aquifer would probably migrate upwards as the groundwater moves towards the New River. The deeper portion of the Castle Hayne would probably migrate underneath the river and discharge into the ocean. It was also explained that the New River was sampled as part of the RI to see if there was any impact. No volatile organics were detected in the surface water.

Selected Alternative for OU No. 1

1. One member from the audience wanted to know if there were other problems at OU No. 1 other than the contaminated groundwater and pesticide-contaminated soils. Are there problems with petroleum products or solvents in soil?

DON/Marine Corps Response: It was indicated that the selected remedy for OU No. 1 focuses on contaminated groundwater and PCB- and pesticide-contaminated soil. It was explained that the soil results near the 900 Buildings did not contain elevated levels of solvents that could be associated with a continuing source. If a potential source was found, it would not have been permitted to remain. It would have been addressed and remediated. It appears that the source has been depleted from the soil matrix at this time and is in the shallow groundwater.

With respect to petroleum product, the DON/Marine Corps have implemented a remedial action involving groundwater remediation at Site 22, the HPIA Fuel Farm. In addition, USTs which contain petroleum product are included as part of the UST program.

Extent of Groundwater Contamination

1. During the public comment period, the NC DEHNR expressed concerns regarding having adequate data or rationale to support conclusions on the extent of groundwater contamination throughout the operable unit.

DON/Marine Corps Response: At this time, no other investigations are planned for the deeper groundwater at OU No. 1. The deeper groundwater will be routinely monitored under the proposed remediation plan for OU No. 1. The results of the monitoring will be reviewed every five years. If the conditions of the deeper groundwater are deteriorating, other actions may be implemented at that time. All of the previous groundwater data has indicated that the shallow portion of the aquifer is the source of contamination. The proposed remedy for OU No. 1 will remediate this source, thereby reducing the amount of contaminants that can impact the deeper groundwater. It is also important to note that the contaminant levels in the deeper groundwater at the western boundary of OU No. 1 is significantly less than at the plume areas within Site 78. Therefore, the extent of the contaminated groundwater can be approximated based on available data.

Intermediate and deep groundwater wells were not deemed necessary for Site 24. Metals and pesticides are not very mobile contaminants and therefore are not expected to have a significant impact on deeper groundwater. In addition, the total metals concentrations detected in the Site 24 shallow wells were similar to the concentrations detected in the shallow wells from Site 78 (which has intermediate and deep wells). The intermediate and deep groundwater results from Site 78 were not impacted by either metals (except for manganese) or pesticides. Therefore, it is not expected that the deeper groundwater at an adjacent site (Site 24) would be impacted from these contaminants. The results from the proposed monitoring plan for OU No. 1 will be evaluated every five years to determine if the groundwater conditions are deteriorating. Additional actions may be implemented at that time.

Appendix A
Transcript: Public Meeting, July 27, 1994

PUBLIC HEARING

ON THE

PROPOSED CLEANUP PLAN FOR OPERABLE UNITS ONE AND FIVE

SITES 21, 24, AND 78

JULY 27, 1994

HELD AT
TARAWA TERRACE ELEMENTARY SCHOOL
CORBIN STREET
JACKSONVILLE, NORTH CAROLINA

REPORTED BY: STACY TONE, CCR

CAPE FEAR COURT REPORTING
P.O. BOX 1256
WILMINGTON, NORTH CAROLINA 28402

(910) 763-0576

A P P E A R A N C E S

PRESENTED BY:

MR. RAYMOND WATTRAS and
MR. TOM BIXIE
BAKER ENVIRONMENTAL, INC.
AIRPORT OFFICE PARK, BUILDING 3
420 ROUSER ROAD
CORAOPOLIS, PENNSYLVANIA 15108
(412) 269-6000

PROCEEDINGS 7:18 P.M.

MR. PAUL: GOOD EVENING. TONIGHT WE'RE GOING TO DISCUSS THE PROPOSED REMEDIAL ACTION PLANS FOR OPERABLE UNIT ONE AND FIVE, NOT TEN WE DISCUSSED THAT LAST NIGHT. THE PUBLIC COMMENT PERIOD WILL BEGIN TODAY, JULY 27TH, AND EXTEND THROUGH AUGUST 27TH OF 1994. I WILL SAVE INTRODUCTIONS TONIGHT BECAUSE YOU GUYS WERE HERE LAST NIGHT AND KNOW PROBABLY WHO EVERYONE IS AND I'LL TURN IT OVER NOW TO MR. RAY WATTRAS FROM BAKER.

MR. WATTRAS: THANK YOU. PRETTY MUCH THE SAME FORMAT AS LAST NIGHT. FEEL FREE TO INTERRUPT ME AT ANY TIME TO DISCUSS SOMETHING THAT MIGHT NOT BE CLEAR AND WE'LL GO FROM THERE; A PRETTY CASUAL FORMAT HERE.

WE'RE FIRST GOING TO BE TALKING ABOUT OPERABLE UNIT NUMBER ONE. THIS OPERABLE UNIT CONSISTS OF THREE SITES. THE MOST NOTABLE SITE MIGHT BE SITE 78, THE HADNOT POINT INDUSTRIAL AREA. IT'S THE MAIN PART OF CAMP LEJEUNE, ONE OF THE FIRST PORTIONS OF THE BASE THAT WAS CONSTRUCTED.

THE OTHER TWO SITES -- SITE 21 IS ACTUALLY LOCATED WITHIN THE BOUNDARY OF HADNOT POINT. IT'S A TRANSFORMER STORAGE LOT. AND SITE 24 IS KNOWN AS THE INDUSTRIAL AREA FLY ASH DUMP. IT'S LOCATED RIGHT OFF OF THE HADNOT POINT AREA.

SITE 21 IS THE SMALLEST OF THE SITES. IT'S ROUGHLY TEN ACRES IN SIZE. THE HISTORY OF THAT SITE TELLS US THAT AT ONE TIME PART OF THIS SITE WAS USED AS A PESTICIDE HANDLING AND MIXING

AREA. AND ANOTHER PORTION OF THE SITE WAS USED TO EMPTY TRANSFORMER FLUIDS INTO IT. AND, OF COURSE, AT THAT TIME PCB'S WERE USED IN THOSE TRANSFORMERS.

THIS IS A SLIDE SHOWING THE -- THE SITE 21. THERE'S SOME BETTER PICTURES HERE. IN THIS AREA -- THIS IS THE AREA WHERE THEY DISPOSED OF THE PCB. YOU CAN TELL WHEN YOU'RE OUT THERE -- YOU CAN'T REALLY SEE THIS ON THE FIGURE, BUT WHEN YOU GO OUT THERE THERE IS A SMALL DEPRESSION IN THE GROUND SURFACE, AND THAT'S WHERE WE STARTED WITH OUR SAMPLING. WE TOOK OUR SAMPLES IN THE CENTER OF THAT PIT AND WE WORKED OUR WAY OUTWARD. THIS IS JUST ANOTHER ANGLE. AGAIN, IT'S VERY DIFFICULT TO TELL, BUT IT'S RIGHT BEHIND THIS DARK MOUND IS WHERE THIS SMALL PIT IS.

MR. PAUL: IT'S ABOUT THREE OR FOUR FEET DEEP OR?

MR. WATTRAS: NO, PROBABLY AT BEST A FOOT, I WOULD SAY, THE DEPRESSION. NOT BEING -- NO, NOT THAT NOTICEABLE. MAYBE A FOOT IN THE CENTER. YOU CAN BARELY TELL. THIS IS A PORTION OF THE SITE, AND BY THE WAY, THE SITE IS FENCED IN. AND IT IS ACTIVELY USED FOR STORAGE WITH THE EXCEPTION OF THIS DISPOSAL PIT AREA THAT PART IS OUTSIDE OF THE FENCE. BUT THIS IS THE -- WHAT WE KNOW AS THE PESTICIDE HANDLING AND MIXING AREA OF THE SITE. IT'S JUST ANOTHER VIEW OF THAT SAME AREA. A LOT OF THE LOT IS COVERED WITH GRAVEL. AS YOU CAN SEE IT'S STILL USED TO STORE DIFFERENT THINGS.

SITE 24 IS THE FLY ASH DUMP. IT'S APPROXIMATELY 100

ACRES IN SIZE. IT WAS REPORTED THAT NUMEROUS THINGS WERE TAKEN OUT THERE, INCLUDING FLY ASH, SLUDGE, SOLVENTS, CIDERS, PAINT STRIPPING COMPOUNDS AND CONSTRUCTION DEBRIS.

WE LOOKED AT FIVE AREAS WITHIN THIS 100 ACRE AREA. WE CALL THESE AREAS OF CONCERN. WE NOTED THIS AREAS USING HISTORICAL AERIAL PHOTOGRAPHS. AND ALSO WE DID A GEOPHYSICAL INVESTIGATION OUT THERE, WHICH WAS USED TO TRY TO DEFINE THE BOUNDARIES TO SEE IF THERE WAS ANY BURIED METAL OR BURIED DRUMS OR WHATEVER OUT THERE SO WE USED GEOPHYSICAL TECHNIQUES TO LOOK AT THAT. AND WE NAMED THESE AREAS THE SPIRACTOR SLUDGE DISPOSAL AREA, THE FLY ASH DISPOSAL AREA, THE BORROW AND DEBRIS DISPOSAL AREA, AND TWO BURIED METAL AREAS.

NOW, THE BURIED METAL AREAS WERE NOTED DURING THE GEOPHYSICAL INVESTIGATION WHERE WE LOOKED AT SOME ANOMALIES THAT WE THOUGHT COULD BE ASSOCIATED WITH BURIED METAL; POSSIBLY DRUMS.

THIS IS SOME OF THE FIELD ACTIVITIES AT THE SITE. THIS IS MORE OF THE -- ONE OF THE OPEN AREAS. A LOT OF THE SITES ARE HEAVILY VEGETATED. AS YOU'LL SEE IN THIS PHOTO HERE, IT'S GROWN OVER. THAT'S A PICTURE OF A MONITORING WELL IN THE MIDDLE, BUT IT'S VERY THICK IN MOST OF THE AREAS OF THE SITE.

THIS IS ANOTHER AREA. THIS IS ONE OF THE BURIED METAL AREAS THAT WE WERE LOOKING AT. ANY TIME WE DO TEST PITTING ACTIVITIES WE HAVE TO TAKE PRECAUTIONS AND DON WHAT'S CALLED LEVEL B PROTECTION WHERE OUR FIELD PEOPLE WILL ACTUALLY USE SCBA'S; SELF-CONTAINED BREATHING APPARATUSES IN CASE THEY WOULD ENCOUNTER

SOMETHING AND THEY WOULD EXPOSED TO SOMETHING.

IN THIS CASE, BY THE WAY, WE FOUND THAT WHAT WAS BURIED THERE WAS JUST CONSTRUCTION DEBRIS. SO, THE GEOPHYSICAL INVESTIGATION SAW SOMETHING IN THE SUBSURFACE; WE THOUGHT IT COULD BE DRUMS AND WE CHECKED IT OUT AND IN THIS CASE IT WAS PRETTY MUCH JUST CONSTRUCTION DEBRIS.

MRS. WOOD: WE WENT OVER THAT BECAUSE I THOUGHT WE PRETTY MUCH DISCOUNTED 24 AS NO PROBLEM, BUT YOU WENT BACK AND WENT OVER IT ANYWAY.

MR. WATTRAS: I DON'T BELIEVE -- THIS IS THE FIRST TIME WE'VE -- THERE WERE FIVE EXISTING MONITORING WELLS AT SITE 24 --

MRS. WOOD: YEAH. YEAH, THEY HAD --

MR. WATTRAS: -- THAT WERE PUT IN IN THE MID-80S AND THEY LOOKED AT GROUNDWATER ONLY. THEY NEVER LOOKED AT ANYTHING ELSE. THEY PUT IN FIVE MONITORING WELLS. AND IN THOSE FIVE MONITORING WELLS IF I RECALL THEY REALLY DIDN'T FIND ANY PROBLEMS. THEY HAD A LITTLE BIT OF ELEVATED METALS IN THE SHALLOW GROUNDWATER, BUT AS I REMEMBER THEY DID NOT HAVE ANY VOLATILE ORGANICS OR ANY OTHER TYPE OF ORGANIC COMPOUNDS. BUT THIS IS THE FIRST EXTENSIVE STUDY THAT HAS BEEN DONE AT SITE 24 WHERE WE ACTUALLY DID SOIL SAMPLING AND I'LL DISCUSS A LITTLE BIT LATER WE TOOK SOME SURFACE WATER SEDIMENT SAMPLES AND SO FORTH.

A LITTLE BIT ABOUT THE HADNOT POINT INDUSTRIAL AREA; THIS IS A HUGE AREA, AS YOU PROBABLY KNOW, IT'S ABOUT 590 ACRES.

A LOT OF MAINTENANCE SHOPS AND WAREHOUSES AND ADMINISTRATIVE BUILDINGS. WE KNOW BECAUSE OF ALL THE UNDERGROUND STORAGE TANKS, MOST OF THEM USED FOR HEATING FUEL, THAT THERE HAVE BEEN SPILLS AND LEAKS IN THE PAST.

THERE IS ANOTHER SITE, WHICH I HAVE NOT DISCUSSED YET. SITE 22 IS A FUEL FARM. THIS FUEL FARM SITS RIGHT IN THE CENTER OF THE SITE. THE TANKS HAVE BEEN REMOVED. THIS IS FLOATING PRODUCT ON THE GROUNDWATER, BUT THERE IS A -- THERE IS AN ACTIVE REMEDIATION SYSTEM THAT'S COLLECTING THIS FLOATING PRODUCT. WE ARE NOT GOING TO DISCUSS SITE 22 TONIGHT BECAUSE ACTION IS ALREADY BEING TAKEN AT THIS SITE.

MRS. WOOD: IS THAT UNDER YOUR PURVIEW OR IS THAT UNDER THE UST PROGRAM?

MR. WATTRAS: THAT IS ACTUALLY UNDER THE UST PROGRAM. EXACTLY.

MRS. WOOD: HAVE THEY CHANGED THE LEGISLATION ON THAT AT ALL? THEY DON'T DO THE PUBLIC HEARINGS. I HAVEN'T EVEN SEEN ANYTHING. THEY JUST GO AHEAD AND THAT'S THAT. IS THAT -- IS IT --

MR. WATTRAS: I DON'T KNOW HOW THAT GOES TO BE QUITE HONEST WITH YOU. I'M NOT SURE IF NEAL COULD HELP ANSWER THAT QUESTION.

MR. PAUL: THERE IS A CORRECTIVE -- WHEN YOU GO INTO A CORRECTIVE ACTION PLAN THERE IS A PUBLIC MEETING THAT YOU HAVE TO HAVE BEFORE YOU --

MRS. WOOD: ONCE YOU'RE UNDERWAY THERE SEEMS TO BE A DIFFERENT --

MR. PAUL: YOU MEAN FOR HADNOT POINT?

MRS. WOOD: WELL, NO, FOR THIS SITE 22 UNDER UST. THEY MAY HAVE THE SAME RESPONSIBILITIES.

MR. PAUL: THERE ARE SOME PUBLIC RELATIONS REQUIREMENTS AND THIS PREDATES ME. SO, I WASN'T HERE WHEN THIS SYSTEM STARTED.

MRS. WOOD: WELL, NOTHING IS MENTIONED IN THIS LETTER TO -- THAT WENT OUT TO THE EPA. AND IT WAS AN EVALUATION THAT YOU ALL -- NOT YOU PER SE --

MR. PAUL: RIGHT.

MRS. WOOD: -- BUT WHOEVER WAS HERE THEN HAD NOT INCLUDED 22 IN THIS DATA BECAUSE IF FELL UNDER THE UST PROGRAM AND THEY GOT A VERY NASTY LETTER BACK FROM THE EPA SAYING "HEY, SOME OF YOUR CONTAMINANTS ARE COMING OUT OF THIS. THEREFORE, YOU DO NOT -- YOU MUST INCLUDE IT AS PART OF THE CLEANING FACTOR GOING ON. BUT IT DID INDICATE --

MS. BERRY: SINCE THAT PREDATED HIM, THEN WE'LL TAKE A LOOK AT IT AND SEE IF THERE'S OTHER CONTAMINANTS THAT MUST BE TREATED UNDER THERE.

MRS. WOOD: I THOUGHT IT WOULD BE THERE BETWEEN THE TWO.

MS. BERRY: EXACTLY.

MRS. WOOD: IN THE MAJORITY OF THE THINGS

IN THE LIBRARY YOU JUST DON'T SEE THAT. NONE OF THAT'S UNDER YOUR PROGRAM.

MR. PAUL: WELL, WE HAVE -- I HAVE --

MRS. WOOD: NONE OF THAT'S UNDER YOUR PROGRAM.

MR. PAUL: WELL, IT IS UNDER MY PROGRAM BECAUSE I HAVE I.R. SITES AND I ALSO HAVE OTHER PROGRAM SITES. BUT IT HAS TO BE INCLUDED AS PART OF THE RECORD BECAUSE THE STATE OF NORTH CAROLINA ACTUALLY ADDRESSES THE RECORD. THEREFORE, THEY ARE CERCLA REGULATED SITES, WHERE THE STATE HAS JURISDICTION NOT EPA. SO, WE SEND THOSE GUYS QUARTERLY REPORTS, QUARTERLY REPORTS OF HOW MUCH WE PULL OUT OF THE GROUND; WATER WE'VE ACTUALLY TREATED. AND TO DATE THERE'S LIKE 25,000 GALLONS OF GASOLINE FROM THE INVENTORY RECORDS THAT WERE SHOWN TO BE MISSING. AND TO DATE WE HAVE RECOVERED ABOUT 20,000 OF GASOLINE AND WE'VE TREATED OVER 3 MILLION GALLONS OF WATER AND THAT'S BEEN SINCE OCTOBER OF '91. SO, THAT SYSTEM HAS JUST ABOUT DONE EVERYTHING YOU CAN DO. AND WE'LL PROBABLY GO BACK IN A YEAR OR TWO AND ADDRESS THE SOILS THERE, BUT THE PLUME TREATMENT IS PRETTY CLOSE TO BEING REMEDIATED. THE REST OF THE WATER IS DISSOLVING. WE'RE PROBABLY NOT GOING TO BE TAKING ANY FREE PRODUCT, WE'LL JUST BE TREATING THE CONTAMINATED GROUNDWATER. GAS HAS BEEN ACTUALLY DISSOLVED. SO IT REALLY HAS BEEN AN EFFECTIVE SYSTEM. AND IF YOU WANT TO KNOW ANYTHING ABOUT IT FEEL FREE TO GIVE WALT OR MYSELF A CALL.

MRS. WOOD: OH, I WAS --

MR. PAUL: AND THAT IS REALLY ONE OF OUR BIG SUCCESS STORIES.

MRS. WOOD: JUST TO GO ON, WHAT WOULD YOU EXPECT THE -- WHAT PERCENTAGE WOULD YOU EXPECT TO GET OUT?

MR. PAUL: WITH THE PLUME TREATMENT OPERATING FOR FREE PRODUCT?

MRS. WOOD: NO, IF YOU'VE GOT GASOLINE.

MR. PAUL: AND SOME OF THIS IS STRAIGHT FROM RICH BONNELLI, IS THAT IF YOU GET 75 PERCENT OF THE FREE PRODUCT THAT YOU THINK YOU SPILLED INTO THE GROUNDWATER THEN YOU'RE DOING A GREAT JOB, AND 20 OUT OF 25 IS ALMOST 80 PERCENT. SO, WE DONE PROBABLY AS GOOD AS WE CAN DO. AND EVEN 75 PERCENT IS A GREAT RECOVERY RATE. BUT FROM THE PEOPLE I'VE TALK TO IN THE STATE AGREE IT IS A SUCCESS.

MRS. WOOD: I'M SORRY. GO AHEAD.

MR. WATTRAS: NO, THAT'S FINE. THIS IS HADNOT POINT. CAN I ASK, HAVE YOU BEEN DOWN TO HADNOT POINT OR HAVE YOU EVER BEEN BASE?

MRS. WOOD: OH, FOR YEARS. OH, I HAVE --

MR. WATTRAS: OKAY. SO, YOU HAVE SOME IDEA OF WHAT THIS PLACE LOOKS LIKE?

MRS. WOOD: YEAH, I KNOW THIS WHOLE AREA.

MR. WATTRAS: OKAY. THESE ARE JUST RANDOM PHOTOS IT WASN'T ANYTHING PARTICULAR; JUST GOING AROUND THE HADNOT POINT AREA AND TAKING SOME PICTURES. I WILL SAY MOST OF THIS --

HADNOT POINT IS -- YOU KNOW, IT'S VERY INDUSTRIAL IN NATURE FROM THE STANDPOINT THAT MOST OF THE AREA IS GRAVEL COVERED OR COVERED WITH CONCRETE OR ASPHALT. THERE'S NOT THAT MANY OPEN AREAS WITHIN THE MAIN INDUSTRIAL AREA.

MRS. WOOD: WHAT WERE YOUR INDUSTRIAL BUILDINGS? BUILDING 900 OR --

MR. WATTRAS: YES, WE'RE GOING TO TALK ABOUT THIS RIGHT NOW. BUILDING 900 AREA IS A FORMER MAINTENANCE AREA. AND THAT'S WHERE WE KNOW WE HAVE A CONTAMINATE PLUME OF SOLVENTS IN THE GROUNDWATER AND THAT'S WHERE WE CURRENTLY ARE CONSTRUCTING A REMEDIATION SYSTEM TO CONTAIN THE MIGRATION OF THIS PLUME AND WE'RE READY TO -- THEY'RE BUILDING IT RIGHT NOW IN FACT. THIS -- WE DISCUSSED THIS EFFORT ABOUT TWO YEARS AGO. I THINK BACK IN 1992 THE DECISION WAS MADE TO PUT IN SOME CONTAINMENT WELLS TO CONTAIN ANY MIGRATING OF THIS PLUME BY THE 900 BUILDING AREA AND ALSO BY THE 1600 BUILDING AREA.

MRS. WOOD: 1600, YES.

MR. WATTRAS: NOW, THERE'S ANOTHER BUILDING 1502, WHICH WE'LL TALK ABOUT. THAT'S A DIFFERENT PROBLEM. THIS IS JUST THE 900 BUILDING AREA. UNDERNEATH THIS AREA IS WHERE WE PROBABLY HAVE THE HIGHEST LEVELS OF SOLVENTS IN GROUNDWATER.

MRS. WOOD: SO, YOU'RE TALKING ABOUT THE TCE'S?

MR. WATTRAS: THE TCE'S, YES. WE ALSO HAVE A LITTLE BIT OF BENZENE WHICH IS ASSOCIATED WITH FUELS, BUT THE

TCE IS THE MAIN -- THE SOLVENTS TCE AND OTHER THINGS LIKE THAT ARE THE MAIN CONTAMINANTS IN THIS PLUME.

MRS. WOOD: WELL, NOW, HOW DO YOU -- WHEN YOU SAY "CONTAINING IT" IS IT JUST PULLED OUT OR WHAT? WHAT ARE YOU DOING?

MR. WATTRAS: WHEN I SAY CONTAINED WE HAVE A PLUME -- IT'S PROBABLY ON ONE OF THESE FIGURES OVER HERE. I DON'T KNOW -- LET ME JUST MOVE AHEAD REAL QUICK HERE. I DON'T THINK IT'S ON THE SLIDE.

WE WILL PUT WELLS AT THE EDGE WHERE WE BELIEVE THE EDGE OF THE PLUME TO BE, THE OUTER LIMITS OF THE PLUME, AND WE KNOW THAT MY SAMPLING MONITORING WELLS. AND IN THE SOURCE AREA, FOR EXAMPLE, WE MIGHT HAVE 10,000 PARTS PER BILLION OF THE SOLVENTS. AS WE PUT IN WELLS AWAY FROM THAT ALONG THE OUTER EDGES WE MIGHT 50 OR A HUNDRED PARTS PER BILLION. SO WE SEE A NICE PATTERN GOING FROM HIGH CONCENTRATION DOWN TO LOW CONCENTRATION AND IT FOLLOWS THE FLOW. GROUNDWATER AT HADNOT POINT PRETTY MUCH FLOWS IN A, I BELIEVE, A SOUTHWEST DIRECTION -- SOUTHWEST OR SOUTHEAST DIRECTION, AND WE CAN FOLLOW THAT. AND WE PUT IN WELLS. THE WELLS ARE BEING CONSTRUCTED RIGHT NOW TO PUMP GROUNDWATER AT A RATE OF ABOUT FIVE GALLONS PER MINUTE, AND THE WELLS ARE AT THE EDGES OF THIS PLUME TO PREVENT IT FROM GOING ANY FURTHER AND THAT'S WHAT WE CALL CONTAINMENT.

MRS. WOOD: NOW, WHAT HAPPENS IF YOU GET, YOU KNOW, HEAVY EXTENDED RAINS?

MR. WATTRAS: NOT ONE OR TWO TIME EVENTS OF RAIN, IT WILL NOT EFFECT -- OTHER THAN THE WATER LEVEL RISING A LITTLE BIT.

MRS. WOOD: YEAH.

MR. WATTRAS: BUT IT REALLY WOULD NOT DO MUCH TO THE CONCENTRATIONS. I MEAN, THESE PROBLEMS AT HADNOT POINT HAVE BEEN AROUND FOR YEARS.

IN FACT, THIS PLUME THAT I'M TALKING ABOUT RIGHT NOW WAS FIRST STUDIED IN THE MID 1980'S AND THE CONCENTRATIONS HAVEN'T DIFFERED THAT MUCH. YOU KNOW, WE -- FOR EXAMPLE BACK IN THE 1980'S THEY SAW VERY SIMILAR LEVELS. IT'S NOT LIKE IN 1985 THEY SAMPLED IT AND MEASURED 10,000 AND THEN IN 1994 WE SAMPLED IT AND SAW 1,000. THAT WOULD BE A PRETTY DRASTIC CHANGE IN CONCENTRATION OVER SUCH A SHORT PERIOD. WE'VE SEEN VERY SIMILAR LEVELS.

MRS. WOOD: NOW, ARE THEY SAYING THAT -- I MEAN, WHAT ARE THEY DOING NOW TO CONTROL THIS?

MR. WATTRAS: CONTROL?

MRS. WOOD: I MEAN, DO THEY HAVE UNDERGROUND TANKS WHERE THESE SOLVENTS ARE OR IS IT JUST --

MR. WATTRAS: NO, THE SOLVENTS, THEY'RE -- WE BELIEVE THERE MAY HAVE BEEN ONE TANK THAT WAS USED FOR SPENT SOLVENTS. THAT TANK AS FAR AS WE KNOW HAS SINCE BEEN REMOVED.

THERE ARE OTHER UNDERGROUND STORAGE TANKS RELATED TO FUEL. I MEAN, THAT -- WE DON'T BELIEVE THOSE TANKS ARE ASSOCIATED WITH THIS PROBLEM.

BUT WE DID LOOK AT SOIL AND FOUND VERY LITTLE OF THE SOLVENTS IN THE SOIL IN THE HIGHEST AREA THAT WE KNOW OF GROUNDWATER CONTAMINATION WE PULLED SOIL SAMPLES AND FOUND VERY LOW LEVELS WHICH GOES BACK TO SOMETHING WHERE I SAID -- WHAT I WAS TALKING ABOUT LAST NIGHT. I THOUGHT I MAYBE SAID IT HERE AT THIS MEETING WHERE OVER TIME, YOU KNOW, KNOWING THAT THESE SPILLS HAPPENED MANY YEARS AGO THROUGH TIME WITH PRECIPITATION AND EVERYTHING IT SORT OF -- THE SOLVENTS WILL MOVE OUT OF THIS FRONTAL ZONE. AND THAT MIGHT BE THE CASE HERE WHERE WE HAVE VERY LOW LEVELS IN SOIL AND VERY FEW SAMPLES HAVE SOLVENTS IN THEM.

SO, THE TANK HAS -- AS FAR AS WE KNOW HAS BEEN PULLED THAT HAD SPENT SOLVENTS. AND EVEN THAT INFORMATION TO BE QUITE HONEST WITH YOU IS SKETCHY. IF WASN'T CONCRETE THAT THE TANK THAT THEY PULLED WAS USED FOR SPENT SOLVENTS; ONE REPORT SAID THAT IT DID AND ANOTHER REPORT DID NOT SAY THAT. BUT WE HAVE TO THAT FOR WHAT --

MRS. WOOD: YEAH, WE'VE GOT THE MATERIAL THERE.

MR. WATTRAS: WE AGREE, YOU KNOW, WE SUSPECT THAT THERE WAS A TANK THAT WAS USED TO COLLECT SPENT SOLVENTS.

I'LL TALK A LITTLE BIT ABOUT THE PAST INVESTIGATIONS. I JUST MENTIONED -- YOU KNOW, WE -- THERE HAVE BEEN A LOT OF INVESTIGATIONS ESPECIALLY AT HADNOT POINT SINCE THE MID-80S. NOW THIS INTERIM REMEDIAL ACTION OF THE SHALLOW AQUIFER, THIS IS WHAT I WAS JUST TALKING ABOUT THE CONTAINMENT WALLS AND WE MADE THE

DECISION BACK IN 1992 -- WHEN I SAY "WE" I SOMETIMES TALK AS A GROUP HERE -- THE DEPARTMENT OF THE NAVY AND THE MARINE CORPS MAKES THE DECISION.

MRS. WOOD: MARINE CORPS.

MR. WATTRAS: THEY MADE THE DECISION TO GO WITH THE CONTAINMENT ALTERNATIVE WHICH WAS ACCEPTED BY THE EPA AND THE STATE OF NORTH CAROLINA.

WHAT WE'RE DOING NOW WE STARTED IN 1993/1994. WE'RE NOW LOOKING AT THE ENTIRE HADNOT POINT AREA. SEE, THE DIFFERENCE BETWEEN THIS STUDY OF 1993 AND 1994 VERSUS 1991 AND 1992, IN THAT INTERIM STUDY WE WERE JUST FOCUSING ON "LET'S DO SOMETHING ABOUT THIS PROBLEM NOW. LET'S CONTAIN IT." AND THAT WAS THE ALTERNATIVE CHOSEN. BUT IT JUST FOCUSED ON SHALLOW GROUNDWATER. THE STUDY OF 1993 AND 1994 LOOKED AT OTHER PORTIONS OF THE AQUIFER, LOOKED AT SURFACE WATER AND SEDIMENT AND LOOKED AT SOIL. THAT'S THE DIFFERENCE BETWEEN THESE TWO INVESTIGATION.

MRS. WOOD: WHAT ABOUT THE DEEP AQUIFER, YOU DIDN'T FIND ANY --

MR. WATTRAS: ABOUT THE?

MRS. WOOD: THE DEEP AQUIFER.

MR. WATTRAS: WE'LL TALK ABOUT THAT IN A MINUTE HERE.

BASICALLY, TO THROW OUT THE TERM REMEDIAL INVESTIGATION, THIS IS DONE UNDER CERCLA. THE OBJECTIVE OF REMEDIAL INVESTIGATION IS TO FIND OUT WHAT IS THE PROBLEM AT THE SITE. HOW

BAD IS THE PROBLEM, WHAT KIND OF CONTAMINANTS ARE THERE, AT WHAT CONCENTRATIONS. AND ONCE WE COLLECT ALL THAT DATA THE MAIN PART OF REMEDIAL INVESTIGATION IS TO DETERMINE WHAT IS THE IMPACT TO HUMAN HEALTH AND THE ENVIRONMENT.

SO, IN A NUTSHELL THE REMEDIAL INVESTIGATION LOOKS AT WHAT'S AT THE SITE, TRIES TO FIGURE OUT WHERE IS IT GOING, HOW DEEP HAS IT MIGRATED, HOW FAR OFF-SITE HAS IT MIGRATED VERTICALLY -- OR HORIZONTALLY AND WHAT DOES THIS MEAN TO THE PEOPLE WORKING THERE OR THE ENVIRONMENT.

NOW, HERE'S WHAT WE FOUND AND THIS IS WHERE I'LL GET INTO THESE DIFFERENT AQUIFERS. WE CONFIRMED -- WE KNEW RIGHT THEN WE HAD TWO MAIN PLUMES TO LOOK AT. WE PUT IN A FEW MORE WELLS TO MAKE SURE WE KNEW THE EXTENT -- THE HORIZONAL EXTENT OF THESE PLUMES. WE DEFINED THE HORIZONAL EXTENT OF THE PLUMES. WE FEEL VERY COMFORTABLE THAT WE HAVE A GOOD IDEA OF HOW FAR THE CONTAMINATION HAS MIGRATED HORIZONTALLY. AND AS I MENTIONED BEFORE THE TWO PLUMES ARE AT THE 900 BUILDING AREA AND THE 1600 BUILDING AREA.

WE ALSO RECOGNIZED THE BTEX PLUME AT SITE 22 WHICH NEAL TALKED ABOUT EARLIER. WE HAD TOTAL METALS -- WE HAD SOME METALS THROUGHOUT HADNOT POINT AND AT NO SPECIFIC PATTEN. PRETTY MUCH RANDOM HITS OF LEAD, CHROMIUM, MANGANESE, IRON, BUT NO PARTICULAR PATTERN THAT YOU CAN ASSOCIATE IT WITH A PLUME. WE FOUND THIS AT OTHER SITES TOO. WE'RE NOT SO SURE THESE METALS ARE NECESSARILY DUE TO DISPOSAL ACTIVITIES. THEY COULD BE DUE TO A LOT OF OTHER

THINGS SUCH AS THE GEOLOGIC CONDITIONS OF THE SHALLOW AQUIFER AND POSSIBLY --

MRS. WOOD: WOULD YOU EXPAND ON THAT A LITTLE BIT BECAUSE I DON'T UNDERSTAND THAT.

MR. WATTRAS: OKAY.

MRS. WOOD: YOU KNOW, THE CHROMIUM I DON'T UNDERSTAND.

MR. WATTRAS: THAT'S FINE.

MRS. WOOD: WHERE WOULD THEY COME FROM IN YOUR --

MR. WATTRAS: FROM THE SOIL ITSELF. THE SOIL SAMPLES WILL HAVE CHROMIUM AND LEAD.

MRS. WOOD: YEAH, I MEAN --

MR. WATTRAS: AND THAT'S NATURALLY OCCURRING. I MEAN --

MRS. WOOD: MANGANESE, I --

MR. WATTRAS: MANGANESE -- EVEN LEAD -- YOU HAVE SOME LEAD IN SOILS, AND SOME LEAD FROM PARTICULATES AND SO FORTH.

WHEN WE PUT IN A SHALLOW WELL THE SHALLOW AQUIFER IS IMPOUNDED ABOUT FIVE TO TEN FEET BELOW GROUND SURFACE HERE AT HADNOT POINT DEPENDING UPON WHERE YOU'RE AT.

THE CHARACTERISTICS OF THE AQUIFER, IT'S VERY LOOSELY COMPACTED, VERY SANDY; IT'S NOT TIGHTLY COMPACTED. WE PUT IN A WELL, WE HAVE A SCREEN IN THE WELL THAT TRIES TO GET OUT THESE

SILTS AND SANDS FROM THE SAMPLE, BUT YOU STILL HAVE SOME THAT GO THROUGH THE SLOTS OF THE SCREEN.

WHEN WE SAMPLE WE TRY TO TAKE PRECAUTIONS WHEN WE PULL A SAMPLE NOT TO HAVE ANY SUSPENDED SOLIDS IN THAT WATER SAMPLE. IT'S VERY HARD TO DO THAT IN THIS GEOLOGIC FRAMEWORK BECAUSE OF THE LOOSELY COMPACTED SILTS AND SANDS.

NOW, OUR DEEP WELLS, AND HERE'S THE ONLY PATTERNING THAT WE'RE SEEING, WE'RE SEEING THESE TOTAL METALS AND TOTAL METALS MEANS JUST THAT; IT'S A SAMPLE OF THE WATER IT'S TAKEN STRAIGHT TO THE LABORATORY, IT'S NOT FILTERED.

SO, WITH THE -- THE ANALYSIS MIGHT BE BIASED HIGH A LITTLE BIT BECAUSE OF THE FINDS OR PARTICULATES IN THE SAMPLE. I CAN TELL YOU THIS THAT WE ALSO LOOK AT DISSOLVED METALS. AND WHEN WE LOOK AT DISSOLVED METALS THAT WATER SAMPLE IS PUT THROUGH A FILTER FIRST, AND ALL THE FINDS ARE TAKEN OUT OR ANY MATTER, YOU KNOW, IT COULD BE SOME BACTERIA OR WHATEVER THAT COLLECTS IN THE WELL, THAT'S SCREENED AWAY AND THEN THAT SAMPLE IS SENT TO THE LABORATORY.

NOW, WHEN WE LOOK AT DISSOLVED WATER SAMPLES WE REALLY DON'T FIND A METALS PROBLEM. ANOTHER PLACE WHERE WE REALLY DON'T FIND A METALS PROBLEM IS IN DEEP GROUNDWATER AND WE BELIEVE THE REASON IS -- WE USE THE SAME SAMPLING TECHNIQUES, BUT IN THE DEEP GROUNDWATER THE WAY THE GEOLOGY IS YOU HAVE VERY TIGHTLY COMPACTED SILTS AND SANDS. THEY'RE VERY TIGHT AS OPPOSED TO THE SHALLOW WHERE THEY'RE LOOSE. AND IN THE DEEP AQUIFER WE DON'T REALLY HAVE

MUCH OF A METALS PROBLEMS. WE HAVE THE MANGANESE. WE HAVE FOUND THIS MANGANESE IN SOME OF THE DEEP WELLS AND I BELIEVE OUT OF ALL OF OUR DEEP WELLS, I THINK, WE HAD ONE HIT OF LEAD THAT WAS JUST ABOVE THE DRINKING WATER STANDARDS AND IT -- THE DRINKING WATER STANDARDS FOR LEAD -- IT'S 15.

MRS. WOOD: 15, YEAH.

MR. WATTRAS: WE FOUND ONE HIT OF LEAD AT 16 IN ONE DEEP WELL. SO, FOR THE MOST PART THE PATTEN THAT WE'RE SEEING IS THE SHALLOW HAS CONSISTENTLY SHOWN US HIGH TOTAL METALS, NOT JUST AT HADNOT POINT, EVEN IN SOME OF OUR BACKGROUND WELLS THAT WE HAVE THROUGHOUT THE BASE, AND EVEN AT SOME OFF-BASE WELLS. WE'VE LOOKED AT SOME STUDIES THAT WERE DONE -- I'M NOT SURE IF IT WAS MENTIONED HERE LAST NIGHT ABOUT CAMP LEJEUNE ACQUIRING 40,000 ACRES OF LAND.

MRS. WOOD: OH, YEAH. YEAH. RIGHT.

MR. WATTRAS: SO THERE'S BEEN A COUPLE OF STUDIES DONE THERE WHERE THE SAME PATTERN HAS OCCURRED WHERE THE SHALLOW AQUIFER EVERY TIME WE LOOK AT TOTAL METALS IT SHOWS US SOME ELEVATED LEVELS WHICH WOULD BE ABOVE DRINKING WATER STANDARDS.

MRS. WOOD: WELL, THEY HAVE NOT DONE A SOIL STUDY ON THIS AREA THAT WOULD HAVE DEFINED WHAT TO EXPECT IN YOUR TOTAL METALS. I MEAN, BEFORE YOU STARTED THIS PROGRAM THERE ISN'T SOME --

MR. WATTRAS: WELL, WE LOOKED AT THE SOIL

RESULTS. WE COMPARED THE SOIL RESULTS, IF I'M UNDERSTANDING YOUR QUESTION --

MRS. WOOD: NO, I'M JUST SAYING --

MR. PAUL: DIDN'T THE STATE STUDY THIS AREA?

MRS. WOOD: -- JUST A GENERAL STUDY.

MR. WATTRAS: NO, NOT BEFORE THIS. WE JUST LOOKED AT THIS, WE DID A PRELIMINARY STUDY PROBABLY ABOUT TWO MONTHS AGO AND BAKER LOOKED AT 21 SITES AT CAMP LEJEUNE AND THESE WERE -- THE 21 SITES MAKE UP DIFFERENT INVESTIGATIONS THAT WE'RE LOOKING AT, DIFFERENT PHASES AND SO FORTH. AND AT ALL 21 SITES WE HAD HIGH TOTAL METALS AND WE HAD A NUMBER OF WHAT WE CALL BACKGROUND WELLS. THESE ARE WELLS THAT ARE INSTALLED OFF-SITE, UPGRADIENT, WITH RESPECT TO FLOW THAT WE WOULDN'T EXPECT THAT WELL TO BE CONTAMINATED FROM THIS SITE. FOR EXAMPLE, IF THIS SITE IS SITTING HERE AND THERE'S A HILL COMING UP THIS WAY, WE MIGHT PUT A WELL UP HERE, WHICH WE HOPE IS GOING TO TELL US WHAT IS OUR BACKGROUND CONCENTRATIONS.

WELL, I THINK WE LOOKED AT 14 BACKGROUND WELLS, AND I BELIEVE -- I'M GOING TO SAY EITHER SIX OR NINE OF THE BACKGROUND WELLS ALSO HAD THIS SAME TOTAL METALS PATTERN IN THE SHALLOW AQUIFER.

SO, THE OTHER THING WE DID TOO TO LOOK AT THIS TOTAL METALS PROBLEM IS WE LOOKED AT THE SOIL RESULTS TO SEE IF THERE WAS A CORRELATION BETWEEN WHAT WE SEE IN THE SOIL AND HIGH LEVELS

IN THE SHALLOW GROUNDWATER. AND WE LOOKED AT SOIL RESULTS FROM I'LL SAY A CLEAN WELL, A WELL THAT SHOWED NO REAL ELEVATED LEVELS OF METALS AND THE SOIL RESULTS WE LOOKED AT THAT, AND WE COMPARED THOSE SOIL RESULTS WITH SOIL RESULTS TAKEN FROM ANOTHER AREA THAT EXHIBITED HIGH TOTAL METALS AND THERE WAS NO DIFFERENCE. SO, WE SAID THERE'S NO SOURCE.

I MEAN, WHEN YOU HAVE A GROUNDWATER PROBLEM YOU HAVE TO ASSOCIATE IT WITH A SOURCE. WE COULD NOT CORRELATE THESE TOTAL METALS IN SHALLOW GROUNDWATER WITH A SOURCE IN SOIL. SO, WE PRETTY MUCH PRELIMINARILY -- WE'VE ONLY CONDUCTED ONE STUDY AND THIS IS SOMETHING THAT WE'RE GOING TO LOOK AT ON AND ON BECAUSE WE'RE FACING THIS PROBLEM WITH EVERY SITE OF TOTAL METALS. AND WE HAVE TO -- OBVIOUSLY THE STATE OF NORTH CAROLINA AND EPA STANDARDS ARE BASED ON TOTAL METALS AND THAT'S A PROBLEM BECAUSE WE'RE NOT SO SURE WHETHER THESE TOTAL METALS ARE NECESSARILY RELATED TO DISPOSAL ACTIVITIES OR WHETHER THEY'RE RELATED TO A COMBINATION OF THE GEOLOGIC FRAMEWORK AND SAMPLING TECHNIQUES.

MRS. WOOD: NOW, AS A CORPORATION ARE YOU RESPONSIBLE FOR MAKING -- I MEAN, YOU ALL ARE DOING THIS WORK AND GETTING PAID FOR IT, BUT I THINK THE STATE WOULD HAVE TO COME IN AND DO COMPLEMENTARY STUDIES. I DON'T SEE WHY YOU WOULD HAVE TO BE RESPONSIBLE IF IT IS A GEOLOGICAL CONDITION OR A NATURAL CONDITION TO FIND THAT.

MR. WATTRAS: WE ARE -- WE'RE --

MR. WATTERS: NOT -- NOT --

MR. WATTRAS: SORRY GO AHEAD, PATRICK.

MR. WATTERS: NOT NECESSARILY. THE STATE WOULDN'T HAVE TO COME IN AND DEAL WITH THAT. IT'S JUST THAT IN THIS PARTICULAR CASE THE STATE WILL TELL WHOEVER IS WORKING ON THE PROBLEM TO SHOW US WHETHER OR NOT THIS IS REAL OR WHETHER OR NOT THIS IS --

MRS. WOOD: SO, IN OTHER WORDS THEY'RE THE ONES THAT COME IN --

MR. WATTERS: IT'S UP TO WHOEVER OWNS THE PROPERTY.

MRS. WOOD: THEY HAVE TO REVEAL THOSE STANDARDS. I MEAN, THEY COULD COME IN AND SAY THIS IS A NATURAL CONDITION THAT THEY ARE FINDING AND YOU WOULD HAVE TO MAKE THAT DETERMINATION. SO, IF THIS CAME UP SOMEWHERE DOWN THE LINE IF THEY ARE FINDING, YOU KNOW, IT AS A NATURAL PHENOMENON.

MR. WATTERS: IF THERE'S SOMETHING TO PAY WELL I GUESS IT GOES BACK TO THE GENERAL ASSEMBLY AND WE NEED TO DEAL WITH THE STANDARD, BUT IN THE MEAN TIME WE HAVE TO DEAL WITH THE INITIAL --

MRS. WOOD: COULDN'T YOU DO A WAIVER?

MR. WATTERS: WE COULD DO THE WAIVER SYSTEM BUT --

COURT REPORTER: WAIT I CAN'T HEAR HER.

MR. WATTRAS: CAN YOU SPEAK UP?

MS. TOWNSEND: WE MET WITH THE GROUNDWATER

SECTION UP IN WILMINGTON AND THIS ISSUE CAME UP AND RAY AND HIS GROUP HELPED PRESENT THE FACTS OF WHAT WE WERE FINDING AND THE CONCLUSION WAS LIKE IN THIS EVENT. AND WE'RE TRYING TO SEE WHAT'S ACTUALLY GOING ON, WHAT WE THINK IS GOING ON. YOU KNOW, WE PROVED IT ON PAPER, BUT WE NEED TO SEE WHAT'S ACTUALLY IN THE ACTUAL SAMPLE AND WE HAVEN'T DONE THAT IN THE PAST. THAT'S WHERE WE'RE HEADING.

MR. WATTRAS: ANOTHER THING THAT WE'RE DOING -- TOM BIXIE HERE WORKS FOR BAKER AND HE'S INVOLVED WITH A PROJECT FOR AN INDUSTRIAL CLIENT WHERE THEY HAD THE SAME SITUATION WHERE THEIR TOTAL METALS WERE VERY HIGH AND THEY WEREN'T REALLY CONVINCED THAT THESE METALS WERE DUE TO WHAT WAS DISPOSED OF AT THIS SITE HE WAS WORKING AT AND THERE'S NOW DIFFERENT SAMPLING TECHNIQUES THAT WE'RE GOING TO TRY IN THE FUTURE TO ELIMINATE THE SUSPENDED PARTICLES, YOU KNOW, TRY TO REDUCE THAT DOWN. SO, WE'RE GOING TO TRY THAT IN OUR NEXT INVESTIGATION, A LITTLE BIT DIFFERENT SAMPLING TECHNIQUES. SO, THERE'S SOME THINGS THAT WE'RE LOOKING AT BECAUSE, YOU KNOW, IT COULD BE PARTLY DUE TO THE SAMPLING TECHNIQUE.

MRS. WOOD: YEAH.

MR. WATTRAS: I MEAN, THERE'S NO DOUBT ABOUT IT.

MRS. WOOD: YEAH.

MR. WATTRAS: NOW, THE GEOLOGIC FRAMEWORK IS ONE THING, BUT WE'VE GOT TO TRY TO DEAL WITH THAT AND THAT'S WHAT

WE'RE GOING TO TRY TO.

CORRECT ME IF I'M WRONG GINA, BUT I WAS TALKING TO N.U.S., YOU KNOW, AT THE MEETING THE OTHER DAY AND THEY'RE WORKING AT CHERRY POINT, WHICH IS ABOUT AN HOUR AWAY, AND THEY -- THEY'RE RUNNING INTO SIMILAR PROBLEMS ALSO AND IT'S BECAUSE OF THIS LOOSELY COMPACTED SANDS AND SILTS OF THE SHALLOW AQUIFER AND THEY'RE ALSO GOING TO BE TRYING THIS LOW FLOW TECHNIQUE --

MRS. WOOD: TO SEE --

MR. WATTRAS: -- TO SEE.

MRS. WOOD: -- WHAT CHANGES.

MR. WATTRAS: NOW, THE INTERMEDIATE GROUNDWATER AND THE DEEP GROUNDWATER WERE ALSO STUDIED. WE SAW A DRASTIC CHANGE IN CONCENTRATION COMPARED TO THE SHALLOW, WHICH IS GOOD. THE INTERMEDIATE I'M TALKING ABOUT DEPTHS OF ABOUT 75 FEET; ROUGHLY 75 FEET. THE DEEP, I'M REFERRING TO DEPTHS OF ABOUT 150 TO 175.

NOW, THE SUPPLY WELLS IN THE HADNOT POINT AREA, AND THERE ARE QUITE A FEW. THERE ARE ABOUT -- AT LEAST SIX SUPPLY WELLS SURROUNDING THE HADNOT POINT AREA. THEY ARE SCREENED IN SEVERAL INTERVALS. THESE SUPPLY WELLS AND THEY'RE ALL -- THEY ARE SHUT DOWN. THEY'VE BEEN SHUT DOWN FOR A NUMBER OF YEARS, BUT THEY ARE SCREENED AT ABOUT 75 FEET AND THEN DOWN BELOW FURTHER AT ABOUT 150 UP TO 200 FEET AND THAT'S WHY THE INTERMEDIATE WELLS WERE INSTALLED, AND THESE WERE INSTALLED BY ANOTHER FIRM, BUT THEY INSTALLED THEM, I BELIEVE, TO MATCH THE SCREENING INTERVALS OF THE

SUPPLY WELLS.

AGAIN, WHAT WE SAW WAS A DRASTIC CHANGE IN CONCENTRATION BETWEEN WHAT WE ARE SEEING IN THE SHALLOW AND THEN WHAT WE'RE SEEING IN THE INTERMEDIATE AND EVEN LOWER IN THE DEEP. AND IN THE DEEP I WOULD ALMOST SAY WE HAVE NOT MUCH OF A PROBLEM AT ALL. THERE WAS JUST BENZENE AND, IN FACT, IT WAS AT A WELL NEAR HADNOT POINT FUEL FARM. THAT WAS AT ABOUT FIVE PARTS PER BILLION, WHICH IS JUST AT THE M.C.L., MAYBE FIVE, MAYBE SIX; IT WAS RIGHT AROUND THE M.C.L. EVERYTHING ELSE IN THE DEEP WAS PRETTY -- WHAT WE WOULD CALL CLEAN; MEANING, BELOW THE DRINKING WATER STANDARDS.

MRS. WOOD: NOW, THESE WERE THE FIGURES YOU GOT AND YOU'RE NOT RELYING ON THE ONES THAT WERE TAKEN FROM THE PREVIOUS STUDIES?

MR. WATTRAS: YEAH. OH, YEAH. WE RE-SAMPLED THESE WELLS. THESE WELLS HAVE BEEN SAMPLED SEVERAL TIMES. WE ARE SEEING SOME PATTERN OVER TIME THAT THE CONCENTRATIONS IN THE INTERMEDIATE AND DEEP HAVE BEEN DECREASING.

WE DID TAKE ONE MORE SAMPLE -- OR ANOTHER ROUND OF SAMPLES LATE IN THE INVESTIGATION AND THEY SLIGHTLY INCREASED. SO, OVERALL THERE HAS BEEN A TREND OF DECREASE IN CONCENTRATIONS WITH THE EXCEPTION OF THE LAST ROUND; THEY INCREASED SLIGHTLY. NOT -- I MEAN, I'M NOT TALKING A MAJOR INCREASE, BUT I CAN'T SAY THAT EVERY SAMPLING ROUND THEY WENT DOWN, DOWN, DOWN, DOWN IN CONCENTRATION, BUT THE LAST ONE WAS SLIGHTLY HIGHER THAN THE PREVIOUS ONE.

WE'LL TALK A LITTLE BIT ABOUT THE SOIL. AS EXPECTED WITHIN SITE 21 WE HAD SOME HIGH LEVELS OF PESTICIDES IN THAT MIXING AREA AND ALSO IN THE PCB DISPOSAL PIT. WE FOUND PCB'S AT 4.6 PARTS PER MILLION. THAT IS A LITTLE BIT ELEVATED. I WOULDN'T -- YOU HAVE A -- WHAT'S CALLED A TSCA WASTE WHEN YOU HIT 50 PARTS PER MILLION AND THAT'S WHEN YOU REALLY HAVE A PROBLEM. SO, WE'RE -- WE DO HAVE SOME ELEVATED LEVELS. THEY'RE AT FOUR -- ROUGHLY FOUR AND A HALF PARTS PER MILLION AND THAT WAS THE MAXIMUM CONCENTRATION. IN FACT, THAT WAS RIGHT FROM THE CENTER CORE OF THE PIT.

AT SITE 24 WE HAD SOME METALS THAT WERE ABOVE WHAT WE CALL BACKGROUND CONCENTRATIONS IN THE SOIL. AGAIN, AS WE INVESTIGATE EACH SITE WE ALWAYS TAKE BACKGROUND SAMPLES OF EACH SITE AND WE'VE BEEN -- WE HAVE A DATABASE THAT HAS BEEN ACCUMULATING OVER TIME. THE METALS IN -- AT SITE 24 WERE SLIGHTLY ABOVE THOSE BACKGROUND CONCENTRATIONS, BUT I WILL SAY WHEN WE COMPARED THE SOIL RESULTS AT SITE 24 WITH SITE 21 AND 78 THEY WERE PRETTY COMPARABLE. AND SEE, AT SITE 24 THAT'S A FLY ASH DUMP, WE THOUGHT WE WOULD SEE SOME ELEVATED LEVELS OF METALS.

SO, IN ONE SENSE, I'LL SAY THAT YES, THEY WERE ELEVATED BECAUSE THEY WERE ABOVE BACKGROUND, BUT WHEN WE COMPARED THEM TO SITES 21 AND 24 THEY WERE COMPARABLE. SO, WE DIDN'T SEE MUCH OF A PATTERN BETWEEN THE THREE SITES IS WHAT I WOULD SAY.

MRS. WOOD: YOU'VE GOT A PROBLEM GENERALLY.

MR. WATTRAS: WE DON'T BELIEVE IT WAS MUCH OF

A PROBLEM THERE. WE HAD A PESTICIDE THAT WAS DETECTED IN ONE SOIL SAMPLE, THIS HEPTACHLOR EPOXIDE IT WAS AT A LOW CONCENTRATION DOWN AT SITE 24. IT WAS ALSO -- AND I'M KIND OF JUMPING AHEAD OF MYSELF, BUT THE REASON WE PUT IT UP ON THE SLIDE THAT PESTICIDE WAS ALSO FOUND IN GROUNDWATER IN THE SHALLOW AQUIFER AT SITE 24.

HERE'S A CASE WHERE, AGAIN, WE FOUND IT AT LOW LEVELS IN THE GROUNDWATER, BUT IN OUR SOIL WE REALLY DIDN'T SEE MUCH OF IT. WE CAN'T -- WE'RE REALLY NOT TOO CLEAR ON WHAT HAPPENED THERE. YOU KNOW, DID WE MISS THE SOURCE OR IS THE SOURCE DEPLETED FROM THE SOIL, OR -- I MEAN, ANOTHER POSSIBILITY WOULD BE THE SAME SITUATION WITH THE METALS, DID WE GET A GROUNDWATER SAMPLE THAT HAD SOME FINDS IN IT OF SOME PESTICIDES THAT WAS REALLY MORE OR LESS RELATED TO THE SEDIMENT AS OPPOSED TO BEING IN GROUNDWATER. BECAUSE ONE THING ABOUT PESTICIDES THEY'RE NOT -- NUMBER ONE, THEY'RE NOT THAT MOBILE IN THE ENVIRONMENT. THEY DON'T MIGRATE LIKE A SOLVENT WILL. IF YOU HAVE A GASOLINE SPILL OR A SOLVENT SPILL AND IT WOULD RAIN OVER TIME THAT WOULD PRETTY MUCH GO TO THE GROUNDWATER PRETTY QUICK. PESTICIDES STAY WITH THE SOILS. THEY DON'T MIGRATE THAT READILY. SO, WE WERE A LITTLE BIT SURPRISED TO SEE IT IN THE GROUNDWATER ESPECIALLY WHEN WE SAW THAT OUR HIGHEST LEVEL IN SOIL WAS VERY, VERY LOW. THAT'S FIVE PARTS PER BILLION. THAT'S EXTREMELY LOW TO SEE IT -- THINKING THAT IT MIGHT BE PART OF THE GROUNDWATER PROBLEM.

SO, I'M GOING TO JUMP AHEAD OF MYSELF A LITTLE BIT RIGHT HERE. WE ARE GOING TO MONITOR THAT. WE'RE GOING TO LOOK AT THOSE

WELLS SOME MORE TO TRY TO FIGURE OUT, IS THERE REALLY A GROUNDWATER PROBLEM ASSOCIATED WITH PESTICIDES. AGAIN, IT WAS AT VERY LOW LEVELS OR WAS THAT A SAMPLE THAT MIGHT HAVE BEEN BIASED HIGH DUE TO SOME PARTICULATES THAT MAY HAVE ACCUMULATED IN THE SAMPLE ITSELF.

SITE 78 -- AT SITE 78 WE FOUND SOME HIGH LEVELS OF PESTICIDES AROUND BUILDING 1502 AND THE HISTORY OF THAT BUILDING AS FAR AS WE KNOW AND WHAT WE CAN TELL WAS NEVER USED FOR PESTICIDE MIXING AND HANDLING. SO, ALTHOUGH THE HISTORY DOESN'T TELL US ANYTHING WE DO KNOW WE HAVE SOME HIGH LEVELS OF PESTICIDES THAT WILL BE TAKEN CARE OF.

NOW, VOC'S, THESE ARE THE VOLATILES, WE DID FIND THEM AT SEVERAL BUILDING AREAS AND WE ALSO FOUND PAH'S, WHICH ARE ANOTHER GROUP OF CONTAMINANTS, MAINLY IN THE 900 BUILDING AREA AS I MENTIONED. THEY WERE AT LOW LEVELS THOUGH. SO, WE SHOULD OF MAYBE ADDED THAT TO THE SLIDE, THAT THEY WERE DETECTED, BUT AT PRETTY LOW LEVELS. NOTHING WHERE WE WOULD SAY THERE IS A CONTINUING SOURCE OF A GROUNDWATER PROBLEM. I MEAN, WE'RE TALKING IN THE PARTS PER BILLION RANGE.

COLONEL WOOD: WHAT SIDE OF THE MAIN ROAD IS 1502 ON AS YOU GO IN?

MR. WATTRAS: PARDON ME?

COLONEL WOOD: WHAT SIDE OF THE ROAD IS IT ON? THE RIGHT SIDE OR THE LEFT SIDE?

MR. WATTRAS: OF BUILDING --

COLONEL WOOD: IN THE INDUSTRIAL AREA?

MR. WATTRAS: I DON'T RECALL.

MR. HAVEN: IT'S IN THE INDUSTRIAL AREA.

COLONEL WOOD: IT'S IN THE INDUSTRIAL AREA?

MR. HAVEN: YES, SIR. YES, SIR. IT WOULD BE MORE IN THE SOUTHWESTERLY END.

MS. BERRY: IT'S RIGHT HERE. YOU CAN SEE IT HERE.

COLONEL WOOD: I'M SORRY, I THOUGHT IT WAS -- MIGHT BE ASSOCIATED WITH THE WASH TOWER AND THE HARDSTAND WHERE THEY USED TO WASH DOWN VEHICLES AND THINGS LIKE THAT. AND --

MR. HAVEN: NO, SIR; IT'S --

MS. BERRY: IT'S RIGHT OFF GIBB STREET, RIGHT HERE.

COLONEL WOOD: I'M WITH YOU. OKAY, THANK YOU. THANK YOU. I'M SORRY.

MR. WATTRAS: FROM A STANDPOINT OF HUMAN HEALTH RISK WE COLLECT ALL THIS INFORMATION. LOOKING AT THE ACTIVITIES AT HADNOT POINT WE LOOK AT, YOU KNOW, THE PEOPLE WORKING THERE AND HOW THEY WOULD BE EXPOSED TO THIS. THE RISK ASSESSMENT RESULTS SHOWED THAT THERE IS -- THAT THE NUMBERS -- THE INCREMENTAL CANCER RISKS OR THE CHANCE OF ACQUIRING CANCER DUE TO EXPOSURE ARE WITHIN ACCEPTABLE RANGE AS DEFINED BY EPA. CAN I SAY THAT?

MS. TOWNSEND: (NODS HEAD.)

MR. WATTRAS: OKAY. WHICH IS THE RANGE OF ONE IN 10,000 TO ONE IN ONE MILLION. WE ALSO LOOK AT OTHER THINGS SUCH AS WHAT'S CALLED THE HAZARD INDEX, AND THAT'S AN INDEX OF ONE. THAT HAZARD INDEX TAKES INTO ACCOUNT THINGS LIKE LIVER DAMAGE, THINGS THAT ARE OBVIOUSLY NOT CANCER RELATED, BUT IMPACTS THE BODY; SUCH AS THE KIDNEY OR THE LIVER OR OTHER THINGS. AND IT WAS ACCEPTABLE FOR SOIL, BUT NOT FOR GROUNDWATER WHICH WE EXPECTED AT THOSE HIGH LEVELS SOMEBODY -- YOU KNOW, WE DON'T WANT SOMEBODY DRINKING THAT SHALLOW AQUIFER. THAT WOULD GIVE THEM AN UNACCEPTABLE RISK.

NOW, YOU HAVE TO REMEMBER TOO ABOUT THE GROUNDWATER WHEN WE DO A RISK ASSESSMENT CURRENTLY THERE'S REALLY NO EXPOSURE. PEOPLE OBTAIN THEIR WATER FROM SUPPLY WELLS -- FROM CLEAN SUPPLY WELLS. SO, UNDER CURRENT SITUATIONS THERE'S NO RISK TO HUMAN HEALTH WITH THE GROUNDWATER.

NOW, IF HADNOT POINT OR CAMP LEJEUNE WOULD SHUT DOWN ONE DAY AND SOMEONE DECIDED TO TURN IT INTO A COMPLEX AND THEY INSTALLED THEIR WELLS IN THE SHALLOW AQUIFER THEY WOULD HAVE AN UNACCEPTABLE RISK.

SO, WHEN WE DO A RISK ASSESSMENT YOU LOOK AT THE CURRENT SITUATION AND YOU ALWAYS HAVE TO PROJECT OUT, AND WE CALL THAT THE FUTURE POTENTIAL RISK. IT'S A CONSERVATIVE WAY OF LOOKING AT THINGS, BUT YOU KNOW, THINGS OVER TIME CHANGE. IT COULD BE REALISTIC IN A LOT OF CASES. AND AT CAMP LEJEUNE WE THINK RIGHT NOW THAT WOULD BE PRETTY UNREALISTIC.

I'LL HAVE TOM BIXIE TALK A LITTLE BIT ABOUT ECOLOGICAL RISKS BECAUSE THAT'S THE OTHER PART OF THE RISK ASSESSMENT WHICH PLAYS A GREAT IMPORTANCE IS LOOKING AT, YOU KNOW, DO THESE CONTAMINANTS IMPACT THE TERRESTRIAL HABITAT OR THE AQUATIC HABITAT.

MR. BIXIE: AT THE SITE WE DID LOOK AT WHAT WOULD BE THE IMPACTS FROM -- FROM THE SITE AND THE CONTAMINANTS ON BOTH THE AQUATIC, ENVIRONMENT AND THE TERRESTRIAL. WE TOOK SOME SURFACE WATER AND SEDIMENT SAMPLES AND COMPARED THESE TO STANDARDS THAT HAVE ESTABLISHED FOR SCREENING VALUES TO SEE IF -- IF THERE WERE ANY EXCEEDANTS OF THESE VALUES, AND NOT ONLY IF THERE WERE ANY EXCEEDANTS; WHERE WERE THEY, WERE THEY UP STREAM OR WERE THEY DOWN STREAM, WAS THERE ANY PATTERN TO THEM.

IN TERMS OF THE SURFACE SOILS WHAT WE HAVE BEEN DOING IS GOING THROUGH A SCENARIO WHERE WE MODEL THE UPTAKE OF THE CONTAMINANTS ENTERING PLANTS THAT SOME TYPE OF TERRESTRIAL WILDLIFE WOULD BE FOR EXAMPLE, A RABBIT; WE USED A RABBIT, AND WE USED A BIRD AND WE USED A DEER.

SO, WE GO THROUGH A SCENARIO JUST AS YOU GO THROUGH THE HUMAN HEALTH SCENARIO AS A SMALL CHILD USES DRINKING WATER. WE GO THROUGH AND WE HAVE THE DEER EATING SOME SOIL WHILE HE'S GRAZING ON THE PLANTS; HE'S EATING THE PLANTS AND DRINKING THE WATER FROM THE AREAS. SO, WE GO THROUGH THOSE TYPE OF SCENARIOS. IN LOOKING AT THIS PARTICULAR SITE IT LOOKS LIKE THE PESTICIDES SEEM TO REPRESENT THE MOST POTENTIAL FOR ANY TYPE OF ADVERSE IMPACT TO THE

ECOLOGICAL ENVIRONMENT. AND --

MRS. WOOD: OKAY, NOW, I'M THINKING GREAT VAST AREAS OF CEMENT THAT YOU HAVE AROUND BURGER KING. YOU'VE GOT THAT FIELD UP THERE AND YOU'RE GOT THE STEAM PLANT. WHERE IS THIS WATER GOING TO BE?

MR. BIXIE: IT'S -- IT'S IN THE TWO CREEKS THAT ARE LOCATED ON EITHER SIDE.

MRS. WOOD: I'M TRYING TO VIEW THIS.

MR. BIXIE: IT'S COGDELS CREEK AND BEAVER DAM.

MR. WATTRAS: YES, BEAVER DAM AND COGDELS CREEK.

MR. BIXIE: BEAVER DAM IS SOUTHEAST --

MR. WATTRAS: TO THE WEST OF HOLCOMB BOULEVARD. COGDELS CREEK IS TO THE EAST OF THE HADNOT POINT INDUSTRIAL AREA. MAYBE BRING THAT --

MRS. WOOD: NO, I'LL GET OVER THERE. THAT'S FINE.

(MR. WATTRAS AND MR. BIXIE SHOW MRS. WOOD A MAP OF THE LOCATION IN QUESTION.)

(PAUSE.)

MR. BIXIE: LOOKING AT THE IMPACTS OF TERRESTRIAL WILDLIFE IS NOT AS ADVANCED AS IT IS -- AS WHAT WE'RE LOOKING AT WITH IMPACTS TO FISH AND THINGS THAT LIVE IN THE WATER JUST BECAUSE WATER IMPACTS HAVE BEEN A LOT MORE WELL STUDIED OVER

THE YEARS.

WE'VE DEVELOPED THIS MODEL THAT LOOKS AT WHAT TYPE OF DOSAGE THIS PARTICULAR WILDLIFE COULD GET. JUST AS YOU COMPARE FOR HUMANS WHAT THE ALLOWABLE INTAKE EPA HAS ESTABLISHED FOR LEAD AND MERCURY OR WHATEVER THERE'S ALSO LEVELS THAT EPA HAS ESTABLISHED IN THE LITERATURE FOR DEER AND FOR RABBIT THAT MAY BE EXPOSED TO ZINC OR -- SO WE GO THROUGH THAT TYPE OF ANALYSIS AND BASED ON THAT WE CAME UP WITH PESTICIDES ARE -- SEEM LIKE THEY HAVE THE MOST IMPACT.

MRS. WOOD: THAT'S INTERESTING. THANK YOU.

MR. WATTRAS: ONCE ALL THESE THINGS ARE TAKEN INTO ACCOUNT AND WE KNOW WHAT THE POTENTIAL RISKS ARE TO BOTH HUMANS AND WILDLIFE WE WILL LOOK AT WHAT ARE THE PROBLEMS OUT THERE THAT ARE CAUSING A HIGH RISK SUCH AS THE GROUNDWATER, SUCH AS PESTICIDES OF THE SOIL OR WHATEVER. AND WE LOOK AT WHAT ARE THE BEST CLEANUP METHODS OR ALTERNATIVES IN DEALING WITH THESE PROBLEMS.

FOR THE GROUNDWATER, THERE ARE TWO PRIMARY PLUMES WHICH WE'RE LOOKING AT. AND FOR SOIL THERE ARE FOUR AREAS OF CONCERN. THREE OF THE AREAS OF CONCERN ARE WITHIN SITE 21 AND THE FOURTH ONE IS AT THIS BUILDING 1502.

I CAN TELL YOU -- NOW, THOSE AREAS OF CONCERN ARE MEASURED THERE IN SQUARE FEET. IT WOULD HAVE BEEN MAYBE A LITTLE BIT BETTER TO SHOW IT IN CUBIC YARDS. IT'S A LOT EASIER, I THINK, TO PICTURE THINGS IN CUBIC YARDS THAN SQUARE FEET, BUT I'LL TELL

YOU THAT THE PESTICIDES AND PCB'S ARE PRIMARILY UP IN THE TOP TWO FEET OF SOIL. BELOW THAT OUR SOIL SAMPLES REALLY DIDN'T FIND ANY SIGNIFICANT CONTAMINATION.

SO, DURING REMEDIATION IT WOULD PRETTY MUCH INVOLVE TAKING OUT ABOUT TWO FEET OF SOIL OVER THAT AREA. THEY ARE SMALL AREAS. NONE OF THESE AREAS ARE WHAT I WOULD CALL A HUGE AREA OF CONTAMINATION. THEY'RE PRETTY -- YOU KNOW, YOU'RE TALKING ABOUT 800 SQUARE FEET, THAT'S NOT VERY BIG. SAME THING WHERE THE HIGHEST ONE IS AT SITE 21 IS ABOUT 8,100 SQUARE FEET. THAT'S NOT THAT LARGE OF AN AREA.

THE GROUNDWATER ALTERNATIVES THAT WE LOOKED AT WOULD BE THE NO ACTION ALTERNATIVE, WHICH EVERYBODY KNOWS WE LOOK AT. INSTITUTIONAL CONTROLS WHICH WOULD BE SHUTTING WELLS DOWN, NOT ALLOWING NEW WELLS TO BE PUT IN. THE THIRD ALTERNATIVE IS REFERRED TO AS SOURCE CONTROL. AS I MENTIONED BEFORE THE ACTION THAT'S GOING ON RIGHT NOW IS CONTAINMENT ALTERNATIVE. WE'RE CONTAINING MIGRATION.

ALTERNATIVE THREE FOCUSES ON GOING TO THE HOT SPOT AND DEALING WITH THAT HOT SPOT; PUMPING FROM THAT AREA. AND IN ALTERNATIVE THREE IT WOULD SIMPLY BE ADDING ADDITIONAL WELLS IN THE HOTTEST, THE MOST CONTAMINATED PORTION OF THAT PLUME, TYING IT INTO THE EXISTING TREATMENT SYSTEM THAT IS BEING CONSTRUCTED. THE FOURTH ALTERNATIVE WOULD ALSO BE SOURCE CONTROL, BUT IT WOULD USE A DIFFERENT TECHNIQUE OF AIR SPARGING.

AIR SPARGING IS SIMPLY PULLING AIR -- PULLING AIR OUT OF

THE GROUND. BY DOING THIS IT'S ALMOST LIKE A VACUUM WHERE YOU'RE PULLING THE VOLATILES, AND VOLATILES READILY MOVE AND IT WOULD GO THROUGH AN AIR PATHWAY AND IT WOULD BE COLLECTED. THE AIR WOULD BE -- EMISSIONS WOULD BE COLLECTED.

IN THAT ALTERNATIVE THE ADVANTAGES -- YOU DON'T REALLY TREAT ANY -- YOU DON'T HAVE TO PULL ANY GROUND WATER OUT. YOU DO EVERYTHING -- WHAT WOULD BE IN SITU. YOU'RE NOT PULLING OUT ANYTHING. EVERYTHING STAYS THE SAME, IT'S JUST THAT YOU'RE SUCKING AIR OUT AND THE VOLATILES WOULD FOLLOW THAT AIR PATHWAY.

THE FIFTH ALTERNATIVE ADDRESSES THE DEEPER GROUNDWATER. THE FIRST FOUR -- OF COURSE, ONE AND TWO DON'T DO ANYTHING WITH THE GROUNDWATER, BUT THE THIRD AND FOURTH ALTERNATIVE FOCUSES JUST ON THE SHALLOW GROUNDWATER.

THE FIFTH ONE CONSIDERS WHAT WOULD HAPPEN IF -- OR WHAT WOULD BE THE COST AND OUTCOME IF WE PUT IN SOME DEEP EXTRACTION WELLS AND WENT AFTER THE CONTAMINATION IN THE INTERMEDIATE AQUIFER AND IN THE DEEP AQUIFER.

LET ME MOVE AHEAD A LITTLE BIT HERE AND I'LL GO BACK TO THAT. LET'S LOOK AT THE COST OF THESE ALTERNATIVES TOO. THE COST OF --

COLONEL WOOD: COULD YOU FOCUS THAT JUST A LITTLE BIT?

MR. WATTRAS: I'LL TELL YOU THE COST. I'M SORRY IF YOU CAN'T TELL WHAT THEY ARE. THEY ARE A LITTLE BIT HARD TO SEE.

THE ALTERNATIVES FOR GROUNDWATER RANGE ANYWHERE FROM ZERO, IF WE DID NOTHING ELSE OUT THERE, UP TO 690,000 AND THAT WAS FOR THE AIR SPARGING. THE OTHER COSTS IF WE JUST IMPLEMENTED MORE INSTITUTIONAL CONTROLS AND DID MORE MONITORING IT WOULD COST ROUGHLY $260,000.

THE THIRD ALTERNATIVE IS TO ADDRESS THE SHALLOW GROUNDWATER IN THE MOST CONTAMINATED AREA TIE THAT INTO THE EXISTING TREATMENT SYSTEM AND IT'S AT $460,000. THE OTHER TREATMENT ALTERNATIVE INVOLVING SOME REMEDIATION OF THE INTERMEDIATE AND DEEP AQUIFER IS $615,000.

I'LL TALK ABOUT SOIL LATER. I FIGURE IT'S BEST MAYBE TO GO THROUGH THE GROUNDWATER THEN WE'LL MOVE BACK AND TALK ABOUT SOIL.

THE ALTERNATIVE THAT THE DEPARTMENT OF NAVY AND MARINE CORPS IS PROPOSING WOULD BE ALTERNATIVE THREE, AND THAT'S JUST TO ADDRESS MORE CLEANUP OF THE SHALLOW GROUNDWATER IN THE HOTTEST AREA OF CONTAMINATION. AGAIN, THAT'S WHERE WE WOULD JUST ADD ON TO THE EXISTING TREATMENT SYSTEM. THE REASON ALTERNATIVE SIX WAS NOT SELECTED WAS BECAUSE WHAT WE'RE AFRAID OF IS INSTALLING SOME EXTRACTION WELLS IN THE INTERMEDIATE PORTION OF THE AQUIFER AS WELL AS THE DEEP PORTION COULD POTENTIALLY MAKE THINGS WORSE DEEPER.

MRS. WOOD: I WAS WONDERING ABOUT THAT. IF IT WOULDN'T CREATE A PULL.

MR. WATTRAS: WE'RE WORRIED ABOUT THAT

BECAUSE THERE IS NO CONFINING LAYER. YOU KNOW LAST NIGHT WE TALKED ABOUT A SEMI-CONFINING LAYER OUT AT SITE 35. AT HADNOT POINT THE GEOLOGY IS TOTALLY DIFFERENT. IT'S ON THE OTHER SIDE OF THE NEW RIVER. THERE IS NO CONFINING LAYER AT HADNOT POINT UNTIL ABOUT 220 FEET.

WHAT WOULD PROBABLY -- WHAT COULD POSSIBLY HAPPEN WOULD BE IF WE WOULD ADDRESS THE INTERMEDIATE AND DEEP IS YOU WOULD START PUMPING OVER TIME AND YOU COULD ACTUALLY DRAW CONTAMINATES DOWNWARD.

GIVEN THAT THE CONTAMINATION LEVELS IN THE INTERMEDIATE AND DEEP ARE PRETTY LOW TO BEGIN WITH WE FELT THAT WOULD NOT BE -- THAT WE'D ACTUALLY END UP WITH A WORSE RESULT. SO, THAT'S WHY THAT ALTERNATIVE WASN'T SELECTED. IT'S NOT, YOU KNOW, BECAUSE THEY DON'T FEEL LIKE CLEANING UP THE DEEP AQUIFER. WE FEEL IT'S BEST TO JUST ADDRESS THE SHALLOW, WHICH IS THE HOT SPOT AND THAT'S THE SOURCE OF THE DEEP. I MEAN, THE SHALLOW IS THE SOURCE OF OBVIOUSLY THE DEEP. WE FEEL LET'S CLEAN THAT UP SEE WHAT HAPPENS TO THE LEVELS DOWN BELOW. WHILE WE'RE CLEANING UP THAT SHALLOW AQUIFER OVER TIME AND AT CERTAIN INTERVALS, USUALLY IT'S QUARTERLY AND THEN SOMETIMES THEY'LL BACK IT OFF TO MAYBE TWICE A YEAR, WE WILL TAKE SAMPLES FROM OUR MONITORING WELLS TO SEE HOW EFFECTIVE THE SOLUTION IS. WE WILL ALSO TAKE SAMPLES FROM THE DEEP. WE WANT TO SEE IF OVER TIME THE DEEP AQUIFER IS SLOWLY DECREASING IN CONCENTRATION AS WELL AS THE INTERMEDIATE. WE THINK THAT WILL HAPPEN OVER TIME IF WE ADDRESS THE SOURCE AREA.

MRS. WOOD: WHERE WOULD THAT WATER IN THE DEEP BE MIGRATING TO?

MR. WATTRAS: IN THE DEEP?

MRS. WOOD: YEAH.

MR. WATTRAS: IT'S HEADING TOWARDS THE NEW RIVER. THE DEEP AQUIFER --

MRS. WOOD: WELL, AT THAT RATE WOULD IT INTERSECT -- ACTUALLY INTERSECT OR IS IT GOING RIGHT OUT INTO THE OCEAN?

MR. WATTRAS: SOME OF IT -- YOU KNOW, AGAIN, THIS CASTLE HAYNE AQUIFER GOES DOWN TO 220 FEET. YOU KNOW, AT A HUNDRED FEET SOME OF THAT GROUNDWATER AS IT HEADS TOWARDS THE NEW RIVER IS GOING TO START GOING UPWARDS TOWARDS THE RIVER. THE WATER AT 220 FEET IS PROBABLY GOING TO GO RIGHT UNDERNEATH THE NEW RIVER.

BY THE WAY, WE HAVE SAMPLED THE NEW RIVER JUST TO SEE IF THERE IS ANY IMPACT. THERE WAS NO VOLATILE CONTAMINATION OF THAT SURFACE WATER. CHANCES ARE AT LEVELS -- AND I MENTIONED BEFORE WE HAD A LITTLE BIT OF BENZENE IN THE DEEP AQUIFER AT ABOUT FIVE PARTS PER BILLION. MY BEST JUDGEMENT WOULD BE THAT ONCE THAT WOULD REACH THE NEW RIVER AND ENTER THE NEW RIVER YOU WOULD NOT EVEN BE ABLE TO MEASURE IT BECAUSE OF DELUSIONAL EFFECTS. THAT WOULD BE -- YOU'D HAVE TO HAVE A PRETTY GOOD SLUG OF GROUNDWATER FOR IT TO ACTUALLY SHOW UP IN THE NEW RIVER; YOU WOULD HAVE A PRETTY GOOD PROBLEM.

COLONEL WOOD: IN YOUR TESTING OF THE NEW RIVER DID YOU FIND ANY METALS THERE?

MR. WATTRAS: WE DO FIND METALS.

COLONEL WOOD: DID YOU FIND MERCURY?

MR. WATTRAS: OH, MERCURY? I DON'T ACTUALLY RECALL. CAN YOU -- I DON'T -- IT DOESN'T RING A BELL.

MR. BIXIE: IT WASN'T ANYTHING THAT WAS ABOVE ANY STANDARDS. I MEAN, YOU ALWAYS FIND VERY, VERY LOW LEVELS OF METALS, BUT NOTHING THAT WAS ABOVE STANDARD.

MR. PAUL: DO YOU ASK THAT FOR ANY SPECIFIC REASON?

COLONEL WOOD: WHAT IT DOES TO THE FISH.

MR. PAUL: WHAT'S THAT?

COLONEL WOOD: WHAT IT DOES TO THE FISH.

MR. PAUL: BUT NO KNOWN PRACTICE THAT YOU KNOW ABOUT?

COLONEL WOOD: NO, NO, NO, NO.

MR. PAUL: THAT WAS THE SITE OF THE AIR STATION THAT WE EXCEPTED TO FIND MERCURY, BUT WE DIDN'T FIND IT.

MR. WATTRAS: YEAH, SAMPLED -- DID YOU ASK ABOUT THE FISH?

COLONEL WOOD: YEAH.

MR. WATTRAS: OKAY. I'M SORRY, I COULDN'T HEAR YOU. YEAH, WE DID --

MR. PAUL: NO, HE JUST SAID WHAT IT DOES

TO THE FISH.

MR. WATTRAS: OH.

MR. PAUL: WHAT IT DOES TO THE FISH.

MR. WATTRAS: OH, I SEE.

MR. PAUL: I DIDN'T KNOW IF THERE WAS SOME HISTORY THERE THAT HE COULD SHED SOME LIGHT ON?

COLONEL WOOD: NO, NOT AT ALL.

MR. WATTRAS: SO, THAT'S THE PROPOSED ALTERNATIVE TO GROUNDWATER. TO SIMPLY -- WE ARE CONTAINING IT AT PRESENT. NOW, WE'RE GOING TO GO OUT TO THE HOT SPOT AND TIE IN WITH THE EXISTING SYSTEM.

I'M GOING TO BACK UP AND GO OVER THE SOIL ALTERNATIVES. WE CAME UP WITH FOUR ALTERNATIVES. OBVIOUSLY, THE NO ACTION ALTERNATIVE IS ALWAYS CONSIDERED. THE SECOND ALTERNATIVE WOULD BE TO LEAVE THE SOIL IN PLACE AND POSSIBLY CAP IT. YOU CAN CAP IT WITH ASPHALT. YOU CAN CAP IT WITH CLAY. YOU CAN CAP IT WITH SOIL, PUT TWO FEET OF SOIL ON IT AND PLANT GRASS. THAT WOULD BE CONSIDERED CAPPING.

THE THIRD ALTERNATIVE IS ON-SITE TREATMENT. THAT WOULD BE EXCAVATION OF THE SOIL, POSSIBLY BRINGING ON -- YOU CAN BRING ON AN INCINERATOR OR ANOTHER TYPE OF TREATMENT TECHNIQUE THAT WOULD BE APPLICABLE TO PESTICIDES AND PCB'S.

THE FOURTH ALTERNATIVE WOULD BE JUST TO EXCAVATE IT AND TO TAKE IT OFF-SITE TO A PERMITTED FACILITY FOR DISPOSAL.

I'LL GO OVER THE COSTS AGAIN; YOU PROBABLY CAN'T SEE

THEM VERY WELL. THE COSTS RANGE ANYWHERE, OBVIOUSLY, FROM ZERO ALL THE WAY UP TO 1.4 MILLION.

1.4 MILLION WOULD BE THE COST OF BRINGING AN ON-SITE INCINERATOR ACTUALLY TO THE BASE. THE REASON IT'S SO HIGH -- I MENTIONED BEFORE ABOUT THE QUANTITIES OF SOIL. WE DON'T REALLY HAVE A -- YOU KNOW, THESE ARE SMALL AREAS. AND HERE'S WHERE YOU RUN INTO THE COST OF, BECAUSE YOU'RE DEALING WITH SUCH A SMALL AMOUNT OF SOIL, IT REALLY DOES NOT MAKE IT COST-EFFECTIVE TO BRING A TREATMENT SYSTEM ON-SITE, BECAUSE OF ALL THE CAPITAL COSTS ASSOCIATED WITH JUST A SMALL AMOUNT OF SOIL. THAT'S WHY THE COST IS SO HIGH; IT'S REALLY NOT THAT COST-EFFECTIVE TO DO ON-SITE TREATMENT FOR SUCH A SMALL COST OF SOIL.

NOW, MAYBE IF YOU HAD A PROBLEM WHERE YOU HAD A VERY LARGE AREA OF SOIL CONTAMINATION, THAT MIGHT BE FEASIBLE, INSTEAD OF EXCAVATING AND TRUCKING EVERYTHING OFF-SITE FOR TREATMENT OR FOR OFF-SITE DISPOSAL, THAT MIGHT BE A CASE WHERE IT'S MORE FEASIBLE TO SAY LET'S BRING THE TREATMENT SYSTEM ON-SITE, BECAUSE WE HAVE PLENTY OF SOIL AND IT'S GOING TO BE COST-EFFECTIVE.

SO, THERE'S A LITTLE BIT OF -- THE LESS CONTAMINATION YOU HAVE, IT SEEMS LIKE THE MORE EXPENSIVE IT IS TO BRING THE TREATMENT ON-SITE. THAT MIGHT NOT -- NOW, FOR PETROLEUM -- AGAIN, WE'RE TALKING PESTICIDES AND PCB'S. LAST NIGHT WE TALKED ABOUT THE PETROLEUM PRODUCT. THAT'S A LITTLE BIT DIFFERENT. IT'S A LOT EASIER TO TREAT, TOO.

PESTICIDES AND PCB'S, THERE AREN'T THAT MANY TREATMENT

TECHNOLOGIES IN DEALING WITH THEM. YOU'RE ALMOST LIMITED TO -- INCINERATION IS PROBABLY THE MOST NOTED AND THE LEAST AMOUNT OF RISK WE KNOW THAT IT'S GOING TO GET RID OF IT. THERE ARE SOME OTHER TECHNOLOGIES THAT ARE WHAT THEY CALL INNOVATIVE, AND THEY HAVE MORE RISKS. YOU WON'T BE -- THERE IS --

MRS. WOOD: DEFINE "INNOVATIVE"?

MR. WATTRAS: FOR EXAMPLE --

MRS. WOOD: DEFINE IT.

MR. BIXIE: SOIL WASHING.

MR. WATTRAS: SOIL WASHING. THEY CAN ADD SOME -- I WANT TO -- ACTUALLY LIKE A SOLVENT TO THE SOIL TO EXTRACT THE PCB'S OR PESTICIDES. THEN, ALL THOSE PCB'S AND PESTICIDES ARE --

MRS. WOOD: YOU STILL HAVE THEM.

MR. WATTRAS: -- IN THE SOLVENT, AND THEN THEY WOULD JUST GET RID OF THE SOLVENT, AND THE SOIL WOULD BE USED AS BACK FILL.

SO, THE COST RANGE, AGAIN, THIS IS -- THAT ONE ON-SITE TREATMENT -- THIS IS A TYPOGRAPHICAL ERROR. THE COSTS RANGE FROM $650,000 TO 1.4 MILLION.

FOR THE OFF-SITE DISPOSAL, THE COSTS WOULD RANGE FROM $480,000 UP TO 1.3 MILLION. THE REASON IS $480,000 REPRESENTS TAKING IT OFF-SITE AND TAKING IT TO A PERMITTED LANDFILL. THE 1.3 MILLION DOLLAR RANGE REPRESENTS TAKING IT OFF-SITE, TREATING IT VIA INCINERATION.

NOW, THE SOIL -- THERE'S OUR TREATMENT SYSTEM, BY THE WAY. WE CAN TALK ABOUT THAT LATER ON.

THE PROPOSED ALTERNATIVE FOR SOIL IS TO CHOOSE ALTERNATIVE FOUR AND SIMPLY EXCAVATE THE SOIL AND TAKE IT TO AN OFF-SITE LANDFILL. IN THIS CASE -- IT HAS A LOT TO DO WITH THE QUANTITY OF SOIL. WE'RE NOT TALKING HIGH QUANTITIES OF SOIL. IN THIS CASE, IT'S MOST FEASIBLE TO JUST TAKE IT TO AN OFF-SITE LANDFILL. THE PESTICIDE AND PCB CONTAMINATED SOIL IS NOT CONSIDERED A HAZARDOUS WASTE. IT'S CONSIDERED -- IT HAS HAZARDOUS SUBSTANCES IN IT, BUT IT DOES NOT FALL UNDER THE CATEGORY OF HAZARDOUS WASTE.

ONCE A SOIL OR A LIQUID FALLS UNDER THE CATEGORY OF A HAZARDOUS WASTE, IT HAS TO GO TO A VERY SPECIAL TYPE OF LANDFILL, AND THAT DOES RUN INTO A LOT OF MONEY. IN THIS CASE, BECAUSE IT'S NOT HAZARDOUS, IT COULD BE TAKEN TO A PERMITTED, WHAT THEY CALL A TITLE C LANDFILL, IF I'M NOT MISTAKEN. BUT IT COULD BE TAKEN TO A LANDFILL THAT DOES NOT -- IT HAS A LOT OF PRECAUTIONS, YOU KNOW, IT'S NOT JUST A DUMP.

MS. WOOD: IT'S LINED.

MR. WATTRAS: BUT IT'S DIFFERENT THAN A HAZARDOUS WASTE LANDFILL AND IT BECOMES MORE COST-EFFECTIVE JUST TO TAKE THIS PESTICIDE AND PCB SOIL TO AN OFF-SITE LANDFILL.

THAT'S THE CONCLUSION OF THE HADNOT POINT PROPOSED ALTERNATIVES.

WE'RE GOING TO TALK ABOUT ANOTHER OPERABLE UNIT. BUT

BEFORE WE GET INTO THAT, ARE THERE ANY OTHER QUESTIONS THAT YOU MIGHT HAVE THAT YOU WANT TO TALK ABOUT NOW OR -- WE COULD -- WE CAN ADDRESS THEM.

MRS. WOOD: JUST, IN OTHER WORDS, YOU'RE CONCENTRATING ON THE WATER AND THE SOILS THAT ARE CONTAMINATED WITH THE PESTICIDES.

MR. WATTRAS: RIGHT, PESTICIDES AND PCB'S.

MRS. WOOD: THERE'S NO PROBLEMS WITH PETROLEUM PRODUCTS --

MR. WATTRAS: NO, THAT --

MRS. WOOD: -- OR SOLVENTS?

MR. WATTRAS: THAT WAS NOT INCLUDED AS PART OF THIS STUDY. YOU'RE TALKING ABOUT SITE 22 OR?

MRS. WOOD: WELL, I MEAN -- YEAH, OR UP THERE BY BUILDING 900, THERE'S NO GROUND PROBLEM?

MR. WATTRAS: OH, NO. NO, NO, NO. AGAIN, WE LOOKED AT THOSE SOIL RESULTS. THAT'S WHAT I WAS SAYING BEFORE, WHERE WE REALLY DIDN'T SEE VERY HIGH LEVELS OF SOLVENTS THAT WE COULD ASSOCIATE WITH A CONTINUING SOURCE.

IF WOULD HAVE, AND THAT WOULD HAVE, YOU KNOW -- THAT WOULD HAVE BEEN A GREAT THING TO SAY THAT THERE'S STILL A SOURCE THERE AND WE'RE GOING TO DO SOMETHING WITH IT. BUT IF WE WOULD HAVE FOUND SOME VERY HIGH LEVELS OF SOLVENTS IN SOILS THAT ARE ASSOCIATED WITH THAT PLUME, THEY WOULD HAVE BEEN TAKEN CARE OF. I MEAN, WE WOULD -- I DON'T BELIEVE --

MRS. WOODS: SO, IT'S JUST THE PLUME.

MR. WATTRAS: -- A SOURCE WOULD HAVE BEEN LEFT THERE. I DON'T BELIEVE EPA OR THE STATE WOULD HAVE EVER PERMITTED A SOURCE OF CONTAMINATION TO THE SOIL TO REMAIN THERE. IT CERTAINLY WOULD HAVE BEEN ADDRESSED. BUT IT APPEARS THAT THE SOURCE HAS BEEN DEPLETED FROM THAT SOIL MATRIX AT THIS TIME AND IS PRETTY MUCH SITTING IN THE SHALLOW GROUNDWATER.

OKAY. OPERABLE UNIT NUMBER FIVE IS A VERY SMALL OPERABLE UNIT. IT CONSISTS OF ONE SITE: SITE TWO. SITE TWO IS CALLED THE FORMER NURSERY DAY CARE CENTER. IT INVOLVES TWO AREAS; ONE IS -- WE CALL THE BUILDING 712 AREA. THAT WAS THE BUILDING THAT USED TO HOUSE THE PESTICIDES AND STORED THEM. AND WE HAVE ANOTHER AREA CALLED THE FORMER STORAGE AREA. THIS IS ACROSS A SET OF RAILROAD TRACKS THAT WAS ONCE OPENED -- THAT'S AN OPEN FIELD THAT WAS ONCE USED TO STORE BULK MATERIALS.

THIS IS A PICTURE OF BUILDING 712, AND BEHIND IT THAT'S A PARKING LOT AREA. IT'S CURRENTLY USED AS AN ADMINISTRATIVE OFFICE. AND I CAN SHOW YOU ON ANOTHER SLIDE, BUT OVER IN THIS AREA, THERE ARE TWO CONCRETE PADS, CEMENT PADS OR CONCRETE PADS, WHICH WE BELIEVE THEY USED TO STORE DRUMS OF PESTICIDES. WE LOOKED AT SOME AERIAL PHOTOGRAPHS WHERE WE COULD SEE THESE DRUMS OF PESTICIDES SITTING ON THESE PADS. AND THEY PROBABLY, YOU KNOW -- THEY WERE 55 GALLON DRUMS THAT WERE TURNED ON THEIR SIDE. THEY PROBABLY HAD THE SPIGOT THERE AND WOULD POUR OUT THE PESTICIDES AS THEY NEED THEM AND FILL UP THEIR SPRAYERS AND APPLY THEM.

COLONEL WOOD: DID THEY OPERATE THOSE PADS COINCIDENTALLY WITH THE -- OR AT THE SAME TIME THAT THE PLACE WAS OPERATING AS A DAY CARE CENTER?

MR. WATTRAS: AS FAR AS I KNOW, NO.

MR. HAVEN: NO, SIR.

MR. PAUL: NO, SIR.

MR. HAVEN: AS A MATTER OF FACT, SITE TWO, IF I'M NOT MISTAKEN, WAS OPERATING FROM 1945 TO 1958 AS A PESTICIDE MIXING AREA. AND THE DAY CARE CENTER WAS PROBABLY A COUPLE OF DECADES LATER.

MRS. WOOD: OH, NO. NO.

MR. HAVEN: IT CAME ABOUT THE '60S.

MRS. WOOD: NO, THAT CAME ABOUT -- YEAH, IT WAS THERE FOR YEARS BEFORE YOU WERE BORN REALLY. I HAD IT IN HERE, BUT IT CAME IN SHORTLY AFTER '58.

MR. HAVEN: IN THE '60S.

MRS. WOOD: AND THEY CLOSED IT DOWN IN THE '70S, '78 OR SOMETHING LIKE THAT.

MR. WATTRAS: I THINK IT'S ONE ON OF THOSE SLIDES. LET ME SEE. FROM 1945 TO 1958 IS WHAT WE HAVE THROUGH OUR RECORDS OR IN LOOKING AT INFORMATION, THAT'S WHEN IT OPERATED.

MRS. WOOD: THE DAY CARE CENTER WENT IN ALMOST IMMEDIATELY AFTER THAT.

MR. PAUL: I WANT TO SAY '63 FOR THE DAY CARE.

MRS. WOOD: THAT SOUNDS AWFULLY CLOSE.

MR. PAUL: YEAH, IT WAS IN THE EARLY '60S, BUT I DON'T THINK IT WAS A YEAR OR TWO AFTER.

MRS. WOOD: THEY DIDN'T MOVE ONE OUT AND PUT ONE IN.

MR. WATTRAS: THESE ARE THE CONCRETE PADS. THE OBJECT IN THE BACKGROUND IS A MONITORING WELL WHICH WE INSTALLED. ON THE OTHER SIDE OF THE MONITORING WELL RIGHT UP HERE IS ANOTHER CONCRETE PAD. SO, WE HAVE A MONITORING WELL RIGHT IN THE MIDDLE OF THIS AREA.

WE TOOK A LOT OF SAMPLES THROUGHOUT HERE, A LOT OF SOIL SAMPLES. WE STARTED AT THE SURFACE AND WORKED OUR WAY DOWN TO THE WATER TABLE, WHICH IS PROBABLY ABOUT SIX OR SEVEN FEET UP HERE. AND WE ALSO LOOKED AT THE OTHER AREA AROUND THE BUILDING, JUST TO MAKE SURE, YOU KNOW, THERE WEREN'T HIGH LEVELS OF PESTICIDES BACK THERE.

THIS IS THE SECOND PAD THAT I WAS SHOWING YOU IN THAT PREVIOUS FIGURE. THIS PAD'S PRETTY --

MRS. WOOD: NOW, IS THAT A DITCH OVER THERE TO THE RIGHT?

MR. WATTRAS: YES, THERE IS A DRAINAGE DITCH, AND THERE'S A SET OF -- THERE'S RAILROAD TRACKS THAT RUN IN THIS DIRECTION. AND THAT DRAINAGE DITCH RECEIVES SURFACE RUN-OFF. RARELY IS THERE WATER IN THAT DITCH EXCEPT AFTER A RAINFALL. SO, IT'S NOT AN INTERMITTENT STREAM; IT'S SIMPLY A DITCH.

THIS IS THE OPEN AREA, THE STORAGE AREA, I WAS TALKING ABOUT. NOW, TYPICALLY IT'S JUST AN OPEN FIELD. THE EQUIPMENT YOU SEE HERE WAS ASSOCIATED WITH OUR INVESTIGATION. BUT TYPICALLY, THERE'S NOTHING THERE. IT'S JUST AN OPEN FIELD. LOOKING AT HISTORICAL PHOTOGRAPHS -- IN FACT, I BELIEVE THERE'S ONE OVER THERE -- YOU CAN SEE THAT THERE USED TO BE, COMING OFF THAT TRAIN TRACK -- NOW, THE TRAIN TRACKS ARE RUNNING RIGHT OVER HERE, OKAY? BUILDING 712 IS ON ONE SIDE. THIS OPEN FIELD'S ON THE OTHER. THERE USED TO BE A RAILROAD SPUR THAT CAME OFF OF THE MAIN LINE, AND YOU CAN SEE THINGS THAT WERE STORED OVER HERE AT ONE TIME. NOW, THAT RAILROAD SPUR IS GONE AND, AGAIN, NOTHING'S STORED THERE.

TO BE QUITE HONEST WITH YOU, THERE'S NO INFORMATION TELLING US WHAT WAS STORED THERE. YOU CAN SEE OBJECTS IN THE HISTORICAL PHOTOGRAPHS, BUT WE LOOKED THROUGH DIFFERENT RECORDS TO SEE IF -- WHAT MIGHT HAVE BEEN STORED THERE. THERE IS A WATER TREATMENT FACILITY ON THE OTHER SIDE OF THIS ROAD, RIGHT OVER HERE. IT COULD HAVE BEEN -- THE STUFF THAT WAS STORED OVER THERE COULD HAVE BEEN ASSOCIATED WITH THAT TREATMENT FACILITY FOR ALL WE KNOW. BUT WE DON'T HAVE ANY INFORMATION ON EXACTLY WHAT WAS STORED THERE.

STUDIES HAVE BEEN CONDUCTED OUT HERE BEFORE WE DID OUR REMEDIAL INVESTIGATION. I BELIEVE THERE WERE FIVE MONITORING WELLS ALREADY IN PLACE. FOUR OF THE MONITORING WELLS WERE LOCATED AROUND THE BUILDING 712 AREA. AND THE FIFTH MONITORING WELL WAS

IN THIS OPEN FIELD AREA.

WHAT WE FOUND -- OBVIOUSLY WE FOUND A LOT OF PESTICIDES IN THE SURFACE SOIL AND THE SEDIMENT NEAR THE CEMENT PADS, VERY HIGH LEVELS. THE HIGHEST LEVEL WAS ABOUT ONE MILLION PARTS PER BILLION. WE'RE TALKING PERCENTAGE, SO VERY HIGHLY CONCENTRATED SOIL -- OR PESTICIDE LEVELS IN THE SOIL; AS WELL AS THE SEDIMENT IN THE DRAINAGE DITCH, WHICH MAKES SENSE BECAUSE IT'S A PRETTY STEEP DITCH, AND I'M SURE THROUGH RUNOFF A LOT OF STUFF FLOWS RIGHT INTO THAT DITCH.

WITH RESPECT TO GROUNDWATER, WE REALLY DIDN'T FIND MUCH OF A PESTICIDE PROBLEM. WE DID HAVE SOME LOW LEVELS. THE WELL IN BETWEEN THE PADS HAD SOME VERY, VERY LOW LEVELS. I LIKE TO CALL THEM TRACE LEVELS; WE'RE TALKING VERY LOW PARTS PER BILLION. BUT THE MAJOR PROBLEM, WITH RESPECT TO GROUNDWATER, HAPPENED TO BE SOME LEVELS OF ETHYLBENZENE AND XYLENE IN THE FORMER STORAGE AREA.

I MENTIONED JUST A BIT AGO WE HAD ONE WELL OVER IN THE FORMER STORAGE AREA. AND HISTORICALLY, BACK IN THE MID-80S WHEN THAT WELL WAS FIRST INSTALLED, IT HAD SOME LOW LEVELS OF ETHYLBENZENE AND XYLENE, AND THAT WELL'S BEEN SAMPLED ABOUT THREE OR FOUR TIMES, AND THE CONTAMINANTS KEEP SHOWING UP AT SLIGHTLY LOWER LEVELS.

WE LOOKED FOR THE SOURCE OF ETHYLBENZENE AND XYLENE; WE KNOW THOSE ARE ASSOCIATED WITH PETROLEUM PRODUCTS, GASOLINE OR WHATEVER, DIESEL FUEL. WE THOUGHT MAYBE THERE WAS AN UNDERGROUND STORAGE TANK OVER THERE THAT NOBODY KNEW ABOUT. SO, WE LOOKED AT

THAT, WE DID SOME GEOPHYSICAL WORK TO SEE IF WE COULD SEE A TANK; NOTHING CAME UP.

WE DID SOME EXTENSIVE SAMPLING IN THE FORMER STORAGE AREA THINKING THAT WE'RE GOING TO HIT SOME KIND OF SPILL AREA THAT WOULD HAVE, YOU KNOW, ETHYLBENZENE AND ALL THESE OTHER PRODUCTS, BUT WE REALLY DIDN'T FIND THE SOURCE OF THIS ETHYL BENZENE AND XYLENE.

LET ME TELL YOU ABOUT THE LEVELS JUST A LITTLE BIT MORE. WE ARE TALKING ABOUT LOW LEVELS OF ETHYLBENZENE AND XYLENE. THEY ARE BELOW WHAT'S CALLED FEDERAL DRINKING WATER STANDARDS. BUT THEY ARE ABOVE THE STATE'S DRINKING WATER STANDARDS. THE STATE'S STANDARDS ARE A LITTLE BIT MORE STRICTER THAN THE FEDERAL STANDARDS (SIC).

THE EXTENT OF THAT CONTAMINATION IS DEFINED. IT'S A VERY SMALL PLUME. WE HAVE WELLS -- WE HAVE A LOT OF WELLS. AT ONE TIME I MENTIONED THERE WERE FIVE WELLS WHEN WE STARTED. I THINK WE'RE UP TO ABOUT 13 WELLS OR 12 WELLS. WE HAVE A PRETTY GOOD IDEA. WE LOOKED AT THE DEEP GROUNDWATER RIGHT BELOW THAT ETHYLBENZENE PLUME, AND WE DIDN'T FIND ANY ETHYLBENZENE OR XYLENE IN THE DEEP GROUNDWATER. SO, WE KNOW IT'S A SMALL LOCALIZED GROUNDWATER PROBLEM.

TALKING ABOUT THE FINDINGS A LITTLE BIT, I PROBABLY WENT OVER MOST OF THIS, JUMPING AHEAD OF MYSELF. I WILL SAY ANOTHER THING, BY THE CEMENT PAD AREA, WE ALSO FOUND SOME SEMI-VOLATILE ORGANICS LIKE NAPHTHALENE. AGAIN, AT ONE TIME THESE PESTICIDES

WERE APPLIED WITH A PETROLEUM-BASED SOLVENT, SO SEEING THINGS LIKE NAPHTHALENE, NAPHTHALENE IS A CONTAMINANT THAT'S ASSOCIATED WITH PETROLEUM. IF THEY USED PETROLEUM-BASED SOLVENTS TO MIX WITH THE PESTICIDES TO APPLY IT, IT MAKES SENSE THAT WE WOULD FIND SOME OF THESE COMPOUNDS IN THAT SEDIMENT OR IN THE SOIL AND SEDIMENT.

THAT'S PRETTY MUCH JUST WHAT I JUST MENTIONED. LOW LEVELS OF XYLENE AND ETHYLBENZENE ABOVE THE STATE STANDARDS, BUT BELOW FEDERAL STANDARDS. I MENTIONED SOME PESTICIDES IN GROUNDWATER, EVEN OUR UPGRADIENT WELL, FOR WHATEVER REASON, HAD SOME LOW LEVELS OF PESTICIDES. AGAIN, THESE LOW LEVELS COULD HAVE BEEN DUE, PRETTY MUCH THE SAME SITUATION WHERE I TALKED BEFORE ABOUT SITE 24 WHERE YOU START GETTING SOME PARTICULATES INTO THE SAMPLE, ESPECIALLY IN OUR BACKGROUND WELL. WE WERE A LITTLE BIT SURPRISED.

WE HAD THE SAME PROBLEM WITH LEAD AND -- METALS SUCH AS LEAD, CADMIUM AND CHROMIUM IN OUR GROUNDWATER. AND THIS GOES BACK TO THE WHOLE DISCUSSION WE HAD PREVIOUSLY, AND WE EVEN INCLUDED ON THERE INCLUDING OUR UPGRADIENT WELL. AGAIN, WE'RE NOT SO SURE WHETHER THESE METALS WERE REALLY ASSOCIATED WITH THE SITE OR NOT. WE REALLY BELIEVE THEY ARE NOT.

WITH RESPECT TO DISSOLVED METALS, MANGANESE WAS THE ONLY CONTAMINANT WHICH EXCEEDED WATER STANDARDS. IT EVEN EXCEEDED IT IN OUR UPGRADIENT WELL, AND AS WE KNOW, I THINK THROUGHOUT THIS REGION, MANGANESE SEEMS TO BE EVERYWHERE, REGARDLESS IF IT'S ON-SITE OR OFF-SITE.

DEEP GROUND WATER; SURPRISINGLY, OUR DEEP WELL, WE WERE LOOKING FOR ETHYLBENZENE, BECAUSE WE WERE INTERESTED IN -- WE HAVE A SHALLOW GROUNDWATER PROBLEM. WE WERE INTERESTED TO SEE HOW FAR DOWN THESE CONTAMINANTS MIGRATE. WE ACTUALLY PICKED UP VERY LOW LEVELS OF TCE IN THE WELL, WHICH WAS SURPRISING BECAUSE THIS SITE, ALL THE SOIL SAMPLES THAT WE'VE TAKEN, ALL THE OTHER MONITORING WELLS HAD NO TCE IN IT. WE FOUND VERY LOW LEVELS OF TCE. SO, WE RE-SAMPLED THE WELL; THE SECOND ROUND WE DIDN'T HAVE IT. NOW, THAT'S NOT UNCOMMON WHEN YOU GET TO LOW LEVELS. IT IS UNCOMMON IF, FOR EXAMPLE, THE FIRST ROUND YOU HAVE 1,000 MICROGRAMS PER LITER, AND THEN THE SECOND TIME YOU SAMPLED IT YOU DIDN'T FIND IT. THAT'S UNUSUAL; SOMETHING'S WRONG THERE. WHEN YOU'RE AT SUCH A LOW LEVEL, FIVE PARTS PER MILLION, THAT'S VERY, VERY LOW TO BEGIN WITH. SO, CAN'T SAY THERE ISN'T ANYTHING THERE, BUT WE'RE SAYING IT'S A PRETTY SMALL PROBLEM. AND AGAIN, WE DON'T BELIEVE IT'S ATTRIBUTABLE TO SITE TWO BASED ON THE DATA THAT WE HAVE OF THIS SITE AND BASED ON THE HISTORY OF THIS SITE, KNOWING IT WAS USED FOR A PESTICIDE STORAGE AREA.

MRS. WOOD: THERE ARE NO WELLS -- WATER WELLS IN THE AREA?

MR. WATTRAS: THERE ARE WATER WELLS, NOT IN THE IMMEDIATE AREA OF SITE TWO. THERE ARE WELLS WITHIN A MILE OF SITE TWO THAT ARE OPERATING AND ARE CLEAN, BUT NOT WITHIN THE IMMEDIATE SITE TWO AREA.

WHILE WE WERE DOING THIS STUDY, WE WERE GETTING THE

RESULTS IN FROM THE LABORATORY. WE WERE SEEING THESE VERY HIGH LEVELS OF PESTICIDES. WE TALKED TO THE DEPARTMENT OF THE NAVY AND MARINE CORPS, AND WE ALERTED THEM THAT, LOOK, WE HAVE SOME -- WE HAVE A MAJOR PROBLEM WITH THE SOIL.

THE NAVY AND MARINE CORPS DECIDED TO "LET'S GET RID OF THE SOILS NOW. LET'S NOT WAIT UNTIL THE STUDY IS OVER. LET'S DO SOMETHING NOW."

SO, THEY DID WHAT'S CALLED A TIME CRITICAL REMOVAL ACTION. THEY WENT IN AND THIS IS BEING DOWN RIGHT NOW IN FACT. THEY'RE EXCAVATING AS WE SPEAK. THERE'S A HOLE IN THE GROUND OUT AT SITE TWO.

THEY DECIDED, "LET'S NOT WAIT FOR THE CLEANUP. WE KNOW WE HAVE A PROBLEM THAT WE'RE GOING TO HAVE TO DEAL WITH. WHY WAIT TO THE END OF THE STUDY TO DEAL WITH IT? LET'S GET RID OF IT NOW." ESPECIALLY IN LIGHT OF THE FACT THAT THE BUILDING IS BEING USED AS AN ADMINISTRATIVE OFFICE.

SO, THAT'S GOING ON RIGHT NOW. AND THAT HAPPENS -- I MEAN, THAT HAPPENS A LOT. IT'S NOT A BAD THING TO DO. IF YOU KNOW YOU HAVE A PROBLEM, WHY WAIT ANOTHER YEAR OR TWO TO COMPLETE A STUDY, WHEN AT THE END OF THE STUDY YOU KNOW YOU'RE GOING TO HAVE TO ADDRESS THAT PROBLEM. IT REALLY MAKES SENSE TO DEAL WITH THE PROBLEM NOW.

THAT'S BEEN THE WAVE OF THINGS, NOT ONLY IN THE DEPARTMENT OF DEFENSE, BUT PRETTY MUCH THROUGHOUT THE INDUSTRY, IS "LET'S NOT WAIT FOR THE END OF THESE STUDIES. WE'LL DEAL WITH THE

OBVIOUS PROBLEM FIRST, THEN WE'LL WRAP UP ANYTHING IN THE FINAL STUDY, AND WE'LL DEAL WITH THE RESIDUAL PROBLEM." SAY, IF IT WAS A GROUNDWATER PROBLEM. YOU KNOW, THERE'S NO RISK TO THE GROUNDWATER, BUT WE'LL DEAL WITH THAT AT THE END OF THE STUDY. LET'S DEAL WITH THE PART THAT MIGHT ACTUALLY HAVE A RISK AS WE SPEAK.

THAT'S JUST THE PAD. CLEANUP IS CURRENTLY UNDERWAY, AS I SAID. IT'S INVOLVING APPROXIMATELY 500 CUBIC YARDS OF PESTICIDE CONTAMINATED SOIL. I BELIEVE THEY ARE TAKING THAT SOIL OFF-SITE TO AN INCINERATOR. IS THAT CORRECT, NEAL?

MR. PAUL: RIGHT.

MRS. WOOD: WHERE IS THE INCINERATOR?

MR. PAUL: IN KENTUCKY.

MRS. WOOD: IN KENTUCKY?

MR. PAUL: ACTUALLY, WE ARE EXCAVATING ALL THE SOIL AND ARE WAITING FOR CONFIRMATION OF THE SAMPLES BACK TO MAKE SURE WE HAVE EXCAVATED ALL WE NEED TO DO. HOPEFULLY WE WILL BE CLOSING THAT JOB OUT. I ANTICIPATE HOPEFULLY NEXT WEEK WE CAN GO IN AND PUT CLEAN BACK FILL BACK INTO IT.

MRS. WOOD: IS BASE EQUIPMENT DOING THIS?

MR. PAUL: NO, OHM IS DOING IT.

MRS. WOOD: OHM.

MR. PAUL: INTERESTINGLY ENOUGH, I'VE HAD QUITE A FEW CALLS FROM OTHER CONTRACTORS ON THIS JOB, WANTING TO KNOW HOW THEY COULD GET INVOLVED IN CONSTRUCTING, AND WE'RE TRYING

TO GET SOME OF THAT BUSINESS BACK IN NORTH CAROLINA. I'VE GIVEN THEM THE PROJECT FOR OHM -- I'VE GIVEN THEM THEIR PHONE NUMBER TO CONTACT THEM BECAUSE THEY DID NOT USE A NORTH CAROLINA CONSTRUCTION COMPANY. SO, HOPEFULLY WE CAN BRING SOME OF THAT BUSINESS BACK INTO ONSLOW COUNTY AND THE STATE OF NORTH CAROLINA.

MRS. WOOD: I MEAN, THEY HAD TO HAVE THE SPECIFIC SITE, ANYTHING THAT'S RUN AROUND THIS --

MR. PAUL: TRIPLE ACTION ALSO WANTS IT BECAUSE THEY'RE CAPABLE OF CARRYING MAYBE 20 CUBIC YARDS.

MR. WATTRAS: I'M SURE THEY HAVE A WEIGHT RESTRICTION, YOU KNOW?

MR. PAUL: WHAT'S THAT?

MR. WATTRAS: I WAS GOING TO SAY ABOUT 15 CUBIC YARDS.

MR. PAUL: YEAH. YOUR BASIC DUMP TRUCK CAN CARRY NINE.

MRS. WOOD: NOW, THAT WOULD HAVE TO BE COVERED, WOULDN'T IT?

MR. PAUL: OH, YEAH.

MR. WATTRAS: OH, YEAH. I'M SURE THEY ARE.

MR. PAUL: AND WE WEIGH THEM ON BASE TO INSURE THAT --

MRS. WOOD: AND THEN THEY WEIGH IT OUT.

MR. PAUL: THEN THEY WEIGH IT OUT TO MAKE SURE WE'RE NOT PAYING FOR ANYMORE THAN WHAT WE'RE ACTUALLY

GETTING.

MRS. WOOD: SO THEY DON'T STOP OFF AND DUMP IT TO SAVE GAS.

MR. PAUL: EVEN THOUGH IT'S NON-HAZARDOUS, YOU STILL MANIFEST IT TO INSURE THAT IT DOES GET SOME DISPOSABILITY.

MR. WATTRAS: NOW, WITH RESPECT TO THE RISK ASSESSMENT, WE LOOKED AT TWO SCENARIOS. SINCE WE KNEW THERE WAS REMOVAL ACTION TAKING PLACE, WE SAID WHAT WOULD BE THE RISK FOLLOWING THE REMOVAL OF THE SOIL, BECAUSE AS I MENTIONED, WE WERE GOING AFTER THE OBVIOUSLY PROBLEM, BUT WE HAVE TO FIGURE OUT IN THE TOTAL SCHEME OF THINGS, IS THERE GOING TO BE SOME RISK EVEN AFTER REMOVING THE SOIL, BECAUSE WE'RE ONLY ADDRESSING THE HOT SPOT, AND IT'S PRETTY WELL DEFINED.

WE ALSO LOOKED AT WHAT WOULD BE THE RISK WITHOUT REMOVING THE SOIL. ALTHOUGH WE KNEW THEY WERE REMOVING IT, WE WANTED TO MAKE A COMPARISON OF WHAT IS THE REAL IMPACT OF DOING THIS.

SO, HUMAN HEALTH LOOKED AT, BEFORE THIS REMOVAL ACTION, AND IT WAS PRETTY OBVIOUS THAT IF THE SOIL SEDIMENTS WEREN'T REMOVED, THERE WOULD BE WHAT WE WOULD CONSIDER AN UNACCEPTABLE RISK FOR THOSE PEOPLE THAT WOULD, YOU KNOW, BE WORKING IN THE AREA OR WHATEVER. THERE WAS A HIGH RISK.

BUT AFTER THE SOIL IS REMOVED -- NOW, WHEN WE DO THIS STUDY, WE KNOW A CERTAIN AREA IS GOING TO BE REMOVED AND WE THROW

OUT THOSE RESULTS. OKAY. NOW, WE LOOK AT WHAT'S THE OTHER CONCENTRATIONS OF THE CONTAMINANTS IN THE AREA. WE HAD, WITHIN THE OTHER PARTS OF THE LAWN, WE HAD SOME PESTICIDES AT WHAT I WOULD CALL TYPICAL LEVELS THAT YOU FIND THROUGHOUT LEJEUNE. I KNOW YOU'VE HEARD ME TALK ABOUT OUR PESTICIDES THROUGHOUT CAMP LEJEUNE THAT I SAID IF I SEE SOMETHING WITH 10 OR 50 PARTS PER BILLION, I REALLY DON'T RAISE AN EYEBROW, BECAUSE I SEE THAT EVERYWHERE. YOU KNOW, THAT DOESN'T TELL ME THAT THERE'S A SOURCE.

SO, THROUGHOUT THE LAWN AREA, AND EVEN IN SOME OF THE BACKGROUND SAMPLES, WE HAVE SOME LOW LEVELS OF PESTICIDES. WELL, WHEN WE USE THAT DATA IN THE RISK ASSESSMENT AFTER REMOVING THIS HOT SPOT; THERE IS NO UNACCEPTABLE HEALTH RISK. EVERYTHING, YOU KNOW, PUTTING CLEAN SOIL BACK IN THE HOLE, REGRADING IT, THERE IS NO UNACCEPTABLE HEALTH RISK AFTER THIS HOT SPOT IS REMOVED.

COLONEL WOOD: WHO ASSUMES RESPONSIBILITY FOR LOOKING INTO THE WELFARE OF THE PEOPLE WHO MAY HAVE BEEN EXPOSED OVER THE YEARS WHILE THEY WERE OUT THERE?

MR. HAVEN: A LOT OF WHAT WENT ON THERE WAS THERE WERE DIFFERENT RISK ASSESSMENTS DONE LIKE HEALTH RISK ASSESSMENT TO HUMAN RECEPTORS IS --

MR. BIXIE: AS I HAD MENTIONED BEFORE AN AGENCY FOR TOXIC SUBSTANCES HAS ALSO TAKEN THAT INTO ACCOUNT AND THEY'RE CONDUCTING A PROGRAM.

COLONEL WOOD: DO THEY HAVE ACCESS?

MR. HAVEN: EVERYTHING -- ALL THE

INFORMATION THEY HAVE REQUESTED THEY FORWARD TO US AND WE'RE WORKING WITH MANPOWER, FOR EXAMPLE, BASE HOUSING TO GET THEM ALL THE INFORMATION THAT THEY WANT. THEY HAVE ALSO GONE THROUGH, I BELIEVE, SOME MEDICAL RECORDS AND THINGS LIKE THAT TO GET MORE INFORMATION, AND THEY ARE ESSENTIALLY LOOKING AT THAT POSSIBILITY.

COLONEL WOOD: DO YOU KEEP THAT --

MR. HAVEN: NO, SIR.

COLONEL WOOD: WILL THEY USE THE FACILITY?

MR. HAVEN: HERE AGAIN, THE ATSTR MANAGER -- BASICALLY BEFORE WE PUT IN MANPOWER, BASE HOUSING --

COLONEL WOOD: DOES ATSTR SAY THEY HAVE THE RESPONSIBILITY FOR IT?

MR. HAVEN: YES, SIR. THEY'D HAVE RESPONSIBILITY FOR IT.

MR. WATTRAS: SEE, THAT'S THE MAIN DIFFERENCE. I BELIEVE LAST NIGHT YOU ASKED A QUESTION ABOUT ATSTR AND THE RISK ASSESSMENT THAT THEY DO. AS I SEE IT, HERE'S THE DIFFERENCE: WHEN WE DO A RISK ASSESSMENT UNDER CERCLA, WE LOOK AT WHAT'S THE CURRENT RISK AND WHAT'S THE FUTURE RISK.

ATSTR, THEY GET INTO THE MORE OF THE -- THOSE F.D. STUDIES, WHAT ARE THEY CALLED? WHATEVER THEY'RE CALLED. THEY WILL DO THAT. THAT'S THE MAIN DIFFERENCE. THEY LOOK AT LOOKING AT BIRTH DEFECTS OR WHATEVER. WE DON'T DO THAT UNDER OUR RISK ASSESSMENT. THAT'S -- WE LOOK AT CURRENT SITUATION. WE DON'T LOOK AT THE PAST. THAT IS PART OF THEIR MISSION. THEY WILL AT

WHAT HAS HAPPENED IN THE PAST AND LOOKING FOR TRENDS IN CANCER IN THE AREA, OR BIRTH DEFECTS OR THINGS LIKE THAT. THAT'S THE MAIN DIFFERENCE IN OUR RISK ASSESSMENT AND THEIR PUBLIC HEALTH ASSESSMENT. IT'S EITHER CALLED -- IT'S CALLED A PUBLIC HEALTH ASSESSMENT, WHEREAS OURS IS CALLED A RISK ASSESSMENT, A HUMAN HEALTH RISK ASSESSMENT.

THEY'RE NOT GOING TO TELL YOU NUMBERS THAT THERE IS -- YOU KNOW, WE COME UP WITH THESE INCREMENTAL CANCER RISKS, YOU KNOW, WHAT'S THE CHANCES OF ACQUIRING CANCER. THEY DON'T DO THAT PART OF IT; THEY LOOK AT MORE OF A TREND-TYPE THING. THAT'S THE MAIN DIFFERENCE. SO, THAT'S THEIR MISSION, AND I BELIEVE THEY'RE PROBABLY LOOKING AT THAT ASPECT.

WITH RESPECT TO ECOLOGICAL RISKS, I'LL LET TOM BIXIE TALK ABOUT THIS AGAIN, HIS SPECIALTY HERE.

MR. BIXIE: AGAIN, WHEN WE WENT THROUGH OUR ANALYSIS, WE DID FIND THAT PESTICIDES, AND THAT WAS NO SURPRISE, WAS THE MAIN PROBLEM OR THE MAIN CONTAMINANT BEFORE THE TIME CRITICAL REMOVAL ACTION.

NOW, THE DRAINAGE DITCH GOES TO OVERS CREEK, THAT'S WHERE THE DRAINAGE DITCH GOES. THAT'S PARALLEL TO THE SITE. BASED ON OUR SAMPLING, WE DIDN'T SEE CONTAMINANTS REALLY MIGRATING DOWN TO THERE. AGAIN, RAY WENT OVER THE PESTICIDES, WHAT THEY DO, THEY ADHERE TO THE SEDIMENTS OR PARTICLES; THEY DON'T TRANSFER DOWNSTREAM READILY.

AND SO, THE AREA OF CONCERN WAS LIMITED TO RIGHT NEXT TO

THE SITE AND ON-SITE. WE WENT THROUGH AND LOOKED AT CERTAIN SEDIMENT, COMPARED IT TO STANDARDS AND VALUES THAT WOULD EVALUATE THE HEALTH OF AQUATIC ORGANISMS EXPOSED, AND ALSO WE WENT THROUGH THE TERRESTRIAL SCENARIO I MENTIONED BEFORE, ASSUMING THAT A DEER OR RABBIT WAS ON-SITE EATING PLANTS AND BEING EXPOSED TO THAT.

MRS. WOOD: WHAT ABOUT THE BURROWERS, OUR EVER-PRESENT MOLES AND THINGS LIKE THAT?

MR. DIXIE: TYPICALLY WE LOOK AT BURROWING WILDLIFE WHEN THERE'S A VERY HIGH RISK OF VOLATILES IN THE SOIL.

MRS. WOOD: BUT THEY WOULD NOT BE AFFECTED BY PESTICIDES?

MR. BIXIE: THEY WOULD. IN FACT, THEY WOULD BE IN CONTACT WITH THEM THE SAME WAY A RABBIT WOULD AND THE SAME WAY A BIRD WOULD. THEIR EXPOSURE WOULD BE GREATER BECAUSE THEY WOULD BE BURROWING INTO THEM. BUT THE DATABASE AND THE LITERATURE, REALLY, I DON'T THINK HAS ADVANCED FAR ENOUGH TO ASSUME THAT IF A GROUND SQUIRREL OR A MOLE WAS IN CONTACT WITH THE SOIL, HOW MUCH OF IT IT ABSORBS. TYPICALLY, THE EXPOSURE IS EVALUATED BASED ON THEM EATING WORMS THAT EAT THE DIRT, THEN EATING DIRT JUST BY GOING THROUGH THE SYSTEM, EATING PLANTS AND THINGS LIKE THAT. SO, IT'S PRIMARILY THAT EXPOSURE.

MRS. WOOD: BUT THEY ARE IN THE MODEL?

MR. DIXIE: EXCUSE ME?

MRS. WOOD: I MEAN, THE MOLES, ARE THEY THE BURROWING ANIMAL THAT'S IN YOUR MODEL?

MR. DIXIE: NO, IN OUR MODEL, WE HAVE RABBITS, DEER AND BIRDS.

MRS. WOOD: I WOULD THINK IF THAT STUFF IS GOING DOWN IT SEEMS APPROPRIATE TO --

MR. DIXIE: WELL, IN THIS PARTICULAR AREA, BASED ON, YOU KNOW, HOW THE PAD WAS AND LOOKING AT THE TYPES OF HABITATS, WE FELT THOSE WERE THE CRITICAL WILDLIFE SPECIES.

MR. WATTRAS: PLUS YOU HAVE TO REMEMBER THIS IS AN AREA, IT'S NOT IN THE MIDDLE OF THE WOODS. IT'S A MOWED LAWN.

MRS. WOOD: RIGHT. YEAH.

MR. WATTRAS: I MEAN, THAT HAS TO BE CONSIDERED, TOO. SO, NOT TO SAY THERE COULDN'T BE A MOUSE OR A MOLE.

COLONEL WOOD: WE'VE GOT MOLES IN OUR LAWN AT HOME.

MR. WATTRAS: OH, I KNOW. I'M NOT SAYING IT'S NOT --

MRS. WOOD: I WAS THINKING OF A MOLE, TOO.

MR. WATTRAS: -- YOUR TYPICAL ENVIRONMENT. WE HAVE THEM, TOO. I KNOW WHAT YOU'RE SAYING.

MR. BIXIE: I GUESS, ON THE OTHER SIDE, TOO, IS WHENEVER WE PICK WILDLIFE THAT WE'RE GOING TO EXAMINE, IT'S TYPICALLY WILDLIFE THAT HAS A LARGE HISTORY OF BEING STUDIED. FOR INSTANCE, THERE'S BEEN A LOT OF HISTORY ON THE EFFECTS OF

CHEMICALS ON RABBITS, ON CHICKENS, ON DEER.

MRS. WOOD: SO, YOU HAVE YOUR --

MR. BIXIE: AND WE KNOW PRETTY MUCH HOW MUCH A RABBIT EATS, HOW MUCH WATER A RABBIT NEEDS, WHAT THE AREA THAT A RABBIT WOULD -- ITS HOME RANGE, BECAUSE THAT HAS TO BE TAKEN INTO CONSIDERATION. WHEN WE LOOK AT A DEER THAT HAS A VERY BIG HOME RANGE. SO, YOU ASSUME THAT THE ACTUAL FOOTPRINT THAT IS CONTAMINATED, MAYBE IT'S 100 FEET BY 100 FEET, MAY ONLY BE ONE PERCENT OF ITS HOME RANGE. THE OTHER 99 PERCENT OF ITS TIME, YOU ASSUME THAT IT'S IN DIFFERENT AREAS THAT ARE NOT CONTAMINATED. SO, THAT HAS TO BE FACTORED INTO THE MODEL.

THAT COMES INTO PLAY, FOR INSTANCE, WHEN WE -- WE DON'T TYPICALLY LOOK AT, LIKE, TURTLES OR SNAKES BECAUSE THERE'S NOT A LOT OF -- ALTHOUGH THEY ARE IMPORTANT, AS WILDLIFE, THERE'S NOT A LOT OF INFORMATION IN TERMS OF HOW MUCH WATER DOES A SNAKE DRINK.

MRS. WOOD: YEAH.

MR. DIXIE: SO, YOU REALLY HAVE TO BASE A LOT OF, WHEN YOU SELECT YOUR WILDLIFE, ON WHAT TYPE OF INFORMATION YOU HAVE ON HOW MUCH IT EATS. SO, THAT COMES INTO PLAY, TOO.

WHEN WE WENT THROUGH THIS MODEL AND BEFORE THE TIME CRITICAL ACTION, WE AGAIN DETERMINED IF PESTICIDES WOULD PRESENT A PROBLEM TO THESE WILDLIFE BEING EXPOSED, AND DO PRESENT A PROBLEM TO ANY TYPE OF AQUATIC ORGANISMS BEING EXPOSED IN THAT DITCH.

NOW, WE DID REALIZE THAT THE DITCH WAS A DRAINAGE DITCH

AND THERE WASN'T OBVIOUSLY A VIABLE POPULATION OF FISH. THERE MAY BE SOME FROGS, MAYBE A TADPOLE OR SOMETHING LIKE THAT, BUT TO BE CONSERVATIVE, WE TREATED IT AS A SERVICE WATER BODY AND COMPARED IT TO THOSE STANDARDS. I THINK THE NEXT SLIDE --

MR. WATTRAS: WELL, THIS ONE BASICALLY SAYS BEFORE -- IF YOU DIDN'T REMOVE THE SOIL, WE FOUND THAT THERE WOULD BE A DECREASE IN VIABILITY, WHICH IS PRETTY OBVIOUS WITH THOSE LEVEL OF PESTICIDES. THEN WE LOOKED AT IT FROM A STANDPOINT, OKAY, AFTER THE SOIL IS REMOVED, AND IT HAS BEEN REMOVED, TOM AND HIS GROUP LOOKED AT WHAT WOULD BE THE IMPACTS AFTER THAT.

MR. BIXIE: AND AFTER WE SAW THAT THERE -- BASED ON THE TERRESTRIAL RECEPTORS IN OUR MODEL, THERE WOULD BE NO DECREASE IN THE VIABILITY OF THE TERRESTRIAL RECEPTORS. THERE WOULD STILL BE A VERY SLIGHT DECREASE IN TERMS OF THE AQUATIC RECEPTORS, BUT WHAT WE SEE THIS IS, AND RAY MENTIONED THIS, IS TO THE LEVELS OF PESTICIDES THAT WE SEE THROUGHOUT THE BASE FROM A NORMAL SPRAYING. THE AREAS THAT HAVE VERY HIGH LEVELS THAT REALLY WOULD PRESENT A SIGNIFICANT RISK TO AQUATIC ORGANISMS IN THIS DRAINAGE DITCH, WERE BEING REMOVED BASED ON SOME OF THE REMOVAL ACTIONS. SO, WE FELT LIKE IT ADDRESSED THE SIGNIFICANT RISKS.

MRS. WOOD: WE'VE GOT A DECREASE. IT'S NOT NEUTRALIZED, BUT IT'S --

MR. BIXIE: AND THEN, THAT LOW LEVEL, AGAIN, WOULD EXIST THROUGHOUT ANY AREA, A GOLF COURSE, WOULD HAVE THOSE PESTICIDES, BUT IT WASN'T AT THAT HIGH LEVEL.

MR. WATTRAS: THE FEASIBILITY STUDY, BECAUSE NOW, AFTER REMOVING THE SOIL, AND WE DID AN EVALUATION OF THE RISKS AND WE DETERMINED THERE WAS NO MORE UNACCEPTABLE RISKS TO HUMAN HEALTH AND THE ENVIRONMENT, WE THEN LOOKED AT OUR ONLY PROBLEM REMAINING, WHICH HAPPENED TO BE THIS SMALL PLUME OF ETHYLBENZENE AND XYLENE IN GROUNDWATER.

WE LOOKED AT SIX ALTERNATIVES THAT WE COULD DO WITH THIS CONTAMINATION PROBLEM. ALTERNATIVE ONE BEING NO ACTION; ALTERNATIVE TWO BEING INSTITUTIONAL CONTROL WHERE WE WOULD JUST KEEP MONITORING THE PROBLEM. AGAIN, IN THIS CASE EVEN -- ALTHOUGH WE HAVE SOME SUPPLY WELLS WHICH ARE QUITE FAR FROM THE SITE, IT WOULD INCLUDE SAMPLING OF THOSE WELLS TO MAKE SURE NOTHING IS WRONG WITH THEM. IT WOULD INCLUDE, OBVIOUSLY, NOT LETTING ANYBODY PUT ANY WELLS ON THE SITE.

THE THIRD ALTERNATIVE WOULD BE TO EXTRACT THE GROUNDWATER WITH THE WELL, OR WELLS, TREAT IT ON-SITE, AND THEN DISCHARGE IT THROUGH A SANITARY SEWER LINE TO THE SEWAGE TREATMENT PLANT.

THE FOURTH ALTERNATIVE WOULD BE SIMPLY TO COLLECT IT, DISCHARGE IT TO THE SEWAGE TREATMENT PLANT WITHOUT TREATMENT. THE REASON THAT WAS SELECTED IS BECAUSE, NUMBER ONE, WE'RE TALKING ABOUT SOME PRETTY LOW LEVELS TO BEGIN WITH. LEVELS THAT, AS I MENTIONED BEFORE, ARE BELOW STATE STANDARDS FOR GROUNDWATER, BUT ARE JUST SLIGHTLY ABOVE -- I'M SORRY, THAT ARE BELOW THE FEDERAL STANDARDS FOR GROUNDWATER BUT ARE SLIGHTLY ABOVE STATE STANDARDS.

AND AT THOSE LEVELS, PUTTING IN A SANITARY SEWER LINE AND SENDING IT TO THE SEWAGE TREATMENT PLANT WOULD PROBABLY BE FEASIBLE FOR TREATING IT DOWN TO A FURTHER LEVEL.

MRS. WOOD: OKAY, NOW, THIS IS GOING TO BE ONE THAT A PIPE SWINGS IN? IT'S GOING TO THE FRENCH CREEK PLANT? OR ARE YOU --

MR. WATTRAS: WE WOULD SEND IT TO THE NEAREST SANITARY SEWER LINE. AND I KNOW YOU'RE TALKING ABOUT THE FUTURE TREATMENT PLANT.

MRS. WOOD: YEAH, THEY WERE TALKING ABOUT --

MR. WATTRAS: YEAH, IT WOULD GO TO, PROBABLY BY THE TIME, IT WOULD PROBABLY GO TO THAT TREATMENT PLANT.

MRS. WOOD: SO, I MEAN, THIS IS NOT GOING TO BE DONE INSTANTLY?

MR. WATTRAS: BUT THAT'S NOT GOING TO BE THE SELECTED ALTERNATIVE ANYWAY. BUT IT REALLY WOULDN'T MATTER -- HADNOT POINT, EVEN IF HADNOT POINT IS OPERATING, WHICH IT STILL IS, SENDING IT INTO A SANITARY SEWER LINE AND TAKING IT ALL THE WAY DOWN TO HADNOT POINT WOULD STILL BE ACCEPTABLE. THEY HAVE A BIOLOGICAL TRICKLING FILTER, AND THEY HAVE AN AERATION POND, THAT WOULD PROBABLY BE ABLE TO REMOVE THESE LEVELS OF ETHYLBENZENE AND XYLENE. WE'RE TALKING ABOUT SOME VERY LOW LEVELS.

COLONEL WOOD: BUT YOU'RE ALSO TALKING ABOUT PLANTS THAT ARE BEYOND THE -- USABILITY.

MRS. WOOD: THEY'RE UNDER WAIVER, LET'S PUT IT THAT WAY.

COLONEL WOOD: THEY'RE DISCHARGING LOTS OF WATER INTO THE RIVER THAT THEY SHOULD NOT BE. IN OTHER WORDS, THEY'RE OVER THE STATE STANDARDS.

MR. PAUL: THAT'S CORRECT.

MRS. WOOD: LET'S NOT GET OFF ON THAT.

MR. WATTRAS: YES, I KNOW WHAT YOU'RE TALKING ABOUT.

MR. PAUL: YEAH. YEAH, LET'S DON'T GET -- THE BOTTOM LINE HERE IS WE'RE NOT GOING TO -- IT'S NOT ECONOMICALLY FEASIBLE TO CHASE THESE TRACE AMOUNTS OF CONTAMINATION.

MR. WATTRAS: THE FIFTH ALTERNATIVE WOULD BE TO COLLECT IT AND DISCHARGE IT AND PIPE IT OUT TO SITE 82. NOW, SITE 82 IS LOCATED ABOUT TWO MILES DOWN THE ROAD, AND WE'RE BUILDING A TREATMENT PLANT TO DEAL WITH A MAJOR GROUNDWATER PROBLEM OUT THERE. AND WE SAID, WELL, LET'S JUST COLLECT IT AND SEND IT TO SITE 82.

AND THE SIXTH ALTERNATIVE WOULD INVOLVE IN SITU TREATMENT. AND IT'S PRETTY MUCH WHAT I TALKED ABOUT BEFORE WHERE WE WOULD TRY SOMETHING LIKE VAPOR EXTRACTION TO PULL OUT THESE VOLATILES.

THE COST OF THESE ALTERNATIVES GO FROM ZERO; THE MOST EXPENSIVE ALTERNATIVE WOULD BE TO BUILD AN ON-SITE TREATMENT

PLANT, WHICH IS PRETTY OBVIOUS BECAUSE OF THE CAPITAL COSTS, WE'RE LOOKING AT ALMOST TWO MILLION DOLLARS TO DO THAT.

TO JUST MONITOR IT AND TO SEE WHAT'S HAPPENING OVER TIME WOULD COST THE DEPARTMENT OF THE NAVY ABOUT $350,000. THAT'S MAINLY AN ANALYTICAL COST. WE'RE TALKING ABOUT USING ABOUT FIVE OR SIX MONITORING WELLS, TAKING SAMPLES QUARTERLY, MAYBE OVER TIME TAKING THEM BI-ANNUALLY, AND ANALYZING THEM FOR CONTAMINANTS OF CONCERN HERE.

MRS. WOOD: WELL, NOW, THAT 350,000 IS PROJECTED OVER WHAT PERIOD OF YEARS?

MR. WATTRAS: THAT'S PROJECTED OVER 30 YEARS.

MRS. WOOD: 30 YEARS, OKAY.

MR. WATTRAS: THAT'S A STANDARD TIME FRAME THAT WE LOOK AT THINGS --

MRS. WOOD: OKAY. RIGHT, I REMEMBER THAT CAME UP EARLIER.

MR. WATTRAS: -- WHEN WE DO COST ANALYSES, AND THESE ARE PRESENT WORTH COSTS.

MRS. WOOD: OKAY.

MR. WATTRAS: THAT WOULD BE THE MONEY YOU'D HAVE TO SET ASIDE TODAY AND DRAW FROM.

ALTERNATIVE NUMBER FOUR IS SENDING IT DOWN TO -- THROUGH A SANITARY SEWER LINE DOWN TO HADNOT POINT WOULD BE ABOUT 1.3 MILLION. ALTERNATIVE FIVE -- THAT'S STILL BACKWARDS. I'M SORRY.

MRS. WOOD: YEAH, IT'S GOING TO 82.

MR. WATTRAS: OH, ALTERNATIVE FIVE IS TO COLLECT IT AND SEND IT DOWN TO SITE 82. THAT ONE IS ABOUT 1.4 MILLION. AND ALTERNATIVE SIX IS TO DO THE IN SITU STUDY, OR THE IN SITU REMEDIATION; THAT WOULD BE ABOUT 1.3 MILLION. NOW --

MR. PAUL: EXCUSE ME, RAY, IS THERE A MINIMUM AMOUNT OF ALTERNATIVES YOU HAVE TO COME UP WITH? I DON'T KNOW IF YOU PROBABLY KNOW THIS ANSWER, BUT I KNOW YOU HAVE TO USE ALTERNATIVES IN YOUR FEASIBILITY STUDIES.

MR. WATTRAS: I MISSED YOUR QUESTION. I COULDN'T HEAR YOU.

MR. PAUL: IS THERE A MINIMUM --

MR. WATTRAS: AMOUNT OF ALTERNATIVES?

MR. PAUL: RIGHT. I KNOW YOU HAVE TO USE NOTHING AS ONE.

MR. WATTRAS: YOU ALWAYS HAVE TO USE NO ACTION. YOU ALWAYS SHOULD CONSIDER A TREATMENT, TOTAL TREATMENT ALTERNATIVE.

MR. PAUL: RIGHT.

MR. WATTRAS: YOU SHOULD ALWAYS CONSIDER A CONTAINMENT ALTERNATIVE. I BELIEVE THOSE ARE AT LEAST THREE ALTERNATIVES THAT YOU ALWAYS HAVE TO CONSIDER. CONTAINMENT, TOTAL REMEDIATION AND NO ACTION. AND INNOVATIVE -- WELL, TREATMENT IS PREFERRED.

MS. TOWNSEND: YOU START LOOKING AT -- AT --

OF THOSE THREE OPTIONS, THEN YOU LOOK AT LANDFILL ON-SITE, LANDFILL OFF-SITE. YOU GET INTO THOSE BREAK-UPS WHERE IT'S REALLY THREE CATEGORIES.

MR. PAUL: I KNOW YOU GUYS ALWAYS DO A REAL GOOD JOB OF PROPOSING QUITE A FEW ALTERNATIVES FOR US.

MR. WATTRAS: YEAH, THERE ARE CERTAIN ONES THAT YOU ALWAYS HAVE TO CONSIDER, UNLESS THERE'S A SITUATION WHERE YOU FIND OUT THAT YOU SAMPLE A SITE AND SOMETIMES YOU MIGHT -- YOU DON'T EVEN NEED A FEASIBILITY STUDY IF YOU DETERMINE THAT, AFTER SAMPLING, YOU DON'T HAVE A PROBLEM, THEN IT DOESN'T MAKE SENSE TO DO A FEASIBILITY STUDY, BUT THAT'S KIND OF RARE.

AS I MENTIONED BEFORE, SOIL -- WE'RE NOT GOING TO DO ANYTHING MORE TO THE SOIL. WE'RE DEALING WITH IT NOW, AND WHAT'S REMAINING IS ACCEPTABLE. IT'S NOT AT HIGH LEVELS THAT'S GOING TO CAUSE A PROBLEM.

GROUNDWATER, THE PROPOSED ALTERNATIVE HERE IS TO NOT TREAT IT, BUT TO JUST PERFORM INSTITUTIONAL CONTROLS, AND I'LL EXPLAIN A LITTLE BIT ABOUT THIS APPROACH.

THE INSTITUTIONAL CONTROLS WOULD INCLUDE AN ORDINANCE RESTRICTION FOR PUTTING ANY SUPPLY WELLS IN THIS AREA. IT WOULD INVOLVE LONG TERM GROUNDWATER MONITORING OF THE SHALLOW AND OF THE DEEP AND OF A FEW OF THE SUPPLY WELLS.

COLONEL WOOD: WHAT IS LONG TERM?

MRS. WOOD: 30 YEARS.

MR. WATTRAS: IT WOULD BE 30 YEARS, BUT I'LL

QUALIFY THAT. EVERY FIVE YEARS -- WHEN YOU SELECT AN ALTERNATIVE THAT IS NOT A FINAL REMEDY, IN OTHER WORDS, A CONTAINMENT ALTERNATIVE, FOR EXAMPLE, OUT AT HADNOT POINT WHERE WE'RE CONTAINING THAT PLUME, THAT'S NOT A FINAL REMEDY. EVERY FIVE YEARS, UNDER CERCLA, IT'S A REQUIREMENT THAT YOU LOOK AT THE PROBLEM AGAIN TO SEE IF THE ALTERNATIVE IS, NUMBER ONE, EFFECTIVE; WHETHER IT'S EFFECTIVE FROM THE STANDPOINT THAT YOU ARE REDUCING CONTAMINATION OR YOU'RE PREVENTING MIGRATION; OR IN SOME CASES, YOU KNOW, I GUESS IT'S POSSIBLE THAT THINGS COULD GET WORSE IN FIVE YEARS, THAT THE ALTERNATIVE THAT YOU SELECTED WASN'T THE BEST ALTERNATIVE. BUT WHEN I SAY 30 YEARS, SAY IN FIVE OR TEN YEARS, AND YOU HAVE TO DO THIS EVERY FIVE YEARS, IN TEN YEARS, WE MONITOR THIS PROBLEM AND WE SEE THAT, OVER TIME, THESE ETHYLBENZENE AND THE XYLENE HAS DECREASED IN CONCENTRATION TO THE POINT THAT THEY'RE NOT A PROBLEM ANYMORE, IT WOULD BE DONE. SO, THEORETICALLY 30 YEARS. POSSIBLY AS LITTLE AS FIVE YEARS, SOMEWHERE IN BETWEEN THERE.

MRS. WOODS: SO, WHEN THEY GET DOWN TO BELOW STATE REQUIREMENTS --

MR. WATTRAS: BELOW STATE STANDARDS.

MRS. WOODS: -- THAT'S IT.

MR. WATTRAS: THE REASON WE SELECTED THIS ALTERNATIVE AS OPPOSED TO TREATMENT IS, NUMBER ONE, THERE IS NO RISK. WE'RE TALKING ABOUT A VERY SMALL POCKET OF GROUNDWATER. WE'VE DISCUSSED BEFORE ABOUT THE FACT THAT THERE IS NO EXPOSURE

BECAUSE EVERYBODY'S GETTING THEIR WATER FROM THE SUPPLY WELL.

THE OTHER ASPECT HAS TO DO WITH THE CONTAMINANTS THEMSELVES, XYLENES AND ETHYLBENZENES, THEY'RE RELATED TO PETROLEUM PRODUCTS. OVER TIME, I MENTIONED THAT SAMPLES WERE FIRST BEING TAKEN IN THE MID-80S, CONCENTRATIONS HAVE BEEN DECREASING. WE HAVE A HANDLE ON THE LIMITED AREA OF CONTAMINATION. THESE ARE CONTAMINANTS THAT CAN, THROUGH NATURAL PROCESSES, BIODEGRADE IN THE AQUIFER. THEY ARE SEEING THAT AT A LOT OF SITES NOW WITH PETROLEUM. IF I'M NOT MISTAKEN, THE STATE -- MAYBE, PATRICK, I DON'T KNOW IF YOU CAN ADD ANYTHING TO THIS, THE STATE OF NORTH CAROLINA IS LOOKING AT A LOT OF PETROLEUM GROUNDWATER PROBLEMS WHERE THEY'RE LOOKING AT POSSIBLY JUST MONITORING THAT PROBLEM. IF IT'S A LOW LEVEL PROBLEM. I MEAN, OBVIOUSLY, WE'RE NOT TALKING ABOUT A MAJOR PROBLEM HERE WHERE THE STATE WOULD JUST SAY, "OH, LET'S JUST MONITOR IT."

BUT IN A SITUATION LIKE THIS WHERE YOU'RE JUST AT THE LEVELS, WE'RE LOOKING AT IT FROM THE STANDPOINT IT BECOMES REALLY NOT A FEASIBLE IDEA TO GO AHEAD IN THERE, INVEST ALL THAT CAPITAL TO START TREATING WHEN IT'S COST-EFFECTIVE TO JUST MONITOR THIS PROBLEM, WE THEN -- THEORETICALLY, WE'VE BEEN MONITORING IT SINCE THE MID-80S AND HAVE FOUND THAT THE LEVELS HAVE BEEN SLOWLY DECREASING, AND, DUE TO THE NATURE OF THESE CONTAMINANTS, WE BELIEVE, JUST THROUGH NATURAL ATTENUATION, THAT IT WILL CLEAN ITSELF UP THROUGH TIME.

MRS. WOOD: AND IT'S AN AREA WHERE YOU'VE

GOT TIME.

COLONEL WOOD: DO YOU HAVE AN APPROXIMATE DATE TO EXPECT IT MAY BE CLEAN?

MR. WATTRAS: NO, WE DO NOT. WE DON'T HAVE AN APPROXIMATE DATE. WE WILL BE MONITORING THIS, LIKE I SAID, OVER TIME, AND IN FIVE YEARS, WE'LL DO A PRETTY GO ANALYSIS OF WHAT HAS CHANGED WITHIN THE LAST FIVE YEARS.

THERE ARE MODELS, COMPUTER MODELS, THAT WE COULD THEORETICALLY COME UP WITH A DATE, BUT YOU KNOW WHAT, THAT'S A THEORETICAL MODEL, SO NOTHING'S GUARANTEED. MODELING IS VERY -- THERE'S A LOT OF GOOD ASPECTS ABOUT USING COMPUTER MODELS. YOU COULD USE IT IN THIS CASE, AND IT WILL POP OUT A NUMBER, BUT IT'S JUST GOING TO BE A BEST GUESS OF A NUMBER OF YEARS.

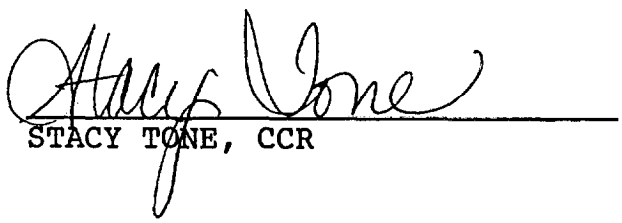
BUT AT THESE LEVELS, I WOULD BE, YOU KNOW, KIND OF SURPRISED IF A MODEL CAME OUT AND SAID IT'S GOING TO TAKE A HUNDRED YEARS, YOU KNOW. I THINK AT THESE LEVELS, BY JUST LEAVING THE PROBLEM GO AND SEEING THE DECREASE OVER TIME, THAT WE HAVE SEEN, THAT WE WOULD BE IN PRETTY GOOD SHAPE.

THAT CONCLUDES THIS OPERABLE UNIT, AND DO YOU HAVE ANY QUESTIONS?

MRS. WOOD: NO, I JUST ENJOYED THIS VERY MUCH. WE APPRECIATE THIS.

(WHEREUPON, THESE PROCEEDINGS CONCLUDED AT 8:58 P.M.)

I CERTIFY THAT THE FOREGOING IS A CORRECT TRANSCRIPT FROM THE RECORD OF PROCEEDINGS IN THE ABOVE-ENTITLED MATTER.



STACY TONE, CCR

8-9-94
DATE