06.04-08/31/94-01520

FINAL

INTERIM RECORD OF DECISION
CONTAMINATED SOIL
OPERABLE UNIT NO. 10
SITE 35 - CAMP GEIGER AREA FUEL FARM

MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA

CONTRACT TASK ORDER 0160

AUGUST 31, 1994

Prepared For:

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

Under:

LANTDIV CLEAN Program
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APPENDIX

A Transcript: Public Meeting, July 26, 1994

LIST OF ACRONYMS AND ABBREVIATIONS

ARAR/TBC	Applicable or Relevant and Appropriate Requirement/To Be Considered (Criteria)
AST	aboveground storage tank
Baker	Baker Environmental, Inc.
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COPC	contaminant of potential concern
CSA	Comprehensive Site Assessment
DOD	Department of Defense
DON	Department of the Navy
EPA	United States Environmental Protection Agency
ESE	Environmental Science and Engineering, Inc.
FFS	Focused Feasibility Study
FS	Feasibility Study
IAS	Initial Assessment Study
IRP	Installation Restoration Program
MCB	Marine Corps Base
mg/kg	milligrams per kilogram
MTBE	methyl-tertiary butyl ether
NCDEHNR	North Carolina Department of Environment, Health, and Natural Resources
NCDOT	North Carolina Department of Transportation
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
O&M	operation and maintenance
OU	Operable Unit
PRAP	Proposed Remedial Action Plan
RAA	remedial action alternative
RBC	Risk-Based Concentration
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
ROD	Record of Decision
SARA	Superfund Amendments and Reauthorization Act
TPH	total petroleum hydrocarbons

USC	United States Code
USEPA	United States Environmental Protection Agency
UST	underground storage tank
VOC	volatile organic compounds

DECLARATION

Site Name and Location

Operable Unit No. 10 (Site 35)
Marine Corps Base
Camp Lejeune, North Carolina

Statement of Basis and Purpose

This decision document presents the selected remedy for contaminated soil at OU No. 10 (Site 35), Marine Corps Base (MCB), Camp Lejeune, North Carolina which 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 State of 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 Site

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

Description of Selected Remedy

Six Remedial Action Alternatives (RAAs) were evaluated as part of an Interim Remedial Action Remedial Investigation/Feasibility Study (RI/FS). RAA 3 (Source Removal and Off-site Biotreatment) and RAA 5 (Source Removal and Off-Site Soil Recycling) were evaluated to be roughly equivalent when compared using the established criteria. RAA 5 was selected as the preferred alternative because there are more off-site soil recycling facilities that service

the Camp Lejeune area than off-site biotreatment facilities. The availability of facilities should make RAA 5 easier to implement. RAA 3 has been identified as a possible alternate; however, subject to approval and modification of the Interim ROD.

The selected remedy, which is limited to contaminated soil, is an Interim Remedial Action representing only one phase of a comprehensive investigation and remediation program at Site 35. The level of petroleum hydrocarbons in soil identified at the site is in excess of State of North Carolina guidelines. Furthermore, the contaminated soil represents potential sources of contamination of other media including groundwater, surface water, and sediment.

The selected remedy addressed in this ROD provides for the removal and treatment of the contaminated soil to reduce the levels of contamination to below state guidelines and to mitigate the potential threat of future contamination. The major components of RAAs 3, 5, and 6 include:

- Excavating petroleum hydrocarbon contaminated soil located above the seasonal high groundwater table which exhibit levels of total petroleum hydrocarbons (TPH) in excess of 40 mg/kg as determined via EPA Method 5030/8015 or 160 mg/kg as determined via EPA Method 3550/8015.

- Staging excavated soil on site in piles designated as "clean" or "contaminated" in order to allow for sampling and verification analysis.

- Transporting the contaminated soil off site to a permitted soil recycling facility (RAA 5).

- Backfilling the excavated areas with clean fill.

Declaration

This interim action is protective of human health and the environment, complies with Federal and State applicable or relevant and appropriate requirements (ARARs) and criteria to be considered (TBCs) directly associated with this action, and is cost-effective. This action utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable, given the limited scope of the action. Because this action does not constitute the final remedy for Site 35, the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element for othermedia, including groundwater, surface water, and sediment will be addressed at the time of the final response

action. Subsequent actions are planned to address fully the principal threats posed by this site.

Signature (Commanding General, MCB Camp Lejeune)

15 Sept 94
Date

action. Subsequent actions are planned to address fully the principal threats posed by this site.

Signature (Commanding General, MCB Camp Lejeune) Date

1.0 SITE LOCATION AND DESCRIPTION

Camp Lejeune is a training base for the U.S. 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 (See Figure 1).

Camp Geiger is located at the extreme northwest corner of MCB, Camp Lejeune, Onslow County. The main entrance to Camp Geiger is off U.S. Route 17, approximately 3.5 miles southeast of the City of Jacksonville, North Carolina. Operable Unit (OU) No. 10, Site 35, the Camp Geiger Area Fuel Farm, refers primarily to five, 15,000-gallon aboveground storage tanks (ASTs), a pump house, and a fuel unloading pad situated within Camp Geiger just north of the intersection of Fourth and "G" Streets (See Figure 2). To date, the Site 35 study area has been roughly bounded to the west by D Street, to the north by Second Street, to the east by Brinson Creek, and to the south midway between Fourth and Fifth Streets. OU No. 10 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 surface topography at Site 35 is generally flat to the south and west of the ASTs. The ground surface dips rapidly to the north and east in the direction of Brinson Creek. Overland surface drainage is toward Brinson Creek.

The shallow soil stratigraphy at Site 35 consists of fine to medium-grained sands (15 to 30 feet thick), underlain by colitic, fossiliferous limestone (6 to 20 feet thick), which in turn is underlain by a unit of silty sand.

Shallow groundwater flow direction is generally west to east across the site in the direction of Brinson Creek. The top of groundwater is encountered roughly 8 to 10 feet below the ground surface (bgs) across the flat portion of the site and at lesser depths as the surface topography converges with Brinson Creek.

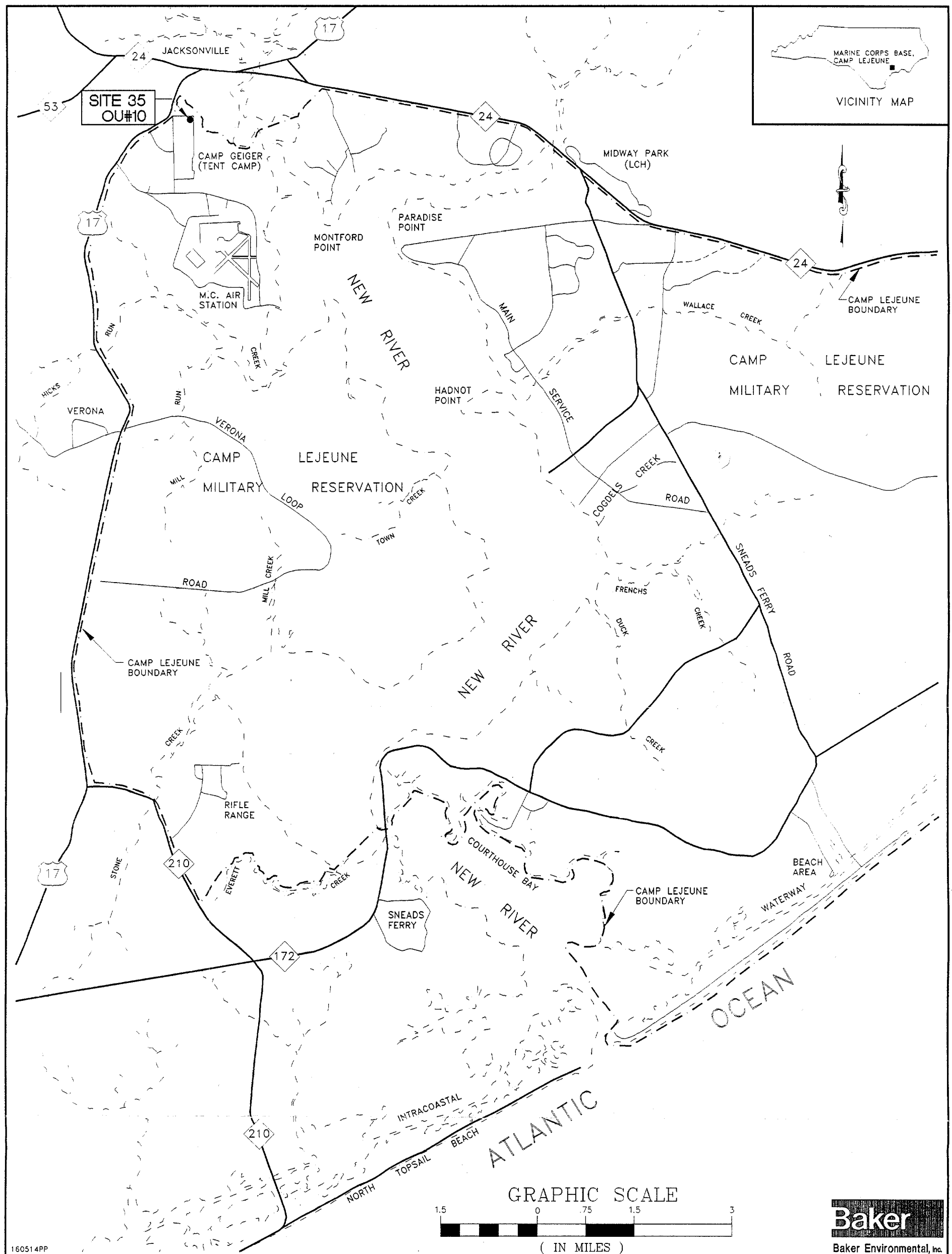

FIGURE 1
CAMP LEJEUNE AND SITE 35
LOCATION MAP

MARINE CORPS BASE, CAMP LEJEUNE
NORTH CAROLINA

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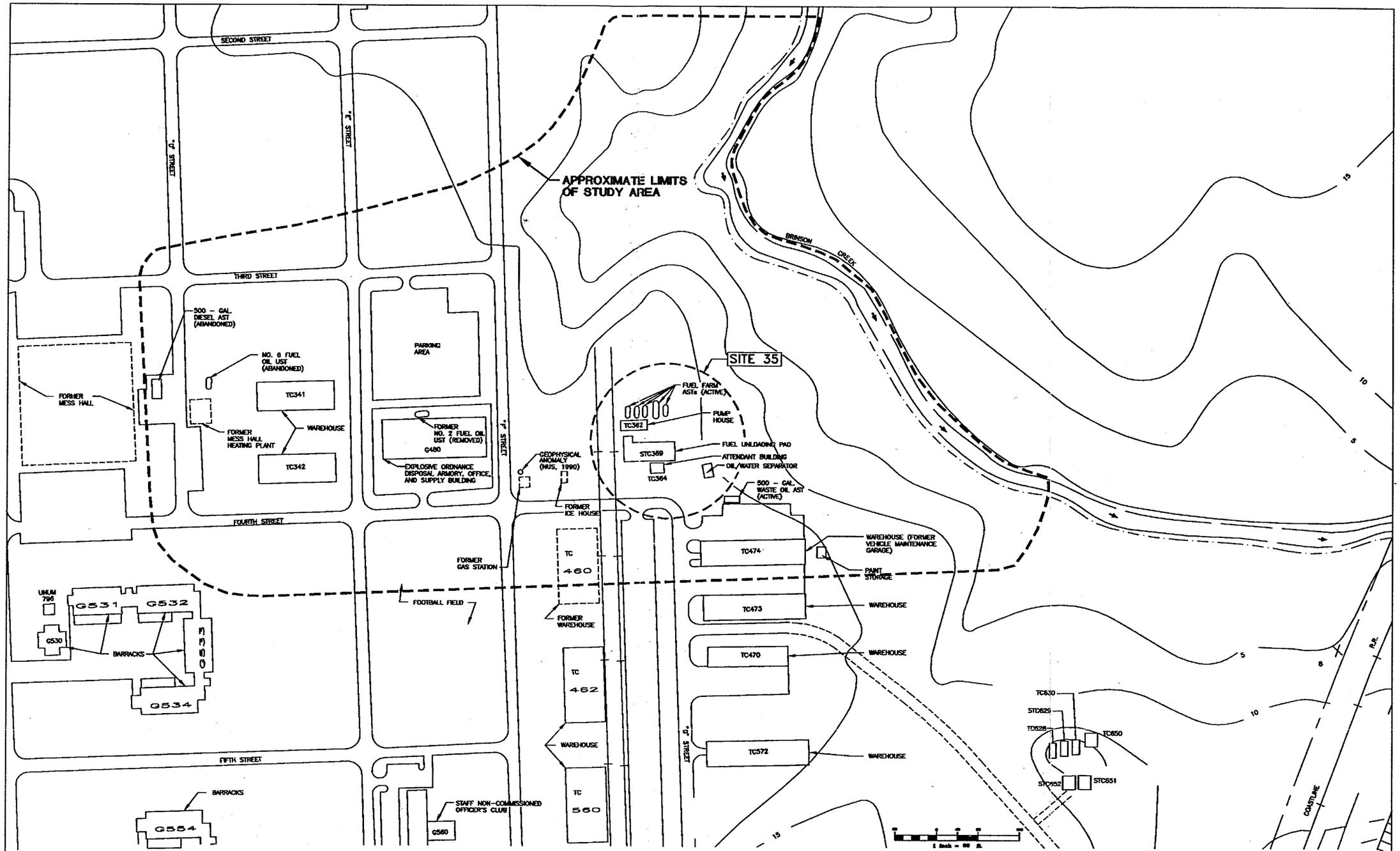

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	DATE	MARCH 1994	NORTH
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	CADD#	160502PP	

INTERIM REMEDIAL ACTION REMEDIAL INVESTIGATION CTO-0160
MARINE CORPS BASE, CAMP LEJEUNE
NORTH CAROLINA

BAKER ENVIRONMENTAL, Inc.
Coraopolis, Pennsylvania

Baker
Baker Environmental, Inc.

SITE PLAN
SITE 35 - CAMP GEIGER AREA FUEL FARM

SCALE 1" = 80' | DATE MARCH 1994

FIGURE No. 2

2.0 SITE HISTORY AND ENFORCEMENT ACTIVITIES

Construction of Camp Geiger was completed in 1945, four years after construction of MCB, Camp Lejeune was initiated. Originally, the ASTs were used for the storage of No. 6 fuel oil, but, were later converted for storage of other petroleum products including unleaded gasoline, diesel fuel, and kerosene. The date of their conversion is not known. The ASTs currently in use at the site are reported to be the original tanks.

Routinely, the ASTs at Site 35 supply fuel to an adjacent dispensing pump. A leak in the underground line from the ASTs to the dispensing island was reportedly responsible for the loss of roughly 30 gallons per day of gasoline over an unspecified period (Law, 1992). The leaking line was subsequently sealed and replaced.

The ASTs at Site 35 are currently used to dispense gasoline, diesel and kerosene to government vehicles and to supply USTs in use at Camp Geiger and the nearby New River Marine Corps Air Station. The ASTs are supplied by commercial carrier trucks which deliver product to fill ports located on the fuel unloading pad at the southern end of the facility. Six, short-run (120 feet maximum), underground fuel lines are currently utilized to distribute the product from the unloading pad to the ASTs. Product is dispensed from the ASTs via trucks and underground piping.

Reports of a release from an underground distribution line near one of the ASTs date back to 1957-58 (ESE, 1990). Apparently, the leak occurred as the result of damage to a dispensing pump. At that time the Camp Lejeune Fire Department estimated that thousands of gallons of fuel were released although records of the incident cannot be located. The fuel reportedly migrated to the east and northeast toward Brinson Creek. Interceptor trenches were excavated and the captured fuel was ignited and burned.

Another abandoned underground distribution line extended from the ASTs to the former Mess Hall Heating Plant, located adjacent to "D" Street, between Third and Fourth Streets. This underground line dispensed No. 6 fuel oil to an UST which fueled the Mess Hall boiler. The Mess Hall, located across "D" Street to the west, was demolished along with its Heating Plant in the 1960s.

In April 1990, an undetermined amount of fuel had been discovered by Camp Geiger personnel along the unnamed drainage channels north of the Fuel Farm. Apparently, the source of the

fuel, believed to be diesel or jet fuel, was an unauthorized discharge from a tanker truck that was never identified. The Activity reportedly initiated an emergency clean-up which included the removal of approximately 20 cubic yards of soil

The Fuel Farm is scheduled to be decommissioned in 1994. Plans are currently being prepared to empty, clean, dismantle, and remove the ASTs along with all concrete foundations, slabs on grade, berms and associated underground piping. The Fuel Farm is being removed to make way for a four lane divided highway proposed by the North Carolina Department of Transportation (NCDOT).

Previous environmental investigations performed at Site 35 include the following:

Initial Assessment Study

In 1983, an Initial Assessment Study was conducted in which 76 potentially contaminated areas of concern were identified at the base (Water and Air Resources, 1983). Site 35 was identified as one of 23 sites warranting further investigation. Sampling and analysis of environmental media was not conducted during the Initial Assessment Study.

Confirmation Study

ESE performed Confirmation Studies of the 22 sites requiring further investigation and investigated Site 35 between 1984 and 1987 (ESE, 1990). During this study, ESE advanced three hand-auger borings and collected groundwater and soil samples from each location. Soils were analyzed for lead and oil and grease. Groundwater samples were analyzed for lead, oil and grease, and volatile organics. Lead was detected in soil samples obtained from hand auger borings at concentrations ranging from 6 to 8 mg/kg. Oil and grease was also detected at concentrations ranging from 40 to 2,200 mg/kg.

In 1986, ESE collected sediment and surface water samples from Brinson Creek and installed three permanent monitoring wells: two east of and one west of the Fuel Farm. Surface water and sediment samples collected from nearby Brinson Creek were analyzed for lead, oil and grease and ethylene dibromide.

Lead and oil and grease were detected in samples taken from the three permanent monitoring wells. Volatile organics were not detected at these well locations. These wells were sampled after installation and again in 1987.

Focused Feasibility Study

A Focused Feasibility Study (FFS) was conducted in 1990 in the area north of the Fuel Farm by NUS Corporation. The investigation included the installation of four groundwater monitoring wells. Results of laboratory analysis revealed that groundwater in one well and soil cuttings from two borings were contaminated with petroleum hydrocarbons although non-aqueous product was not observed.

A geophysical investigation was conducted by NUS as part of the FFS in an attempt to identify underground storage tanks (USTs) at the site of the former gas station. The results indicated the presence of a geophysical anomaly to the north of the former gas station.

Comprehensive Site Assessment

Law Engineering, Inc. (Law) conducted a Comprehensive Site Assessment (CSA) during the fall of 1991 (Law, 1992). The CSA involved the drilling of 18 soil borings to depths ranging from 15 to 44.5 feet. These soil borings were ultimately converted to nested wells that monitor the water table aquifer along two zones. The shallow zone, or water table zone, generally extends from 2.5 to 17.5 feet bgs. The deeper zone monitored by the nested wells generally ranges from 17.5 to 35 feet bgs. Five additional soil borings were drilled and nine soil borings were hand-augered to provide data regarding soil contamination in the vadose zone. Additional groundwater data was provided via 21 drive-point groundwater or "Hydropunch" samples. A "Tracer" study was also performed to investigate the integrity of the active ASTs and underground distribution piping.

Soil and groundwater samples obtained under the CSA were analyzed for both organic and inorganic compounds. Groundwater analyses included purgeable hydrocarbons (EPA 601), purgeable aromatics and methyl-tertiary butyl ether (MTBE) (EPA 602), polynuclear aromatic hydrocarbons (EPA 610), and unfiltered lead (EPA 239.2). Soil analyses were limited to total petroleum hydrocarbons (TPH) (SW846 3rd Edition, 5030/3550) and lead (SW846 3rd Edition, 6010). Ten soil samples were analyzed for ignitability by SW846 3rd Edition, 1010.

The results of the CSA identified areas of impacted soil and groundwater. The nature of the contamination included both halogenated (i.e., chlorinated) organic compounds (e.g., trichloroethene, trans-1,2-dichloroethene, and vinyl chloride) and nonhalogenated, petroleum-based constituents (e.g., TPH, MTBE, benzene, toluene, ethylbenzene, and xylene). The contamination encountered was typically identified in both shallow (2.5 to 17.5 feet bgs) and deep (17.5 to 35 feet bgs) wells.

The soil contamination identified under the CSA was located northwest of the Fuel Farm ASTs along a pear-shaped area extending from the Explosive Ordnance Disposal Armory, Office and Supply Building (G-480) northeast toward Brinson Creek.

In general, contaminant concentrations in soil were greatest in those samples taken at or below the water table. Law concluded that this soil contamination at Site 35 was likely due to the presence of a dissolved phase groundwater plume and seasonal fluctuations of the water table.

Law also identified several plumes of shallow groundwater contamination including two plumes comprised primarily of petroleum-based constituents (e.g., BTEX) and two plumes comprised of halogenated organic compounds (e.g., TCE). The plumes are all located north of Fourth Street and east of E Street except for a portion of a TCE plume that extends southwest beyond the corner of Fourth and E Streets.

A follow-up to the CSA was conducted by Law in 1992. Reported as an Addendum to the CSA (Law, 1993), it was designed to provide further characterization of the southern extent of the petroleum contamination in shallow groundwater. Three monitoring wells were installed from which additional soil samples were obtained for TPH analysis. As part of the follow-up, a pump test was performed to estimate the hydraulic characteristics of the surficial aquifer. This test was designed to determine performance characteristics of a designated pumping well and to estimate hydraulic parameters of the aquifer. An approximate hydraulic conductivity of 100 feet/day was determined for the surficial aquifer.

Interim Remedial Action Remedial Investigation/Feasibility Study

Based on the results of previous investigations at Site 35 and occasional reports of fuel-like odors along an adjoining section of Brinson Creek, Baker Environmental, Inc. (Baker) was

retained to conduct an Interim Remedial Action Remedial Investigation/Feasibility Study (RI/FS) in December of 1993. An additional seven soil borings were located within and around groundwater contaminant plume areas identified during the CSA. In addition to the soil borings, 13 shallow soil samples were taken along Brinson Creek to determine the extent of contamination emanating from Site 35. Two of these shallow soil samples were situated upstream along Brinson Creek to provide background information on TPH and oil and grease.

In addition to soil sampling, a second round of groundwater level measurements were obtained for comparison to those presented in the CSA.

The most prevalent contaminants detected in soil samples taken during the Interim Remedial Action RI were benzene, toluene, ethylbenzene xylenes, naphthalene, and 2-methylnaphthalene. These constituents are commonly associated with fuel contamination. TPH (gasoline and diesel) and oil and grease were also observed, in addition to sporadic occurrences of chromium, vanadium, and arsenic.

Analytical results, in general, confirm the Law findings that contamination in the majority of the identified soil is associated with a dissolved petroleum hydrocarbon contaminant plume in shallow groundwater. Oil and grease results observed in shallow soil samples obtained from the Brinson Creek area may be influenced by the presence of naturally occurring organics in soils. This is supported by elevated background concentrations of oil and grease in surface soil samples obtained along the banks of Brinson Creek approximately 1/2-mile upstream of the site and a lack of detectable levels of fuel-related volatile organics in soil samples that exhibit elevated levels of oil and grease.

Comprehensive Remedial Investigation/Feasibility Study

Concurrent with the Interim Remedial Action RI/FS which is focused on contaminated soil at Site 35, Baker is conducting a comprehensive RI/FS as a separate study to evaluate other potentially impacted site media including groundwater, surface water, and sediment. Field activities for the full RI/FS were initiated in April 1994.

Other Investigations

Two USTs located near the Fuel Farm have been the subject of previous investigations conducted under an Activity-wide UST program. The two USTs include a No. 6 fuel oil UST

situated adjacent to the former Mess Hall Heating Plant and a No. 2 fuel oil UST situated adjacent to the Explosive Ordnance and Disposal Armory, Office, and Supply Building. The former was abandoned in place years ago (date unknown) and has been the subject of previous environmental investigations performed by ATEC Associates, Inc. and Law. The latter was removed in January 1994 and is reported to be scheduled for an upcoming comprehensive environmental investigation.

3.0 HIGHLIGHTS OF COMMUNITY PARTICIPATION

The Final Interim Remedial Action RI/FS Report and the Final Interim Proposed Remedial Action Plan (PRAP) for Site 35 were released to the public in July, 1994. These documents were made available to the public at the information repository maintained at the Onslow County Library and Building 67, MCB, Camp Lejeune. The notice of availability of these documents was published in the "Jacksonville Daily News" during the period July 20 through 26, 1994. A public comment period was held from July 26 to August 26, 1994. In addition, a public meeting was held on July 26, 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, which is part of this ROD (Section 11.0).

This decision document presents the three RAAs (3, 5, and 6) which have been selected for the remediation of petroleum hydrocarbon contaminated soil at Site 35. These RAAs have been 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 RAAs for Site 35 is based on the Administrative Record.

4.0 SCOPE AND ROLE OF THE INTERIM REMEDIAL ACTION

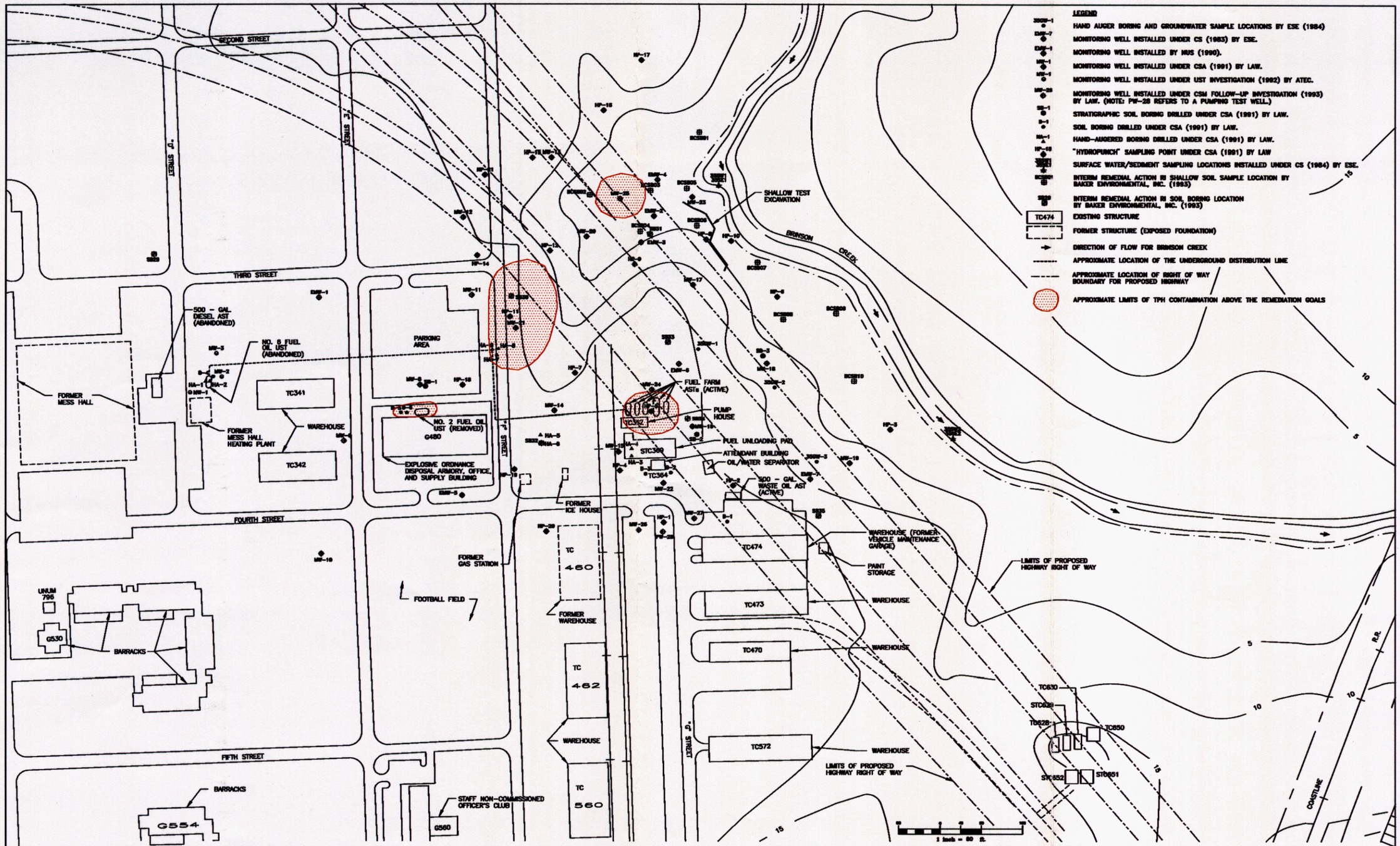
The response action presented in this document is termed an Interim Remedial Action because it represents only one phase of a comprehensive investigation and remediation program at Site 35. This interim phase is limited to contaminated soil at Site 35. Other site media including groundwater, surface water, and sediments are concurrently being addressed as part of a comprehensive site-wide RI/FS.

The results of the environmental investigations performed to date at Site 35 indicate the presence of soil areas contaminated with petroleum hydrocarbons at levels in excess of current state of North Carolina guidelines. The purpose of the selected remedy is to comply with existing state guidelines and to mitigate the contaminated soil areas as potential sources of future contamination of other media including groundwater, surface water, and sediment.

5.0 SITE CHARACTERISTICS

This section of the Interim ROD presents an overview of the nature and extent of petroleum hydrocarbon soil contamination at Site 35. The analytical data generated as part of the Interim Remedial Action RI and data generated during previous investigations conducted at Site 35 identified the presence of TPH contaminated soil in the vicinity of the Fuel Farm ASTs and to the north and northwest of the Fuel Farm in a broad area extending from the former UST adjacent to the Explosive Ordnance Disposal Building to the vicinity of monitoring well MW-25. In general, the analytical data suggests that the majority of the contaminated soil is present along a narrow zone that begins just above the top of the shallow groundwater table. In essence, this contaminated soil is an extension of groundwater contamination which has been identified under the previous investigations and, particularly under the CSA conducted by Law. It can be assumed that seasonal fluctuations in the contaminated groundwater table has resulted in the contamination of soil just above the groundwater table. However, recorded groundwater elevation data obtained to date is insufficient to afford an estimate of the range of groundwater fluctuation at Site 35. This is supported by data which shows very little contamination present in soil located more than a foot or two above the shallow groundwater table as measured on two separate dates by Law and Baker. Contaminated soil was encountered in soil samples obtained about two or more feet above the measured groundwater surface at well MW-21 and MW-25 and at borings B-5.

Four areas of soil contamination requiring remediation have been identified which are depicted on Figure 3. The first area is located in the vicinity of the Fuel Farm ASTs. The second area is associated with a UST formerly located on the north side of Building G-480. The other two areas are located north of the Fuel Farm and Building G-480. The larger of the other two areas is located along "F" Street and is based primarily on contaminated soil samples located above the seasonal high groundwater table obtained from hand auger boring HA-7, soil boring MW-21, and soil boring SB30. The smaller area is based on contaminated soil samples obtained from soil boring MW-25. Baker has estimated that approximately 3,800 cubic yards (5,100 tons) of contaminated soil is present in these four areas.



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	DATE JULY 1994 SCALE 1"= 60' DRAWN WJH REVIEWED DLB S.O.# 62470-232-0000-07000 CADD# 232502RI	NORTH	INTERIM PROPOSED REMEDIAL ACTION PLAN CTO-0160 MARINE CORPS BASE, CAMP LEJEUNE NORTH CAROLINA BAKER ENVIRONMENTAL, Inc. Coraopolis, Pennsylvania	Baker Baker Environmental, Inc.	LIMITS OF TOTAL PETROLUEM HYDROCARBON SOIL CONTAMINATION SITE 35 – CAMP GEIGER AREA FUEL FARM SCALE 1"= 60' DATE JULY 1994

FIGURE No. 3

01520JJ01Y

6.0 SUMMARY OF SITE RISKS

The baseline risk assessment conducted at Site 35 examined the potential for adverse human health effects to occur subsequent to exposure to contaminated surface soil. Tables 1, 2, and 3 present summaries of the frequencies of detection and comparisons to USEPA Region III commercial/industrial and residential risk-based concentrations (RBCs) which were used to select the contaminants of potential concern (COPCs) for surface and subsurface soil, respectively. Benzene and arsenic were identified as COPCs. Benzene was detected in two of 20 soil samples at a maximum concentration of 23 mg/kg. Arsenic was detected in one of 20 soil samples at a concentration of 8 mg/kg. Results of the baseline risk assessment indicate that the unacceptable cancer risks and adverse noncarcinogenic health effects associated with potential on-site worker exposures will not occur. On-site workers were considered the only potential human receptors because of the proximity of soil contamination to the water table and proposed plans to construct a highway through the site. Results of the baseline risk assessment indicate that a no action remedy would be adequately protective of human health. No ecological risk assessment was conducted as part of the Interim Remedial Action RI because of the depths of the soil contamination limits possible ecological exposure to contaminated soil. An ecological risk assessment will be conducted as part of the comprehensive RI/FS that is being performed concurrently at Site 35.

Based on the results of the risk assessment, unacceptable human health risks are not expected at Site 35. However, soil contaminated with elevated levels of petroleum hydrocarbons was identified at several areas across the site. Results of TPH and oil and grease analysis performed to date on soil samples from Site 35 are presented on Tables 4 and 5. The scope and goals for the remediation of petroleum hydrocarbon contaminated soil were developed based on NC DEHNR guidelines for soil remediation. The NC DEHNR guidelines address the presence of low and high boiling point petroleum hydrocarbons and oil and grease. Remediation goals based on the NC DEHNR guidelines were developed by performing a Site Sensitivity Evaluation (SSE). Based on the SSE remediation goals were developed as follows:

- TPH (via EPA Method 5030/8015: low boiling point) = 40 mg/kg
- TPH (via EPA Method 3550/8015: high boiling point) = 160 mg/kg
- Oil and grease (via EPA Method 8071) = 800 mg/kg

Oil and grease was subsequently excluded from the remediation goals because it was detected in background surface soil samples (BCSB11 and BCSB1B) located approximately 1/4 to 1/2

TABLE 1

DETECTED ORGANIC AND INORGANIC CONTAMINANTS IN SURFACE SOIL AND COMPARISON TO COPC CRITERIA
INTERIM RECORD OF DECISION
SITE 35 - CAMP GEIGER AREA FUEL FARM
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Constituent	Frequency of Detection	Maximum Concentration (mg/kg)	Region III RBC Value Commercial/ Industrial Soil (mg/kg)	Region III RBC Value Residential Soil (mg/kg)	Retained/ Not Retained
Acetone	7/11	1.3J	10,000	780	Not Retained
Anthracene	1/11	0.28J	31,000	2300	Not Retained
bis(2-ethylhexyl) phthalate	5/11	0.35J	200	46	Not Retained
di-n-octyl phthalate	3/11	0.29J	2,000	160	Not Retained
Aluminum	11/11	4840L	100,000	23,000	Not Retained
Barium	3/11	31.9J	7,200	550	Not Retained
Calcium	11/11	23,600	--	--	Not Retained(1)
Chromium III	11/11	8.2L	100,000	7,800	Not Retained
Copper	1/11	8J	3,800	290	Not Retained(1)
Iron	11/11	6,350	--	--	Not Retained
Lead	3/11	69.2	*	*	--
Magnesium	11/11	1630L	--	--	Not Retained(1)
Manganese	11/11	105	510	39	Not Retained
Mercury	11/11	0.27K	31	2.3	Not Retained
Nickel	3/11	8.3J	2,000	160	Not Retained
Potassium	2/11	433L	--	--	Not Retained(1)
Selenium	1/11	0.25L	510	39	Not Retained
Sodium	5/11	1,730L	--	--	Not Retained(1)
Vanadium	8/11	18.1L	720	55	Not Retained
Zinc	11/11	88.5	31,000	2,300	Not Retained

Notes:

* RBCs for these constituents are not currently available.

(1) Not retained because of nutritional essentiality.

TABLE 2

DETECTED ORGANIC AND INORGANIC CONTAMINANTS IN SHALLOW UNSATURATED SUBSURFACE SOIL AND COMPARISON TO COPC CRITERIA
INTERIM RECORD OF DECISION
SITE 35 - CAMP GEIGER FUEL FARM
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Constituent	Frequency of Detection	Maximum Concentration (mg/kg)	Region III RBC Value Commercial/ Industrial Soil (mg/kg)	Region III RBC Value Residential Soil (mg/kg)	Retained/ Not Retained
Acetone	4/5	0.15J	10,000	780	Not Retained
Ethylbenzene	1/5	6.8	10,000	780	Not Retained
Trichloroethene	2/5	0.007J	260	47	Not Retained
Xylenes	1/5	13	200,000	16,000	Not Retained
Dibenzofuran	1/5	3.1J	*	*	--
Fluorene	1/5	5.6J	4,100	310	Not Retained
Phenanthrene	1/5	6.7J	3,000	230	Not Retained
Bis (2-ethylhexyl) phthalate	3/5	0.16J	200	46	Not Retained
Di-n-octylphthalate	3/5	0.10J	2,000	160	Not Retained
Naphthalene	1/5	7.1J	4,100	310	Not Retained
2-methyl naphthalene	1/5	34	--	--	Not Retained
Aluminum	5/5	4300L	300,000	23,000	Not Retained
Beryllium	1/5	0.08L	0.67	0.15	Not Retained
Calcium	4/5	416J	--	--	Not Retained(1)
Chromium (III)	5/5	6.2L	100,000	7,800	Not Retained
Iron	5/5	2500J	--	--	Not Retained(1)
Magnesium	3/5	133L	--	--	Not Retained(1)
Manganese	2/5	3.2	510	39	Not Retained
Mercury	2/5	0.08K	31	2.3	Not Retained
Vanadium	1/5	7.8L	720	55	Not Retained
Zinc	1/5	20.4	31,000	2,300	Not Retained

Notes:

* RBCs for these constituents are not currently available.
(1) Not retained because of nutritional essentiality.

TABLE 3

DETECTED ORGANIC AND INORGANIC CONTAMINANTS IN SATURATED SUBSURFACE SOIL AND COMPARISON TO COPC CRITERIA
INTERIM RECORD OF DECISION
SITE 35 - CAMP GEIGER FUEL FARM
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Constituent	Frequency of Detection	Maximum Concentration (mg/kg)	Region III RBC Value Commercial/ Industrial Soil (mg/kg)	Region III RBC Value Residential Soil (mg/kg)	Retained/ Not Retained
Acetone	1/4	0.051J	10,000	780	Not Retained
Benzene	2/4	23	99	22	Retained
2-Hexanone	3/4	12J	--	--	Not Retained
Toluene	2/4	190J	20,000	1,600	Not Retained
Ethylbenzene	3/4	70	10,000	780	Not Retained
Xylenes	3/4	320	200,000	16,000	Not Retained
Dibenzofuran	2/4	10J	*	*	--
Fluorene	3/4	13J	4,100	310	Not Retained
Phenanthrene	3/4	27	3,000	230	Not Retained
Bis (2-ethylhexyl) phthalate	1/4	0.12J	200	46	Not Retained
Di-n-octylphthalate	1/4	0.1J	2,000	160	Not Retained
Naphthalene	3/4	43	4,100	310	Not Retained
2-Methylnaphthalene	3/4	130	--	--	--
Aluminum	4/4	4,480L	300,000	23,000	Not Retained
Arsenic	1/4	8	1.6	0.97	Retained
Chromium (III)	4/4	20.5L	100,000	7,800	Not Retained
Iron	4/4	6,140J	--	--	Not Retained(1)
Magnesium	4/4	186	--	--	Not Retained(1)
Manganese	3/4	8.9	510	39	Not Retained
Vanadium	2/4	22.9L	720	55	Not Retained

Notes:

* RBCs for these constituents are not currently available.

(1) Not retained because of nutritional essentiality.

TABLE 4
SOIL TPH RESULTS FROM THE CSA (LAW, 1992)
INTERIM RECORD OF DECISION
SITE 35 - CAMP GEIGER AREA FUEL FARM
MCB CAMP LEJEUNE, NORTH CAROLINA

SAMPLE LOCATION	SAMPLE DEPTH (ft)	PID READING (ppm)	SAMPLE ANALYZED	ANALYTICAL RESULTS (mg/kg) TPH		DEPTH (bgs) TO WATER TABLE (8/91) (ft)	DEPTH (bgs) TO WATER TABLE (3/94) (ft) (1)
				DIESEL	GASOLINE		
MW-8	1.5-2.0	8					
	3.5-4.0	3					
	5.5-6.0	55					
	7.5-8.0	85	*	9100	ND	5.89	6.07
	9.5-10.0	42					
	11.5-12.0	4					
MW-9	1.5-2.0	ND					
	3.5-4.0	ND					
	5.5-6.0	ND				4.83	5.04
	7.5-8.0	ND	*	ND	ND		
	9.6-10.0	ND					
MW-10	1.5-2.0	>2000	*	ND	ND		
	3.5-4.0	220	*	ND	ND	4.56	4.86
	5.5-6.0	105					
	10-10.5	40					
MW-11	1.5-2.0	ND					
	3.5-4.0	1.5				5.76	6.35
	5.5-6.0	30	*	2100	ND		
	10-10.5	31	*	4	ND		
MW-12	0-1.5	>2000	*	ND	ND		
	1.5-3.0	75				6.86	NA
	3.0-4.5	200	*	ND	ND		
	8.5-10	45					
MW-13	1.5-2.0	ND					
	3.5-4.0	ND				7.33	7.54
	5.5-6.0	ND					
	10.0-10.5	ND	*	ND	ND		

Notes:
ppm - parts per million
* - Indicates which sample interval was for laboratory analysis
ND - Not detected
NA - Not available
bgs - below ground surface
(1) - Water level measurements obtained by Baker

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TABLE 4 (continued)
SOIL TPH RESULTS FROM THE CSA (LAW, 1992)
INTERIM RECORD OF DECISION
SITE 35 - CAMP GEIGER AREA FUEL FARM
MCB CAMP LEJEUNE, NORTH CAROLINA

SAMPLE LOCATION	SAMPLE DEPTH (ft)	PID READING (ppm)	SAMPLE ANALYZED	ANALYTICAL RESULTS (mg/kg) TPH		DEPTH (bgs) TO WATER TABLE (8/91) (ft)	DEPTH (bgs) TO WATER TABLE (3/94) (ft) (1)
				DIESEL	GASOLINE		
MW-14	0-1.5	ND					
	1.5-3.0	3					
	3.0-4.5	60	*	0.3	ND	7.07	NA
	8.5-10.0	16					
	13.5-15.0	3					
MW-15	1.5-2.0	ND					
	3.5-4.0	ND				8.05	8.16
	5.5-6.0	ND	*	ND	ND		
	10.0-10.5	65	*	3500	ND		
MW-16	0-1.5	30					
	1.5-3.0	110				10.25	10.37
	3.0-4.5	200	*	ND	ND		
	8.5-10.0	155					
MW-17	1.5-2.0	ND					
	3.5-4.0	ND					
	5.5-6.0	ND	*	ND	ND	8.51	8.63
	10.0-10.5	ND					
MW-19	1.5-2.0	ND					
	3.5-4.0	ND	*	ND	ND	0.92	1.25
	5.5-6.0	ND					
	10.0-10.5	ND	*	ND	ND		
MW-20	0-1.5	40					
	1.5-3.0	65				6.7	6.86
	3.0-4.5	300	*	14	ND		
	8.5-10.0	220	*	22000	ND		

Notes:
ppm - parts per million
* - Indicates which sample interval was for laboratory analysis
ND - Not detected
NA - Not available
bgs - below ground surface
(1) - Water level measurements obtained by Baker

TABLE 4 (continued)
SOIL TPH RESULTS FROM THE CSA (LAW, 1992)
INTERIM RECORD OF DECISION
SITE 35 - CAMP GEIGER AREA FUEL FARM
MCB CAMP LEJEUNE, NORTH CAROLINA

SAMPLE LOCATION	SAMPLE DEPTH (ft)	PID READING (ppm)	SAMPLE ANALYZED	ANALYTICAL RESULTS (mg/kg) TPH		DEPTH (bgs) TO WATER TABLE (8/91) (ft)	DEPTH (bgs) TO WATER TABLE (3/94) (ft) (1)
				DIESEL	GASOLINE		
MW-21	1.5-2.0	ND					
	3.5-4.0	60	*	5200	ND	6.03	6.27
	5.5-6.0	75	*	21000	ND		
	10-10.5	35					
MW-22	0-1.5	10					
	1.5-3.0	2				8.76	9.0
	3.0-4.5	150	*	5	ND		
	9.5-11.0	90	*	8900	540		
MW-23	1.5-2.0	ND	*	ND	ND		
	3.5-4.0	ND				3.15	1.93
	5.5-6.0	ND					
	10.0-10.5	ND					
MW-24	1.5-2.0	ND					
	3.5-4.0	ND	*	ND	ND	5.76	9.92
	5.5-6.0	ND					
	10.0-10.5	3	*	21	ND		
MW-25	1.5-2.0	22					
	3.5-4.0	45	*	8700	ND	5.44	NA
	5.5-6.0	45	*	5700	ND		
	10.0-10.5	2.5					
MW-26	0-1.5	ND					
	1.5-3.0	ND	*	ND	ND	7.47	NA
	3.0-4.5	ND					
	6.0-7.5	ND	*	ND	ND		
	9.5-11.0	ND					

Notes:
ppm - parts per million
* - Indicates which sample interval was for laboratory analysis
ND - Not detected
NA - Not available
bgs - below ground surface
(1) - Water level measurements obtained by Baker

TABLE 4 (continued)
SOIL TPH RESULTS FROM THE CSA (LAW, 1992)
INTERIM RECORD OF DECISION
SITE 35 - CAMP GEIGER AREA FUEL FARM
MCB CAMP LEJEUNE, NORTH CAROLINA

SAMPLE LOCATION	SAMPLE DEPTH (ft)	PID READING (ppm)	SAMPLE ANALYZED	ANALYTICAL RESULTS (mg/kg) TPH		DEPTH (bgs) TO WATER TABLE (8/91) (ft)	DEPTH (bgs) TO WATER TABLE (3/94) (ft) (1)
				DIESEL	GASOLINE		
MW-27	0-1.5	ND					
	1.5-3.0	ND	*	ND	ND	8.22	8.39
	3.0-4.5	ND					
	6.0-7.5	ND	*	ND	ND		
	9.5-11.0	ND					
PW-28	0-1.5	ND					
	1.5-3.0	ND					
	3.0-4.5	ND	*	ND	ND	8.11	NA
	6.0-7.5	ND					
	9.5-11.0	ND	*	ND	ND		
B-1	0-1.5	200					
	1.5-3.0	160	*	ND	ND	NA	NA
	3-4.5	40					
	8.5-10.0	140	*	ND	ND		
B-2	2.0-2.5	3					
	3.0-3.5	2				NA	NA
	4.0-4.5	8					
	5.0-5.5	7.5					
	5.5-6.0	12	*	ND	ND		
	8.5-10	51	*	7600	630		
B-4	0-1.5	0					
	1.5-3.0	11				NA	NA
	3.0-4.5	22	*	8400	ND		
	8.5-10.0	50	*	5100	ND		
B-5	0-1.5	ND					
	1.5-3.0	ND				NA	NA
	3.0-4.5	20	*	980	ND		
	8.5-10.0	2	*	280	ND		

Notes:
ppm - parts per million
* - Indicates which sample interval was for laboratory analysis
ND - Not detected
NA - Not available
bgs - below ground surface
(1) - Water level measurements obtained by Baker

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TABLE 4 (continued)
SOIL TPH RESULTS FROM THE CSA (LAW, 1992)
INTERIM RECORD OF DECISION
SITE 35 - CAMP GEIGER AREA FUEL FARM
MCB CAMP LEJEUNE, NORTH CAROLINA

SAMPLE LOCATION	SAMPLE DEPTH (ft)	PID READING (ppm)	SAMPLE ANALYZED	ANALYTICAL RESULTS (mg/kg) TPH		DEPTH (bgs) TO WATER TABLE (8/91) (ft)	DEPTH (bgs) TO WATER TABLE (3/94) (ft) (1)
				DIESEL	GASOLINE		
B-6	0-1.5	2					
	1.5-3.0	ND					
	3.0-4.5	ND	*	7	ND	NA	NA
	8.5-10	50	*	6200	ND		
SB-3	0-1.5	ND					
	1.5-3.0	ND					
	3.0-4.5	9	*	ND	ND	NA	NA
	8.5-10	10	*	ND	ND		
HA-3	2	2	*	17	ND	NA	NA
	4	5					
HA-4	2	4	*	ND	ND	NA	NA
	5	3					
HA-7	3	10					
	5	60	*	5700		NA	NA
HA-8	5	8		NA	NA	NA	NA
HA-9	3	ND		NA	NA	NA	NA
	5	8		NA	NA		

Notes:
ppm - parts per million
* - Indicates which sample interval was for laboratory analysis
ND - Not detected
NA - Not available
bgs - below ground surface
(1) - Water level measurements obtained by Baker

TABLE 5
SOIL TPH, OIL AND GREASE RESULTS (BAKER, 1994)
INTERIM RECORD OF DECISION
SITE 35 - CAMP GEIGER AREA FUEL FARM
MCB CAMP LEJEUNE, NORTH CAROLINA

Sample No.	SB2903	SB3003	SB3005	SB305D	SB3102	SB3203	SB3305	SB3405	SB3502	BCSB01	BCSB02	BCSB03
Depth (ft)	4-6	4-6	8-10	8-10	2-4	4-6	8-10	8-9	2-4	0-1	0-1	0-1
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
TOTAL PETROLEUM HYDROCARBONS												
Gasoline	ND	650	1300	1400	ND	ND	ND	19000	ND	60	ND	ND
Diesel	ND	3500	6800	6800	ND	ND	ND	7100	ND	ND	ND	ND
OIL AND GREASE	290	7800	16000	16000	440	370	450	19000	370	3000	930	1300

Sample No.	BCSB03D	BCSB04	BCSB05	BCSB06	BCSB07	BCSB08	BCSB09	BCSB10	BCSB11	BCSB12	BCSB13
Depth (ft)	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
TOTAL PETROLEUM HYDROCARBONS											
Gasoline	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Diesel	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
OIL AND GREASE	1300	390	970	1900	1600	1800	7500	3700	1610	1110	321

Notes:
ND - Not detected

mile upstream of the Fuel Farm at levels on the order of 1610 mg/kg and 1110 mg/kg, respectively, or more than twice the remediation goal based on the SSE. Stream level measurements indicate the locations of the upstream surface soil samples to be beyond the reach of tidal influences and, consequently, indicate that high levels of naturally-occurring organic chemicals are present in the soil adjacent to Brinson Creek and likely account for the high oil and grease results. Although other surface soil samples obtained under the Interim Remedial Action RI indicated the presence of oil and grease at levels as high as 7,500 mg/kg, only one of the surface soil samples (BSCB01) exhibited both detectable concentrations of TPH (60 mg/kg) and oil and grease (3,000 mg/kg). The discrepancy is likely due to the fact that oil and grease is a gravimetric analysis which is highly subject to interferences and influences such as those presented by many naturally-occurring organic chemicals that could be expected to be present in the frequently flooded soils adjacent to Brinson Creek.

Based on the remediation goals, soils exhibiting TPH levels in excess of 40 mg/kg as measured by EPA Method 5030/8015 and 160 mg/kg as measured by EPA Method 3550/8015 will be subject to remediation.

7.0 DESCRIPTION OF ALTERNATIVES

Various technologies and process options were screened and evaluated under the Interim Remedial Action FS. Ultimately, six Remedial Action Alternatives (RAAs) were developed and are listed as follows:

- RAA 1 - No Action
- RAA 2 - Source Removal and Off-Site Landfill Disposal
- RAA 3 - Source Removal and Off-Site Biotreatment
- RAA 4 - Source Removal and On-Site, Ex-Situ Soil Aeration
- RAA 5 - Source Removal and Off-Site Soil Recycling
- RAA 6 - Source Removal and On-Site Low Temperature Thermal Desorption

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

- RAA 1 - No Action

  Capital Cost: $0
  Annual Operation and Maintenance (O&M) Cost: $0
  Months to Implement: 0

The No Action RAA is required under CERCLA to establish a baseline for comparison. Under this RAA, no actions will be performed to reduce the toxicity, mobility, or volume of the contaminated soil at Site 35. This alternative assumes that passive remediation will occur via biodegradation and other natural attenuation processes and that contaminant levels will be reduced over an indefinite period of time.

- RAA 2 - Source Removal and Off-Site Landfill Disposal

  Capital Cost: $527.390
  Annual O&M Cost: $0
  Months to Implement: 2

  Under RAA 2, contaminated soil located above the seasonal high groundwater table will be excavated and transported off site to an appropriately permitted solid waste landfill.

- RAA 3 - Source Removal and Off-Site Biotreatment

  Capital Cost: $558,366
  Annual O&M Cost: $0
  Months to Implement: 2

  RAA 3 involves the excavation of contaminated soil above the seasonal high groundwater table and biological treatment at an off-site commercial composting landfarming facility. Biological treatment is a process whereby naturally occurring microorganisms are stimulated to consume petroleum hydrocarbons as food and fuel with the resulting byproducts being carbon dioxide and water.

- RAA 4 - Source Removal and On-Site, Ex-Situ Soil Aeration

  Capital Cost: $455,304
  Annual O&M Cost: $0
  Months to Implement: 2

  RAA 4 involves the excavation of petroleum hydrocarbon contaminated soil above the seasonal high groundwater table for remediation via on-site, ex-situ soil aeration. In this process the excavated soil is vigorously agitated at a staging area in an effort to release volatile hydrocarbons from the soil to the atmosphere.

- RAA 5 - Source Removal and Off-Site Soil Recycling

  Capital Cost: $558,366
  Annual O&M Cost: $0
  Months to Implement: 2

  RAA 5 involves the excavation of contaminated soil located above the seasonal high groundwater table and transport to an off-site commercial soil recycling facility. Soil recycling processes utilize the soil for the production of basic materials such as brick and asphalt.

- RAA 6 - Source Removal and On-Site Low Temperature Thermal Desorption

  Capital Cost: $613,542
  Annual O&M Cost: $0
  Months to Implement: 2

  RAA 6 involves the excavation of contaminated soil located above the seasonal high groundwater table for remediation via on-site low temperature thermal desorption. This process is commercially available from contractors that utilize mobile units to heat wastes to between 200 and 600 degrees Fahrenheit. The heat volatizes organic contaminants which are then either collected in activated carbon, destroyed via catalytic oxidation, or released to the atmosphere.

8.0 SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

A detailed analysis was performed on the RAAs using the nine evaluation criteria in order to select a site remedy. Table 6 presents a summary of this detailed analysis. A brief summary of each alternative's strengths and weaknesses with respect to the evaluation criteria follows. A glossary of the evaluation criteria is noted on Table 7.

Overall Protection of Human Health and the Environment

All of the RAAs except the No Action RAA will provide for an increase in the overall protection of human health and the environment. The greatest degree of protection will be provided by RAAs 2, 3, and 5 which involve source removal and disposal/treatment at an off-site facility. Under these alternatives, after the contaminated soil is excavated and removed from the site, clean borrow will be used as backfill. RAAs 4 and 6, on the other hand, will use the soil treated on site as backfill material. It is likely that some residual level of

TABLE 6

SUMMARY OF ALTERNATIVES EVALUATION
INTERIM RECORD OF DECISION, CTO-0160
SITE 35 - CAMP GEIGER AREA FUEL FARM, MARINE CORPS BASE, CAMP LEJEUNE, NORTH CAROLINA

	Alternative 1: No Action	Alternative 2: Source Removal and Off-Site Landfill	Alternative 3: Source Removal and Off-Site Biotreatment
Overall Protection of Human Health and Environment	No reduction in potential risks.	Removes contaminated soil from site, thereby eliminating potential exposure to and migration of contaminants.	Removes contaminated soil from site thereby eliminating potential exposure to and migration of contaminants.
Compliance with ARARs			
• Chemical-Specific ARARs	Does not meet NC DEHNR guidelines for TPH soil remediation.	Will comply with NC DEHNR guidelines for TPH soil remediation.	Will comply with NC DEHNR guidelines for TPH soil remediation.
• Location-Specific ARARs	Contaminated soils left in place under no action could impact wetlands and, in turn, fish and wildlife.	Source removal will reduce risks to wetlands, the floodplain, and endangered species in the Camp Lejeune area.	Source removal will reduce risks to wetlands, the floodplain, and endangered species in the Camp Lejeune area.
• Action-Specific ARARs	Not relevant. There are no actions.	Will comply with NC DEHNR guidelines for disposal/treatment.	Will comply with NC DEHNR guidelines for disposal/treatment.
Long-Term Effectiveness and Permanence	Source remains in place. Natural attenuation may reduce contaminant levels, but is unpredictable.	Contaminated soil as a source is permanently removed from site.	Contaminated soil as a source is permanently removed from site.
Reduction of Toxicity, Mobility, or Volume	Natural attenuation may reduce contaminant levels, but is unpredictable.	Total reduction equal to volume of soil removed.	Total reduction equal to volume of soil removed.
Short-Term Effectiveness	No increased risk to community and no risk to workers because no remedial action is implemented.	Excavation and handling would release VOCs to atmosphere. Work to be completed in 1 to 2 months.	Excavation and handling would release VOCs to atmosphere. Work to be completed in 1 to 2 months.
Implementability	Nothing to implement.	Standard construction operation. Easy to implement. NC DEHNR approved landfills available.	Standard construction operation. Easy to implement. Commercial vendors available.
Costs			
Capital	$0	$527,390	$558,366
O&M	$0	$0	$0
USEPA/State Acceptance	USEPA and state will likely not prefer this alternative.	USEPA has a Federal mandate to favor treatment over disposal options. State has preference for on-site versus off-site treatment.	USEPA has a Federal mandate to favor treatment over disposal options. State has preference for on-site versus off-site treatment.

TABLE 6 (Continued)

SUMMARY OF ALTERNATIVES EVALUATION
INTERIM RECORD OF DECISION, CTO-0160
SITE 35 - CAMP GEIGER AREA FUEL FARM, MARINE CORPS BASE, CAMP LEJEUNE, NORTH CAROLINA

	Alternative 4: Source Removal and On-Site Ex-Situ Soil Aeration	Alternative 5: Source Removal and Off-Site Soil Recycling	Alternative 6: Source Removal and On-Site Low Temperature Thermal Desorption
Overall Protection of Human Health and Environment	Risks reduced, but not perhaps not to the degree of other alternatives because treated soil is used as backfill.	Removes contaminated soil from site, thereby eliminating potential exposure to and migration of contaminants.	Risks reduced, but not perhaps not to the degree of other alternatives because treated soil is used as backfill.
Compliance with ARARs			
• Chemical-Specific ARARs	Will comply with NC DEHNR guidelines for TPH soil remediation.	Will comply with NC DEHNR guidelines for TPH soil remediation.	Will comply with NC DEHNR guidelines for TPH soil remediation.
• Location-Specific ARARs	Will reduce risks to wetlands, the floodplain, and endangered species in the Camp Lejeune area, but not perhaps to degree of other alternatives because treated soil is used as backfill.	Source removal will reduce risks to wetlands, the floodplain, and endangered species in the Camp Lejeune area.	Will reduce risks to wetlands, the floodplain, and endangered species in the Camp Lejeune area, but not perhaps to degree of other alternatives because treated soil is used as backfill.
• Action-Specific ARARs	Will comply with NC DEHNR guidelines for disposal/treatment.	Will comply with NC DEHNR guidelines for disposal/treatment.	Will comply with NC DEHNR guidelines for disposal/treatment.
Long-Term Effectiveness and Permanence	Reductions in contaminant achieved via on-site treatment will be permanent. No long-term monitoring required.	Contaminated soil as a source is permanently removed from site.	Reductions in contaminant achieved via on-site treatment will be permanent. No long-term monitoring required.
Reduction of Toxicity, Mobility, or Volume	Total reduction is equal to volume of soil treated and total reduction of contaminant levels.	Total reduction equal to volume of soil removed.	Total reduction is equal to volume of soil treated and total reduction of contaminant levels.
Short-Term Effectiveness	Excavation, handling, and treatment would release VOCs to atmosphere during construction.	Excavation and handling would release VOCs to atmosphere. Work to be completed in 1 to 2 months.	Excavation and handling would release VOCs to atmosphere. Work to be completed in 1 to 2 months.
Implementability	Standard construction operation for excavation and treatment. No special equipment required.	Standard construction operation. Easy to implement. Commercial vendors available.	Standard construction operation. Easy to implement. Commercial vendors available.
Costs			
Capital	$455,304	$558,366	$613,542
O&M	$0	$0	$0
USEPA/State Acceptance	Potential objections regarding unrestricted VOC emissions during treatment. Engineering controls may be required.	USEPA has a Federal mandate to favor treatment over disposal options. State has preference for on-site versus off-site treatment.	USEPA has a Federal mandate to favor treatment over disposal options. State has preference for on-site versus off-site treatment.

TABLE 7
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/TBCs** - addresses whether or not an alternative will meet all of the applicable or relevant and appropriate requirements (ARARs), other criteria to be considered (TBCs), or other Federal and State environmental statutes and/or provide grounds for invoking a waiver.

- **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 report and the PRAP have been received.

contaminants will remain in the post-treated soil although the levels, by design, will be below the remediation goals established in the FS. Consequently, the post-treated soil as backfill will not provide as great a degree of overall protection as the clean backfill to be used under RAAs 2, 3, and 5. However, the difference may largely be insignificant given that a four-lane highway will be constructed over the site.

Compliance with ARARs

A summary of ARARs/TBCs that pertain to the Interim Remedial Action are presented in Table 8. All of the RAAs except the No Action RAA will comply with all of the identified ARARs. The source removal actions must be executed to comply with NC DEHNR guidelines which TBCs were identified as chemical-specific ARARs/TBCs and used as the basis of the remediation goals established under this FS. In addition, NC DEHNR guidelines for treating and disposing of contaminated soil are action-specific ARARs/TBCs. It is assumed that commercial vendors contracted to treat the soil either on site or off site under RAAs 3, 5, and 6 will be pre-approved, appropriately permitted, or otherwise in compliance with all applicable NC DEHNR rules and guidelines. Under RAA 2, it is assumed that the proposed landfill will be permitted to accept non-hazardous, petroleum contaminated soil. The ex-situ soil aeration proposed under RAA 4 will likely be performed by the excavation contractor as this technology does not appear to be available locally as a specialized service. It is possible that soil aeration will not be completely effective and that some portion of the contaminated soil would need to be disposed/treated by an alternative means in order to comply with ARARs.

Long-Term Effectiveness and Permanence

All of the RAAs except the No Action RAA provide for an effective and permanent remediation which does not require any long-term soil monitoring.

Reduction of Toxicity, Mobility, or Volume of Contaminants

All of the RAAs except the No Action RAA provide for the reduction of toxicity, mobility, and volume of contaminants. Under RAAs 2, 3, and 5, where the contaminated soil will be excavated and treated/disposed off site, the overall reduction is based strictly on the volume of contaminated soil removed. RAAs 4 and 6, however, involve the on-site treatment and reuse of the soil as backfill meaning that the total reduction is dependent both on the volume of soil

TABLE 8

SUMMARY OF APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS AND CRITERIA TO BE CONSIDERED
INTERIM RECORD OF DECISION, CTO-0160
SITE 35, CAMP GEIGER AREA FUEL FARM
MARINE CORPS BASE, CAMP LEJEUNE, NORTH CAROLINA

ARAR/TBC Type	Standard, Requirement, Criteria, or Limitation	Description	Comments
Chemical-Specific	NCDEHNR guidelines for soil remediation (NCDEHNR, Division of Environmental Management, Groundwater Section, March 1993)	Provides a means for establishing TPH soil cleanup levels using a site characterization and rating system.	All individual chemical compounds are covered by the TPH cleanup levels unless non-petroleum hydrocarbons are present which is not the case at Site 35.
Location-Specific	Endangered Species Act (50 CFR Part 200 and Part 402)	Requires action to conserve endangered species within critical habitats upon which endangered species depend, involves consultation with the Department of Interior.	Endangered species have been identified near the site. This Act will be applicable if these endangered species are found at the site.
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.	Brinson Creek is located adjacent to OU No. 10. If remedial actions are implemented that modify or impact this stream, then this will be an ARAR.
Location-Specific	Executive Order 11990 on Protection of Wetlands (40 CFR 6)	Establishes special requirements for federal agencies to avoid the adverse impacts associated with the destruction of loss of wetlands.	Based on a review of Wetland Inventory Maps, low-lying areas contiguous to Brinson Creek are wetlands. If remedial actions are implemented that modify or impact these wetlands, this will be an ARAR.
Location-Specific	Executive Order 11988 on Floodplain Management	Establishes special requirements for federal agencies to evaluate the adverse impacts associated with direct and indirect floodplain development.	The 100-year floodplain of Brinson Creek adjoins Site 35. If remedial actions are implemented that modify or impact the 100-year floodplain, then this will be an ARAR.

TABLE 8 (Continued)

SUMMARY OF APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS AND CRITERIA TO BE CONSIDERED
INTERIM RECORD OF DECISION, CTO-0160
SITE 35, CAMP GEIGER AREA FUEL FARM
MARINE CORPS BASE, CAMP LEJEUNE, NORTH CAROLINA

ARAR/TBC Type	Standard, Requirement, Criteria, or Limitation	Description	Comments
Action-Specific	Clean Air Act - National Ambient Air Quality Standards (40 CFR 50)	Federal air standards established for six criteria pollutants.	These standards may be applicable for any alternative that generate air pollutants.
Action-Specific	Clean Water Act (33 USC 404)	Prohibits discharge of dredged or fill material into a wetland without a permit.	This will be an ARAR due to the proximity of wetlands associated with Brinson Creek.
Action-Specific	NCDEHNR guidelines for soil remediation (NCDEHNR Division of Environmental Management, Groundwater Section, March 1993)	Provides guidelines for the application of various remediation methods to petroleum hydrocarbon impacted soil.	Covers on-site and off-site treatment and off-site disposal and is an ARAR pertaining to remedial actions undertaken at this site.

removed and the total reduction of contaminant levels. The difference should not be significant since all of the remediation goals will be achieved by design.

Short-Term Effectiveness

The short-term effectiveness of the action oriented RAAs (2 through 6) are roughly equivalent. It is expected that each RAA will be fully implemented in about two months. VOC emissions will be expected during the excavation and staging activities of each RAA. A higher volume of VOC emissions can be expected under RAA 4 because the soil aeration process, by design, is intended to release the VOCs from the soil to the atmosphere.

Implementability

RAAs 2, 3, and 5 will be roughly equivalent to implement. Each of these RAAs will involve mobilization of construction equipment to the site for the performance of clearing, excavation, staging, and backfilling operations, and the off-site treatment/disposal of the contaminated soil.

Since RAAs 3 and 5 involve off-site commercial biotreatment and soil recycling facilities, it can be reasoned that the RAA that offers more vendors would be more flexible and easier to implement. Baker identified more soil recycling facilities than biotreatment facilities that service the Camp Lejeune area. Consequently, RAA 5 (Source Removal and Off-Site Soil recycling) was evaluated as easier to implement than RAA 3 (Source Removal and Off-Site Biotreatment).

RAAs 4 and 6 involve on-site treatment and disposal which will be more difficult to implement because more on-site activities will be involved. A staging area will need to be constructed for each RAA to provide a location where the excavated soil can be placed to be sampled and segregated as either clean or contaminated and await treatment/disposal. It is reasonable to assume that the staging area for the on-site RAAs 4 and 6 may need to be larger to afford space for on-site treatment activities.

RAAs 2 through 6 will require the construction of a decontamination area for equipment and personnel. All of the anticipated site activities involve standard construction techniques, equipment, and materials and should be relatively easy to implement.

Cost

The estimated costs of alternatives, excluding the No Action alternative, range from approximately $455,000 for RAA 4 (Source Removal and On-Site, Ex-Situ Soil Aeration) to approximately $613,000 for RAA 6 (Source Removal and On-Site Low Temperature Thermal Desorption). Although RAA 4 is estimated to be the lowest cost option it is, along with RAA 2 (Source Removal and Off-Site Landfill Disposal), the alternative most likely to face objections from the USEPA and NC DEHNR. These objections will likely pertain to the designed intention of this alternative to release VOCs from the soil to the atmosphere in an uncontrolled manner. In addition, RAA 4 is the only alternative which involves technology that is not commercially supplied by specialty contractors. It is the option believed to have the best chance of not performing as expected and, therefore, has the highest potential for increased costs. The contingency for RAA 4 at 25 percent is the highest of all of the RAAs which represents an attempt to recognize the uncertainties of this option. The ranking of the alternatives in terms of cost is as follows:

RAA 1:	No Action	$0
RAA 4:	Source Removal and On-Site, Ex-Situ Soil Aeration	$455,304
RAA 2:	Source Removal and Off-Site Landfill Disposal	$527,390
RAA 3:	Source Removal and Off-Site Biotreatment	$558,366
RAA 5:	Source Removal and Off-Site Soil Recycling	$558,366
RAA 6:	Source Removal and On-Site Low Temperature	$613,542

All of the costs shown are capital costs because none of the RAAs have any extended term operation and maintenance activities associated with them. In all cases, the cost of treatment/disposal was the most significant variable. The next most significant variable was the cost of off-site transportation of waste. The cost of transportation and treatment/disposal for all of the RAAs except RAA 4 are based on telephone quotations from commercial vendors specifically for this project. The cost of on-site treatment under RAA 4 is based on the estimated time and equipment required to execute this task rather than a quote from a commercial vendor because a contractor that specializes in providing this technology was not identified.

USEPA/State Acceptance

Neither the USEPA or NC DEHNR is likely to favor RAA 1 - No Action because it will not result in compliance with ARARs.

The USEPA is mandated to favor treatment over disposal alternatives and, therefore, RAA 2 - Source Removal and Off-Site Landfill Disposal will not likely be as acceptable as the other alternatives that feature treatment. The placement of non-hazardous, petroleum contaminated soil in an approved, permitted landfill is a common practice in North Carolina and will likely be acceptable to the NC DEHNR.

RAAs 3 through 6 all involve source removal and either on-site or off-site treatment. In general, the NC DEHNR states its preference is toward remedial actions performed on site. However, the state will accept remedial actions performed at appropriately permitted commercial facilities. Only RAA 4 - Source Removal and On-Site, Ex-Situ Soil Aeration is likely to be confronted with objections by either the USEPA or NC DEHNR. The likely focus of the objections will be that this alternative, by design, allows VOCs to escape to the atmosphere rather than be collected or destroyed as is the case in the other treatment RAAs.

Community Acceptance

To be addressed following public comment.

9.0 SELECTED REMEDY

All of the alternatives, except for RAA 1 - No Action will result in a permanent reduction in toxicity, mobility, and volume of waste at Site 35, comply with ARARs, achieve the TPH remediation goals, and contribute to the overall protection of human health and the environment. In general, alternatives include RAA 3, 5, and 6 are considered roughly technically equivalent overall. Based on estimated costs, RAAs 3 and 5 appear to be more cost effective than RAA 6. RAA 5 (Source Removal and Off-Site Soil Recycling) is the selected alternative in lieu of RAA 3 (Source Removal and Off-Site Biotreatment). The primary reason for selecting RAA 5 over RAA 3 is that more off-site commercial soil recycling facilities service the Camp Lejeune area than off-site commercial biotreatment facilities which should make RAA 5 easier to implement.

Aside from RAA 1 - No Action, the other alternatives which were not selected include RAA 2 - Source Removal and Off-Site Disposal and RAA 4 - Source Removal and On-Site, Ex-Situ Soil Aeration. RAA 2 involves a technology based on the transfer of the contaminated soil from the site where its effects are uncontrolled to a secure, appropriately permitted landfill where environmental impacts are routinely monitored. Unlike RAA 3 through RAA 6, RAA 2 does not include any provision for waste treatment and, therefore, was not selected as one of the preferred alternatives. RAA 4 - Source Removal and On-Site, Ex-Situ Soil Aeration, on the other hand, does involve soil treatment via aeration; a process designed to release volatile contaminants directly to the atmosphere in an uncontrolled manner. The other three treatment oriented RAAs 3, 5, and 6 involve processes whereby the contaminants are biologically metabolized (RAA 3), utilized in the production of basic materials (RAA 5), or physically captured or destroyed (RAA 6). The fact that the contaminants are released to another media (air) rather than being captured or destroyed coupled with a measured degree of uncertainty as to the potential overall effectiveness of soil aeration at this site result in RAA 4 not being selected as the preferred alternative.

Remedy Description

The major components of RAAs 5 include:

- Excavating contaminated soil located above the seasonal high groundwater table which have TPH concentrations exceeding 40 mg/kg via EPA Method 5030/8015 or 160 mg/kg via EPA Method 3550/8015.

- Staging excavated soil on site in piles designated "clean" or "contaminated" for verification sampling and analysis.

- Transporting the contaminated soil off site to a permitted soil recycling facility. Soil recycling refers to a manufacturing process that utilizes petroleum hydrocarbon contaminated soil in the production of bricks..

- Backfilling the excavations with clean fill.

Estimated Costs

The estimated cost of RAA 5 including a breakdown of major cost components, is depicted in Table 9.

No annual O&M costs are associated with RAA 5 since thia alternative would be completed in less than one year. Consequently, the net present worth of RAA 5 is equal to the total capital cost. It is important to note that the cost estimate was calculated for the FS evaluation and should not be considered a construction-quality estimate. An FS cost estimate should have an accuracy of +50 or -30 percent (EPA, 1988).

10.0 STATUTORY DETERMINATIONS

A selected remedy should satisfy the statutory requirements of CERCLA Section 121 which include: (1) be protective of human health and the environment, (2) comply with ARARs, (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 RAA 5 satisfies these requirements for Site 35 is presented below.

Protection of Human Health and the Environment

RAA 5 provides protection to human health and the environment through the removal and off-site/on-site treatment of the contaminated soils exceeding the remediation goal. The potential risks associated with exposure to these soils is eliminated under this alternative.

Compliance With Applicable or Relevant and Appropriate Requirements

RAA 5 will comply with all ARARs.

Cost-Effectiveness

The selected remedy, RAA 5, has been evaluated to be, along with RAA 3, the most cost-effective of the alternatives considered.

TABLE 9

ESTIMATED COST FOR RAA 5
(SOURCE REMOVAL AND OFF-SITE SOIL RECYCLING)
INTERIM RECORD OF DECISION, CTO-0160
SITE 35 - CAMP GEIGER AREA FUEL FARM
MARINE CORPS BASE, CAMP LEJEUNE, NORTH CAROLINA

Cost Component	RAA 5
Site Preparation	$68,600
Soil Excavation/Staging	100,000
Off-Site Hauling/Disposal	178,500
Site Restoration	43,360
Demobilization	7,800
Distributive Costs	63,200
Engineering and Contingencies	96,907
Total Capital Cost	**$558,366**

Source: Baker, 1994. Interim Remedial Action Feasibility Study Report, Operable Unit No. 10, Site 35 - Camp Geiger Area Fuel Farm, Marine Corps Base, Camp Lejeune, North Carolina. Final. Department of the Navy, Atlantic Division, Naval Facilities Engineering Command.

Utilization of Permanent Solutions and Alternative Treatment Technologies

RAA 5 represents a permanent treatment solution. That is, it utilizes, a permanent solution and alternative treatment technology to the maximum extent practicable.

Preference for Treatment as a Principal Element

RAA 5 satisfies the preference for treatment as a principal element since the contaminated soil exceeding the remediation goals will be excavated and treated off site.

11.0 RESPONSIVENESS SUMMARY

Overview

At the time of the public comment period (July 26 through August 26, 1994), the Department of the Navy/Marine Corps had already selected a preferred alternative for the remediation of contaminated soil at Operable Unit No. 10 (Site 35). The preferred alternative specified in the Interim ROD is Source Removal and Off-Site Soil Recycling (RAA 5). This alternative involves the excavation of contaminated soil located above the seasonal high groundwater table and transport to an off-site commercial facility that utilizes the soil for the production of basic materials such as bricks and asphalt.

No written comments were received during the public comment period and, based on the comments received from the audience at the public meeting of July 26, 1994, the public appears to support the preferred alternative. In addition, the EPA Region IV and the NC DEHNR are in support of the preferred alternative. Members of the community who attended the public meeting on July 26, 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 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 Site 35). 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 revised Preliminary Draft Community Relations Plan, August 1993.

- Established two information repositories.

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

- Released PRAP for public review in repositories, June 1994.

- Released public notice announcing public comment and document availability of the PRAP, July 20-26, 1994.

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

- Held public meeting on July 26, 1994, to solicit comments and provide information. Approximately 10 people attended. The public meeting transcript is available in the repositories.

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

As previously mentioned, no comments (written) were received during the public comment period. However, several questions/comments were generated at the July 26, 1994, public meeting. The public meeting was held to discuss the Department of the Navy/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 given below.

Source of Contamination

(1) One member of the audience at the public meeting inquired as to the source(s) of the soil contamination at Site 35.

Navy/Marine Corps Response: The five aboveground storage tanks (ASTs) and associated underground piping which comprise the Fuel Farm at Site 35 appear to be the primary source of the soil contamination. Other sources include the former UST adjacent to Building G480 and various reported surface spills of which little or no documentation is available.

Soil Contamination as a Source of Groundwater Contamination

(1) One member of the audience inquired as to the nature of the subsurface geology at Site 35 and whether the soil contamination identified to date had been determined to be a potential source of groundwater contamination.

Navy/Marine Corps Response: The shallow subsurface geology at Site 35 consists of a layer of sand that extends from the ground surface to a depth of 35 to 40 feet below the ground surface (bgs). The water table aquifer is typically encountered at six feet or less bgs. Underlying the sand is a five to 10 feet thick zone of less permeable finer grained material

which may serve as an aquitard. This zone appears to be similar to the zone which has been encountered at other Camp Lejeune sites and has been used to demarcate the upper portion of the Castle Hayne aquifer. The Castle Hayne aquifer is the principle potable water supply aquifer at Camp Lejeune.

Based on data obtained to date from Site 35, contamination is present in the shallow water table aquifer. The source of this contamination appears to be past discharges from the Fuel Farm ASTs, associated underground piping, and the UST adjacent to Building G480. The nature and extent of soil contamination identified to date is such that it is unlikely to be a significant contributor to future additional contamination of site groundwater. The determination of the nature and extent of groundwater contamination is an objective of the comprehensive RI/FS currently ongoing at Site 35. This study will also determine whether groundwater contamination has extended to the Castle Hayne aquifer.

Interim Versus Comprehensive RI/FS

(1) One member of the audience requested an explanation as to the purpose of the Interim versus comprehensive RI/FS.

Navy/Marine Corps' Response: The Interim RI/FS was focused strictly on soil contamination at Site 35 along the area bounded by Brinson Creek to the east, "E" Street to the West, Second Street to the north and, Fourth Street to the south. This is the area through Site 35 that the North Carolina Department of Transportation has proposed for the construction of a new four-lane divided highway. The remediation of contaminated soil in this area was deemed necessary to reduce the environmental impact to Brinson Creek and to facilitate the construction of the new highway. Concurrent with the Interim study, a comprehensive RI/FS was initiated to focus on other media such as groundwater, sediment, and surface water as well as potentially contaminated soil outside of the area investigated under the Interim RI/FS.

Remediation

(1) One member of the audience inquired as to Interim Remedial Action bidding process and to the identity of the remediation contractor.

Navy/Marine Corps Response: Baker Environmental, Inc., is responsible for this project through the completion of the remedial design which includes the preparation of plans and specifications. Remediation services at Camp Lejeune are procured under a separate contract. The remediation contractor is OHM Remediation Services Corporation of Findlay, Ohio, which is responsible for all subcontracts required to execute the remediation.

Appendix A
Transcript: Public Meeting, July 26, 1994

PUBLIC HEARING

ON THE

PROPOSED CLEANUP PLAN

CAMP GEIGER AREA FUEL FARM
MARINE CORPS BASE CAMP LEJEUNE
SITE 35 - OPERABLE UNIT NO. 10
JACKSONVILLE, NORTH CAROLINA

JULY 26, 1994

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

REPORTED BY: JAMES A. PALMER, CCR

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

(919) 763-0576

COPY

FORM LASER BOND A PENGAD/INDY 1-800-631-6989

APPEARANCES

DANIEL E. BONK, P.E., PROJECT MANAGER

RAYMOND WATTRAS

BAKER ENVIRONMENTAL, INC.
AIRPORT OFFICE PARK, BUILDING 3
420 ROUSER ROAD
CARAOPOLS, PENNSYLVANIA 15108
(412) 269-6000

FORM LASER BOND A PENGAD/INDY 1-800-631-6989

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NEAL PAUL:	4
RAYMOND WATTRAS:	5

FORM LASER BOND A PENGAD/INDY 1-800-631-6989

1 P R O C E E D I N G S 7:24 P.M.

2 MR. BONK: GOOD EVENING. I WOULD LIKE
3 TO--CAN YOU HEAR ME? I WOULD LIKE TO WELCOME EVERYONE TO THE
4 PUBLIC MEETING FOR OUR PROPOSED REMEDIAL ACTION PLAN FOR
5 OPERABLE UNIT 10, OR SITE 35, CAMP GEIGER FUEL FARM.
6 I WOULD LIKE TO MAKE SOME INTRODUCTIONS. MY NAME IS
7 NEAL PAUL AND I'M EMPLOYED HERE BY THE BASE. I'M DIRECTOR OF
8 THE INSTALLATION-RESTORATION DIVISION. MR. WALT HAVEN, WHO IS
9 THE GEOLOGIST WHO WORKS FOR ME IS ALSO HERE. MR. RAY WATTRAS,
10 WHO IS THE PROGRAM MANAGER FOR BAKER ENVIRONMENTAL, OUR
11 CONSULTANT, IS ALSO HERE; MS. KATE LANDMAN, WHO IS THE REMEDIAL
12 PROJECT MANAGER FROM THE ATLANTA DIVISION OF NAFEC IS HERE; MR.
13 DAN BONK FROM BAKER, MR. TOM BIKSEY, ALSO FROM BAKER; AND OUR
14 OTHER REMEDIAL PROJECT MANAGER, LINDA BERRY; AND LAST BUT NOT
15 LEAST, OUR REGULATORS MR. PATRICK WATTERS FROM THE STATE OF
16 NORTH CAROLINA; MS. GEENA TOWNSEND FROM EPA REGION 4.
17 THE PURPOSE OF THIS MEETING IS REALLY JUST TO
18 DISSEMINATE SOME INFORMATION ON WHAT OUR PLANS ARE IN CLEANING
19 UP THIS SITE. JUST TO LET EVERYONE KNOW, THE HIGHWAY 17 BYPASS
20 THAT HAS BEEN MUCH TALKED ABOUT IN EASTERN NORTH CAROLINA IN THE
21 LAST YEAR IS GOING TO COME DIRECTLY OVER TOP OF THIS SITE. THIS
22 IS GOING TO BE AN INTERIM REMEDIAL ACTION AND NOT THE FINAL
23 REMEDIAL ACTION OF THIS SITE TO FACILITATE THAT HIGHWAY AND
24 PRECLUDE ANY DELAYS THAT MAY--THAT WOULD HAVE PROBABLY
25 ACCOMPANIED IT HAD WE NOT TAKEN THIS REMEDIAL ACTION.

FORM LASER BOND A PENGAD/INDY 1-800-631-6989

1 MR. RAY WATTRAS FROM BAKER WILL BE PRESENTING THE SITE
2 SPECIFICS ON THE REMEDIAL ACTION PLAN. RAY?
3 MR. WATTRAS: THANK YOU, NEAL.
4 MR. PAUL: I FORGOT TO SAY ONE OTHER
5 THING. THE PUBLIC COMMENT PERIOD WILL BEGIN TODAY AND END
6 AUGUST 26 OF 1994. THE PROPOSED REMEDIAL ACTION PLAN IS IN WALT
7 AND MYSELF'S OFFICE, WHICH IS BUILDING 67 ABOARD THE BASE. TO
8 ACCESS IT, IT WOULD PROBABLY BE GOOD TO GIVE US A CALL AT
9 451-5068, OR THE ONSLOW COUNTY LIBRARY SHOULD HAVE THE COMPLETE
10 ADMINISTRATIVE RECORD. SO, MR. WATTRAS WILL NOW PRESENT THE
11 PROPOSED PLAN.
12 MR. WATTRAS: THANK YOU VERY MUCH AND THANK
13 YOU FOR COMING TONIGHT. WE ARE GLAD TO HAVE YOU HERE. DURING
14 MY DISCUSSION, AS NEAL MENTIONED, WE ARE GOING TO TALK ABOUT
15 SITE 35 AT CAMP LEJEUNE. IT'S CALLED THE CAMP GEIGER FUEL DUMP.
16 DURING MY DISCUSSION FEEL FREE TO INTERRUPT ME IF YOU
17 HAVE ANY QUESTIONS. IF I SAY SOMETHING YOU DON'T QUITE
18 UNDERSTAND, DON'T HESITATE. WE WOULD ASK, IF YOU DO HAVE A
19 QUESTION, FOR PURPOSES OF RECORDING IT, STATE YOUR NAME AND THEN
20 PROVIDE YOUR QUESTION.
21 IF YOU DON'T FEEL LIKE ASKING A QUESTION DURING THE
22 MEETING HERE, AFTERWARDS COME UP TO US. ASK US ANY QUESTIONS
23 THAT YOU WOULD LIKE; WRITE QUESTIONS ON A SLIP OF PAPER AND WE
24 WILL SEE THAT YOU GET AN ANSWER.
25 SITE 35, AS I MENTIONED, IS CALLED THE CAMP GEIGER

FORM LASER BOND A PENGAD/INDY 1-800-631-6989

1 FUEL FARM. THIS SITE HAS BEEN STUDIED FOR A NUMBER OF YEARS.
2 PREVIOUS INVESTIGATIONS HAVE IDENTIFIED SOIL CONTAMINATED WITH
3 PETROLEUM PRODUCTS. IT HAS BEEN DETERMINED THAT THE SOIL
4 CONTAMINATION DOES NOT PRESENT A SIGNIFICANT HEALTH RISK OR
5 ENVIRONMENTAL RISK, PRIMARILY BECAUSE MOST OF THE CONTAMINATION
6 IS BELOW THE SUBSURFACE, WHICH WE WILL GET INTO LATER ON. THIS
7 CLEANUP ACTION, THOUGH, IS GOING TO FOCUS ON THIS PETROLEUM
8 CONTAMINATION.
9 ALTHOUGH THE CONTAMINANT LEVELS DON'T POSE ANY REAL OR
10 SIGNIFICANT RISK TO THE PEOPLE THAT WORK OUT THERE OR TO THE
11 ENVIRONMENT IN THE AREA, THERE ARE LEVELS OF PETROLEUM
12 HYDROCARBONS WHICH EXCEED STATE STANDARDS. AND AS NEAL
13 MENTIONED, THE HIGHWAY THAT IS TO BE BUILT IN THE AREA WILL BE
14 COMING RIGHT THROUGH THAT AREA. BEFORE THEY CAN BUILD THAT, WE
15 NEED TO GO IN THERE AND REMEDIATE THAT SOIL, OR CLEAN THAT SOIL
16 UP.
17 AND SITE 35 IS LOCATED UP AT CAMP GEIGER. CAMP
18 GEIGER, IF YOU DON'T KNOW WHERE IT IS, IT'S LOCATED RIGHT ALONG
19 ROUTE 17, SOUTH OF JACKSONVILLE. THE SITE, ITSELF, REFERS TO
20 FIVE 15,000 GALLON ABOVE-GROUND STORAGE TANKS WHICH HAVE BEEN IN
21 OPERATION SINCE BACK IN 1945 WHEN THE FUEL FACILITY WAS FIRST
22 BUILT. AND THESE ABOVE-GROUND STORAGE TANKS HOLD PETROLEUM
23 PRODUCTS SUCH AS HEATING FUEL, DIESEL FUEL AND GASOLINE.
24 AS I MENTIONED BEFORE, THE SITE IS LOCATED JUST SOUTH
25 OF JACKSONVILLE, RIGHT UP HERE. THESE ARE THE FIVE ABOVE-GROUND

FORM LASER BOND A PENGAD/INDY 1-800-631-6989

1 STORAGE TANKS. BENEATH THIS AREA, THERE IS PIPING THROUGHOUT.
2 PIPING GOING TO VARIOUS DISPENSING BUILDINGS. THERE ARE SOME
3 UNDERGROUND STORAGE TANKS IN THE AREA THAT PIPING LEADS TO.
4 THERE HAVE BEEN VARIOUS REPORTS OF SPILLS DATING BACK
5 TO 1950. SPILLS OCCUR IN A VARIETY OF WAYS. SOMETIMES BY
6 FILLING UP THE TANKS AND OVERFLOWS. YOU CAN HAVE SPILLAGE THAT
7 WAY. OTHER TIMES YOU HAVE PIPES THAT MAY LEAK AND YOU CAN HAVE
8 REPORTED LOSS OF PETROLEUM PRODUCT IN THAT MANNER.
9 IN SOME CASES DUE TO THE AMOUNT OF FUEL LEAKING OR
10 SPILLING FROM THE FACILITY, THEY ACTUALLY HAD TO EXCAVATE
11 TRENCHES TO COLLECT THE FUEL, AND THEY WOULD ALSO REMOVE ANY OF
12 THE CONTAMINATED SOIL FROM THE TRENCH AREA.
13 I MENTIONED BEFORE THERE HAVE BEEN QUITE A NUMBER OF
14 INVESTIGATIONS CONDUCTED, DATING BACK TO 1983. MOST OF THESE
15 INVESTIGATIONS HAVE BEEN INVOLVED WITH THIS FUEL FACILITY.
16 THE HIGHWAY IS PROPOSED TO BE BUILT IN THE SUMMER OF
17 1995. AND BEFORE THAT HIGHWAY CAN BE PUT IN, A NUMBER OF
18 BUILDINGS HAVE TO BE TAKEN DOWN; AND, ALSO, THE FUEL FARM,
19 ITSELF. AND THAT IS BEING SCHEDULED FOR DECEMBER OF THIS YEAR.
20 THE STUDIES CONDUCTED TO DATE HAVE IDENTIFIED A FEW
21 AREAS OF SOIL CONTAMINATION WITH PETROLEUM PRODUCT. IN
22 ADDITION, BY PUTTING IN MONITORING WELLS, THEY HAVE IDENTIFIED
23 PLUMES OF PETROLEUM SOLVENTS, OR PETROLEUM PRODUCTS IN
24 GROUNDWATER AS WELL AS SOLVENTS IN GROUNDWATER. THE SOLVENTS
25 WERE NOT EXPECTED. TYPICALLY FROM A FUEL FACILITY, YOU EXPECT

FORM LASER BOND A PENGAD/INDY 1-800-631-6989

1 TO FIND CONTAMINANTS ASSOCIATED WITH GASOLINE AND DIESEL. BUT
2 IN THE INVESTIGATIONS, THEY ALSO HAD CONTAMINANTS IN GROUNDWATER
3 SUCH AS TRICHLOROETHANE WHICH IS A SOLVENT.
4 ALSO MENTIONED, TO DATE, THE PREVIOUS INVESTIGATIONS
5 THAT WERE CONDUCTED REALLY DIDN'T ANALYZE FOR SOLVENTS IN SOIL.
6 BECAUSE OF THE FACT THAT THEY ARE DEALING WITH A FUEL FACILITY,
7 THE LOGICAL APPROACH IS TO LOOK FOR THINGS THAT YOU WOULD
8 ASSOCIATE WITH FUEL SUCH AS PETROLEUM HYDROCARBONS, BENZINE,
9 XYLENES AND OTHER CONTAMINANTS LIKE THAT.
10 TO POINT OUT A COUPLE OF THINGS ON THIS FIGURE HERE.
11 THESE ARE THE GROUNDWATER PLUMES THAT I'VE JUST MENTIONED.
12 RIGHT HERE IN THIS GRAY AREA ARE THE FIVE ABOVE-GROUND STORAGE
13 TANKS. THE AREA OUTLINED IN GREEN IS A GROUNDWATER PROBLEM,
14 SHALLOW GROUNDWATER PROBLEM, WHICH IS CONTAMINATED WITH
15 PETROLEUM HYDROCARBONS. WE HAVE ONE FROM THIS FUEL FACILITY AND
16 ONE FROM ANOTHER AREA UP IN THIS AREA. NOW, THERE IS A SMALL
17 FUEL OIL TANK RIGHT HERE THAT WE'RE LOOKING AT.
18 THE OTHER BOUNDARY THAT YOU WILL SEE ON HERE IS THE
19 SOLVENTS THAT SHOWED UP IN GROUNDWATER. THERE WAS A SMALL
20 PLUME IDENTIFIED DOWN IN THIS AREA, A LARGER ONE COMING FROM
21 THIS AREA, AND A THIRD ONE SOUTH OF THE SITE.
22 LET ME BACK UP ONE SLIDE. BRINSON CREEK IS LOCATED
23 JUST TO THE EAST OF THIS SITE. AND AS YOU KNOW, BRINSON CREEK
24 GOES ALL THE WAY UP TO ROUTE 17 AND THE HEADWATERS ARE ACTUALLY
25 JUST BEYOND ROUTE 17. AND THIS IS A PICTURE OF BRINSON CREEK.

FORM LASER BOND A PENGAD/INDY 1-800-631-6989

1 ONE OTHER THING THAT I WOULD LIKE TO MENTION. WE'RE
2 TALKING TONIGHT ABOUT SOIL CONTAMINATION AND WHAT WE'RE GOING TO
3 DO TO CLEAN IT UP. WE ARE ALSO INVOLVED WITH ANOTHER STUDY. WE
4 ARE LOOKING AT THE GROUNDWATER JUST NOW. IT'S JUST THAT WE'RE
5 FAST-TRACKING THE SOIL TO, NUMBER ONE, DO SOMETHING ABOUT IT;
6 AND NUMBER 2, TO DO SOMETHING ABOUT IT IN TIME FOR THE HIGHWAY
7 TO COME THROUGH. SO, WE ARE LOOKING AT THE GROUNDWATER. WE
8 JUST COMPLETED OUR FIELD INVESTIGATION BACK IN JUNE.
9 IS THAT RIGHT, DAN?
10 MR. BONK: YES.
11 MR. WATTRAS: AND WE ALSO LOOKED AT THE
12 SURFACE DOWN IN BRINSON CREEK. WE LOOKED AT SURFACE WATER AND
13 SEDIMENTS, AS WELL AS THE AQUATIC WILD LIFE.
14 THE STUDY THAT I WAS JUST TALKING ABOUT, WE BEGAN IN
15 1993, AND WE JUST GOT OUT OF THE FIELD IN JUNE OF 1994. PART OF
16 THIS STUDY FOCUSED JUST ON CONTAMINATED SOIL. NOW, THERE ARE A
17 LOT OF STUDIES DONE TO DATE. WE LOOKED AT THAT INFORMATION.
18 IT'S GOOD INFORMATION, BUT WE FELT IN ORDER TO DO AN ENGINEERING
19 STUDY, THERE WERE STILL A FEW PIECES OF INFORMATION THAT WE
20 WOULD LIKE TO HAVE; SO, WE CONDUCTED A LIMITED INVESTIGATION.
21 WE ONLY NEEDED ABOUT SEVEN SHALLOW SOIL BORINGS, AND WE
22 COLLECTED ABOUT 13 SURFACE SOIL SAMPLES. WE WANTED TO TAKE A
23 LOOK AT WHAT IS ON THE SURFACE BECAUSE ONE OF THE THINGS WE HAVE
24 TO LOOK AT ARE IMPACTS TO HUMAN HEALTH. AND WE DID A SMALL
25 TRENCH EXCAVATION.

FORM LASER BOND A PENGAD/INDY 1-800-631-6989

1 THE RESULTS PRETTY MUCH CONFIRMED THE PREVIOUS
2 INVESTIGATIONS. THEY DID SUPPLEMENT THE INVESTIGATIONS FROM THE
3 STANDPOINT OF WHAT WE WERE REALLY TRYING TO DO, IS GET A BETTER
4 HANDLE ON THE EXTENT OF CONTAMINATION. THAT'S IMPORTANT,
5 OBVIOUSLY, IN THE ENGINEERING SIDE OF THINGS. WHEN YOU GO TO
6 CLEAN IT UP, YOU WANT TO HAVE A PRETTY GOOD IDEA OF HOW MUCH
7 SOIL WAS CONTAMINATED AND SO FORTH.
8 SO, WE DID IDENTIFY THE FOUR AREAS AND WE HAVE A
9 PRETTY GOOD FEEL FOR THE EXTENT OF THAT SOIL CONTAMINATION. I
10 WOULD LIKE TO POINT OUT, TOO, THAT MOST OF THE SOIL
11 CONTAMINATION IS BELOW THE SURFACE AT ABOUT THREE TO SIX FEET.
12 BASED ON OUR RESULTS--AND WE LOOK AT IT FROM THE
13 STANDPOINT OF THE PEOPLE THAT WORK THERE. WE ALSO LOOK AT IT
14 FROM THE STANDPOINT THE CONSTRUCTION WORKERS WILL BE DIGGING
15 THIS SOIL UP. BASED ON THE LEVELS OF CONTAMINATION, WE LOOKED
16 AT THOSE EXPOSURE SCENARIOS AND DETERMINED THAT THERE WOULD BE
17 NO REAL SIGNIFICANT HUMAN HEALTH RISK.
18 THE THING THAT IS CLEANING UP THIS ACTION, AS I
19 MENTIONED BEFORE, IS PRIMARILY RELATED TO THE STATE GUIDELINES
20 FOR TPH. ONCE THE CONTRACTOR COMES IN TO PUT THE HIGHWAY IN, IF
21 THAT CONTRACTOR WOULD RUN INTO SOIL CONTAMINATED WITH PETROLEUM
22 PRODUCTS, THEY WOULD HAVE TO DISPOSE OF IT PROPERLY AND THEY
23 WOULD HAVE TO CLEAN UP TO A LEVEL THAT WOULD MEET THE STATE
24 GUIDELINES. THAT'S WHY WE'RE DOING THIS, TO GET RID OF THAT SO
25 THAT THEY DON'T RUN INTO ANY OBSTACLES PUTTING THAT HIGHWAY IN.

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1 THIS IS JUST A PICTURE OF THE TRENCH THAT WE DUG
2 THROUGH THERE. THE PURPOSE OF THAT TRENCH WAS REALLY TO GET A
3 FEEL FOR--IF THEY START DIGGING, MEANING EXCAVATION OF THE
4 HIGHWAY, WE DIDN'T WANT ANY SURPRISES SUCH AS PRODUCT FLOWING
5 INTO AN EXCAVATION. SO, WE DECIDED TO PUT A TRENCH ABOUT, I
6 GUESS--DAN, HOW LONG WAS THAT TRENCH, ABOUT 100 YARDS OR SO, OR
7 LONGER?
8 MR. BONK: NO, IT WAS LONGER. MAYBE SIX
9 OR SEVEN-HUNDRED FEET.
10 MR. WATTRAS: AND IT WENT DOWN ABOUT WHAT,
11 A FOOT AND A HALF, TWO FEET?
12 MR. BONK: ABOUT TWO FEET. AND IT WAS
13 PURPOSELY PUT INTO A LOW AREA WITH THE THINKING THAT ANY
14 CONTAMINATION WOULD HAVE FLOWED FROM THE HIGHER ELEVATIONS TO
15 THE LOWER ELEVATIONS. SO, IT WAS IN THE MOST LIKELY POSITION.
16 IT WAS VERY CLOSE TO THE GROUNDWATER. WE JUST WANTED TO GET A
17 LONG LOOK AT THE AREA.
18 MR. WATTRAS: AGAIN, BASED ON OUR
19 EXPERIENCE AT OTHER SIMILAR SITES--WE RAN INTO A SITUATION ONE
20 TIME WHERE A CONTRACTOR STARTED TO DIG A TRENCH, OR STARTED TO
21 EXCAVATE, AND CAME BACK THE NEXT MORNING AND IT WAS FILLED UP
22 WITH PRODUCT. SO, WE SAID AHEAD OF TIME, LET'S SEE WHAT HAPPENS
23 WITH DIGGING A TRENCH. AND THAT'S THE SOLE PURPOSE OF PUTTING
24 THIS TRENCH IN, IS TO ELIMINATE ANY SURPRISES DOWN THE ROAD.
25 MS. WOOD: WHERE IS THE WATER TABLE

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1 THERE?

2 MR. WATTRAS: PARDON ME?

3 MS. WOOD: WHERE IS THE WATER TABLE

4 THERE?

5 MR. WATTRAS: THE WATER TABLE IS ABOUT SIX

6 TO SEVEN FEET, DAN?

7 MR. BONK: OVER MOST OF THE SITE THE

8 WATER TABLE IS ABOUT SIX TO SEVEN FEET BELOW THE GROUND SURFACE.

9 BUT THERE ARE TWO--BASICALLY TWO LAYERS TO OUR SITE WITH THE

10 FLAT PORTION WHERE THE TANKS ARE LOCATED, THE GROUNDWATER IS

11 ABOUT SIX OR SEVEN FEET DOWN, AND THEN IT DROPS OFF TOWARDS THE

12 CREEK. SO, BASICALLY, THE GROUND WATER MEETS THE CREEK AT THAT

13 POINT. SO, IN BETWEEN, YOU MAY BE THREE FEET, OR TWO FEET, OR

14 WHATEVER.

15 MR. WATTRAS: OKAY. THE CLEANUP GOALS THAT

16 WE ESTABLISHED WERE BASED ON A SITE SENSITIVITY EVALUATION. IT

17 IS A CHECK LIST, IT IS A FORM THAT YOU FILL OUT, IT IS A NORTH

18 CAROLINA ACTION LEVEL. AND IT TAKES INTO CONSIDERATION SUCH

19 THINGS AS THE DEPTH OF THE GROUNDWATER, LOCAL POPULATION. AND

20 YOU FILL OUT INFORMATION ON THIS FORM AND IT CALCULATES AN

21 ACTION LEVEL THAT THEY WOULD LIKE YOU TO CLEAN UP TO.

22 IN OUR CASE, WE'RE LOOKING AT TPH, WE LOOKED AT TWO

23 ACTION LEVELS: ONE THAT WOULD BE ASSOCIATED WITH THE LIGHTER

24 COMPOUND SUCH AS GASOLINE. AND THAT'S GOING TO BE 40 PARTS PER

25 MILLION. THE OTHER ACTION LEVEL INVOLVES A TPH ANALYSIS THAT

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1 LOOKS AT DIESEL, AND THAT'S A LITTLE BIT MORE OF A HEAVIER FUEL.
2 AND THAT ACTION LEVEL IS ROUGHLY 150 PARTS PER MILLION.
3 I BELIEVE THIS FIGURE THAT'S HERE THAT'S UP ON THIS
4 SLIDE IS THE SAME ONE THAT'S PRINTED UP ON THE POSTERS. SO, IF
5 YOU CAN'T READ IT, MAYBE LATER ON YOU WOULD LIKE TO TAKE A LOOK
6 AT THAT POSTER AND WE CAN DISCUSS IT.
7 THERE ARE FOUR AREAS THAT WILL BE EXCAVATED. THE ONE
8 OBVIOUS AREA IS RIGHT BELOW THE ABOVE-GROUND STORAGE TANKS.
9 ALTHOUGH NO SAMPLES WERE TAKEN RIGHT BELOW THESE TANKS, RIGHT
10 NOW THERE IS A CONCRETE LAYER THAT YOU REALLY WOULD HAVE TO BUST
11 UP TO GET TO, WE ASSUME WITH PIPING, THAT ONCE THEY REMOVE THOSE
12 TANKS, THERE IS PROBABLY GOING TO BE STAINED SOILS AND PETROLEUM
13 CONTAMINATED SOILS. THAT'S BASED ON EXPERIENCE. ON A LOT OF
14 TANK SITES, THAT'S WHAT YOU FIND WHEN YOU PULL THEM. SO, WE
15 ASSUME RIGHT NOW THERE WILL BE SOME SOIL THAT WILL NEED TO BE
16 TAKEN OUT WHEN THEY DISMANTLE THIS FACILITY.
17 TWO OTHER AREAS ARE LOCATED NORTH OF HERE. ONE IS UP
18 JUST NORTH OF THIS SITE, AND ANOTHER ONE TO THE NORTHWEST OF
19 THIS SITE. AND THEN THERE IS THE THIRD AREA. I MENTIONED
20 BRIEFLY BEFORE THAT THERE WAS AN UNDERGROUND STORAGE TANK THAT
21 CONTAINED FUEL OIL. BASED ON OUR SOIL RESULTS, THERE IS SOME
22 SOIL CONTAMINATION HERE.
23 YOU MIGHT BE ABLE TO SEE IT ON HERE. THIS IS THE
24 LOCATION OF THE FOUR-LANE HIGHWAY GOING THROUGH. SO, IT IS
25 COMING RIGHT THROUGH THE CENTER OF THE SITE.

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1 AGAIN, THE SOIL, WE ARE GOING TO HAVE TO EXCAVATE
2 ABOUT TWO TO THREE FEET OF CLEAN SOIL, STOCKPILE IT IN A CERTAIN
3 AREA, THEN GET THE CONTAMINATED SOIL. WE WILL EXCAVATE DOWN
4 PROBABLY JUST TO THE TOP OF THE WATER TABLE, AND THEN IT WOULD
5 BE BACKFILLED WITH CLEAN SOIL AGAIN.
6 WE LOOKED AT SIX ALTERNATIVES IN DEALING WITH THIS
7 PROBLEM. ONE ALTERNATIVE THAT WE ALWAYS CONSIDER IS THE
8 NO-ACTION ALTERNATIVE. THAT MEANS DO NOTHING. THAT'S ALWAYS AN
9 ALTERNATIVE. SOMETIMES YOU END UP NOT DOING ANYTHING AT A SITE
10 BECAUSE AFTER STUDYING IT, YOU FIND OUT THAT THERE IS REALLY NO
11 IMPACT OF THE PROBLEM. BUT NO ACTION IS ALSO USED AS A BASELINE
12 TO MEASURE THE OTHER ALTERNATIVES.
13 THE SECOND ALTERNATIVE WOULD INVOLVE THE REMOVAL OF
14 THE CONTAMINATED SOIL AND WE WOULD TAKE IT TO AN OFF-SITE
15 LANDFILL THAT WOULD BE PERMITTED TO ACCEPT PETROLEUM WASTE.
16 THE THIRD ALTERNATIVE INVOLVES EXCAVATION OF THE SOIL
17 IN TAKING IT OFF SITE TO A BIOTREATMENT FACILITY. HERE THAT
18 FACILITY WOULD TAKE IT. IT PROBABLY WOULD INVOLVE LAND FARMING
19 WHERE OVER TIME THOSE PETROLEUM LEVELS WOULD DEGRADE.
20 THE FOURTH ALTERNATIVE INVOLVES EXCAVATION OF THE
21 SOILS IN WHAT'S CALLED SOIL AERATION. SOIL AERATION IS SIMPLY
22 WHEN YOU EXCAVATE OR YOU LIFT THE SOIL UP AND YOU AERATE IT.
23 YOU DROP IT, YOU PICK IT UP AGAIN, YOU MOVE IT AROUND AND IT
24 VOLATILIZES OUT OF THE SOIL. IT COULD EITHER VOLATILIZE
25 DIRECTLY TO THE ATMOSPHERE, OR IT COULD BE COLLECTED IN HOODS

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1 THAT CAPTURE THESE CONTAMINANTS.

2 THE FIFTH ALTERNATIVE INVOLVES SOURCE REMOVAL AND
3 OFF-SITE SOIL RECYCLING. THERE ARE A NUMBER OF FACILITIES IN
4 THIS GENERAL AREA THAT WOULD RECYCLE THIS TYPE OF MATERIAL.
5 THEY COULD MAKE IT INTO ASPHALT OR INTO BRICKS.

6 AND THE SIXTH ALTERNATIVE INVOLVES EXCAVATION AND
7 ON-SITE THERMAL DESORPTION, WHICH IS ESSENTIALLY LIKE BAKING THE
8 SOIL. IT BAKES IT TO A TEMPERATURE WHERE IT WOULD NOT TURN INTO
9 ASH, BUT IT VOLATILIZES OUT THE CONTAMINANTS. AND THEN THAT
10 SOIL WOULD BE USED AS BACKFILL.

11 THESE ALTERNATIVES RANGED ANYWHERE FROM ZERO, IF WE DO
12 NOTHING, ALL THE WAY TO ABOUT SIX-HUNDRED-THOUSAND DOLLARS. YOU
13 NOTICE, OTHER THAN THE NO ACTION ALTERNATIVE, THE LEAST
14 EXPENSIVE IS ALTERNATIVE NUMBER FOUR, WHICH I MENTIONED IS THE
15 SOIL AERATION ALTERNATIVE. THAT ONE ALSO HAS THE HIGHEST RISK
16 INVOLVED. BECAUSE OF THE TIME FRAME INVOLVED HERE, WE DID NOT
17 PERFORM ANY TREATABILITY STUDIES TO SEE BY AERATING THE SOIL CAN
18 WE GET DOWN TO THE ACTION LEVELS THAT THE STATE WOULD LIKE US TO
19 GET DOWN TO. IF WE DON'T GET DOWN TO THE ACTION LEVELS, THAT
20 MEANS ONE THING. YOU KEEP AERATING IT, WHICH MEANS TIME, AND
21 TIME MEANS MONEY; SO, THERE IS A LOT OF RISK IN THAT
22 ALTERNATIVE.

23 THE SECOND LEAST EXPENSIVE ALTERNATIVE IS ALTERNATIVE
24 NUMBER TWO WHERE WE WOULD SIMPLY EXCAVATE IT AND TAKE IT OFF TO
25 A LANDFILL. THAT ALTERNATIVE IS NOT MUCH CHEAPER OR EXPENSIVE

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1 AS SOME OF THE OTHERS. AND WITHOUT TREATING IT, IT'S NOT--IT'S
2 ACCEPTABLE BUT IT'S NOT THE PREFERRED ALTERNATIVE, ESPECIALLY
3 WHEN THERE ARE OTHER ALTERNATIVES WITHIN A CLOSE RANGE OF MONEY
4 HERE THAT WOULD ACTUALLY TREAT THE SOIL.
5 THE OTHER TWO ALTERNATIVES, TAKING IT TO AN OFF-SITE
6 BIOREMEDIATION FIRM, AND ALTERNATIVE NUMBER FIVE, RECYCLING,
7 WERE PRETTY MUCH THE SAME COST. AND FINALLY, THE LAST AND THE
8 MOST EXPENSIVE ALTERNATIVE ENDED UP BEING THE THERMAL DESORPTION
9 ALTERNATIVE.
10 THE ALTERNATIVE BEING PROPOSED BY THE NAVY MARINE
11 CORPS IS ALTERNATIVE NUMBER FIVE. THIS WOULD INVOLVE EXCAVATION
12 OF THE SOIL AND TAKING IT TO AN OFF-SITE SOIL RECYCLING
13 FACILITY. BECAUSE THERE ARE A NUMBER OF FACILITIES IN THIS
14 AREA, WE FELT WE WOULD BE ABLE TO GET COMPETITIVE BIDS WHICH
15 COULD POSSIBLY EVEN DECREASE THE COST OF THIS ALTERNATIVE. BUT
16 SOIL RECYCLING IS AN ACCEPTABLE ALTERNATIVE. PETROLEUM
17 CONTAMINATED SOILS ARE USED A LOT IN ASPHALT PRODUCTION AND
18 BRICK BAKING.
19 I BELIEVE THAT'S OUR PRESENTATION. I WOULD LIKE TO
20 ENTERTAIN ANY QUESTIONS RIGHT NOW.
21 MS. WOOD: WHERE DO YOU BELIEVE THE
22 CONTAMINATION CAME FROM?
23 MR. WATTRAS: WE ALL BELIEVE IT CAME FROM
24 AN UNDERGROUND STORAGE TANK. OUR RECORDS INDICATE THAT ALL THE
25 UNDERGROUND STORAGE TANKS IN THE AREA ARE RELATED TO PETROLEUM

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1 FUELS AND SO FORTH. THERE ARE A NUMBER OF MAINTENANCE
2 FACILITIES IN THE AREA. AND WITH ANY MAINTENANCE FACILITY, YOU
3 HAVE DEGREASING OPERATIONS. AND IT IS LIKELY THAT OVER THE
4 YEARS SMALL SPILLS HAVE OCCURRED. THAT'S WHAT WE'RE LOOKING AT
5 RIGHT NOW. AND AS PART OF THE COMPREHENSIVE STUDY, WE ARE
6 LOOKING AT GROUND WATER IN BRINSON CREEK. WE'VE TAKEN A NUMBER
7 OF SOIL SAMPLES FROM DIFFERENT AREAS AND ANALYZED THEM FROM
8 SOLVENT CONSTITUENTS TO FIND OUT WHERE THE SOURCE MIGHT BE.
9 NOW, I KNOW FROM EXPERIENCE DOWN HERE AT CAMP LEJEUNE,
10 A LOT OF THESE SPILLS OCCURRED SUCH A LONG TIME AGO THROUGHOUT
11 THE YEARS, I WOULD NOT BE SURPRISED--BECAUSE WE'VE SEEN THIS AT
12 OTHER SITES--THAT IT MIGHT NOT BE IN THE SOIL MATRIX ANY MORE.
13 THROUGH THIRTY-FORTY YEARS OF OPERATIONS AND INFILTRATION OF
14 RAIN AND SO FORTH, IN THOSE TYPES OF SOLVENTS ARE VERY--THEY
15 MIGRATE VERY RAPIDLY IN THE ENVIRONMENT. THEY COULD HAVE BEEN
16 WASHED RIGHT DOWN TO THE WATER TABLE. SO, THEY MAY NO LONGER BE
17 IN THE SOIL, BUT THEY ARE JUST SITTING IN THE GROUND WATER.
18 MS. WOOD: WELL, WHAT IS THE LAND
19 STRUCTURE DOWN HERE? ARE YOU NOT WORRIED ABOUT YOUR AQUIFER?
20 MR. WATTRAS: WE HAVE A PRETTY GOOD PICTURE
21 OF IT. AT ABOUT 35 TO 40 FEET THERE IS A SEMI-CONFINING CLAY
22 LAYER, DAN, WOULD YOU SAY?
23 MR. BONK: IN GENERAL WE SEE THE TYPICAL
24 SAND MATERIAL THAT YOU WOULD PICK UP EVEN OUTSIDE HERE FOR ABOUT
25 35 TO 40 FEET. THEN WE HAVE--BETWEEN 40 AND 45 FEET, WE HAVE

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1 HIT A MORE CLAY ZONE. WHETHER IT'S CONTINUOUS ENOUGH TO BE
2 CONSIDERED SOMETHING THAT WOULD HOLD THE CONTAMINATION ABOVE IT
3 IS PART OF WHAT OUR STUDY WAS SUPPOSED TO DETERMINE BECAUSE WE
4 DID SET WELLS ABOVE AND BELOW THAT ZONE, AND WE SHOULD BE ABLE
5 TO ANSWER THAT QUESTION. BUT THERE IS A LENS AT ABOUT 40 FEET
6 WHICH WE HOPE IS A CONFINING LAYER AND WE WILL DETERMINE THAT.
7 MS. WOOD: WELL, ONE OTHER QUESTION.
8 WOULD YOU DIFFERENTIATE BETWEEN YOUR INTERIM ACTION AND THEN
9 YOUR LONG TERM? AS I UNDERSTAND, YOU WANTED TO GET THE DIRT
10 OUT--
11 MR. WATTRAS: YES.
12 MS. WOOD: --SO THAT THE HIGHWAY CAN GO
13 THROUGH. BUT THEN, WHERE IS THE LONGER TERM--
14 MR. WATTRAS: SIMPLY PUT, THE INTERIM
15 ACTION FOCUSES ON THE SOIL; THE LONG TERM WILL FOCUS ON THE
16 GROUND WATER, POSSIBLY MORE SOIL, IF WE CAN ASSOCIATE IT WITH
17 THIS GROUNDWATER PROBLEM, AND ALSO IF WE FIND ANY PROBLEMS WITH
18 BRINSON CREEK, ITSELF. SO, THAT'S A MORE COMPREHENSIVE PICTURE.
19 BUT IT'S PRIMARILY GOING--IT LOOKS LIKE IT WOULD BE MAINLY
20 FOCUSED ON GROUNDWATER.
21 MS. WOOD: WELL, NOW ON THE BIDS, WHO
22 TAKES THE BIDS?
23 MR. WATTRAS: WELL, I TALKED ABOUT BIDDING
24 BEFORE. THERE IS A CONTRACTOR. BAKER ENVIRONMENTAL IS INVOLVED
25 FROM THE INVESTIGATION STAGE. WE DO THE RISK ASSESSMENTS AND

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1 THEN WE DO THE DESIGN OF THE ALTERNATIVE. THE DEPARTMENT OF THE
2 NAVY HAS ANOTHER CONTRACTING MECHANISM, AND THERE IS ANOTHER
3 COMPANY--IT'S CALLED OHM--IT DOESN'T STAND FOR ANYTHING. BUT
4 THEY ARE FROM FINDLAY, OHIO. THEY HAVE OFFICES--IN FACT, THE
5 OFFICE THAT NEAL IS DEALING WITH IS OUT OF NORCROSS, GEORGIA.
6 BUT THAT COMPANY HAS THE CONTRACT TO DO THE REMEDIATION HERE AT
7 CAMP LEJEUNE.
8 THAT COMPANY WOULD DO THIS WORK. OHM DOES NOT OWN
9 RECYCLING FACILITIES. THEY WOULD TAKE THAT SOIL. AND IT IS UP
10 TO THEM. THEY WOULD GO OUT FOR COMPETITIVE BIDS TO THE LOCAL
11 RECYCLING CENTERS HERE AND TRY TO GET THE LOWEST COST.
12 MS. WOOD: SO, NORFOLK IS NOT GOING TO
13 BE INVOLVED IN THE BIDDING?
14 MR. WATTRAS: NO.
15 MR. PAUL: DID YOU SAY NORFOLK? THAT
16 WOULD ADMINISTER THE CONTRACT, BUT THAT--WHEN YOU SAY INVOLVED--
17 MS. WOOD: I MEAN, THEY ARE NOT
18 ACCEPTING THE BIDS? IT'S OHM.
19 MR. PAUL: IT'S OHM, THAT'S RIGHT.
20 MR. WATTRAS: OKAY.
21 ANY OTHER QUESTIONS? FEEL FREE TO STICK AROUND AND IF
22 YOU HAVE ANYTHING YOU WANT TO TALK ABOUT ON THE POSTER BOARDS,
23 FEEL FREE TO DO SO.
24 MS. WOOD: WAS THIS THE ONE? I THINK I
25 GET CONFUSED ON THIS. WAS THIS THE ONE WHERE THEY HAD THE BIG

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1 SPILL AND THEY HAD THE FIRE AND THEN THE RECORDS WERE DESTROYED.
2 MR. WATTRAS: YES.
3 MS. WOOD: BUT THOSE RECORDS WERE
4 REALLY--
5 MR. WATTRAS: WE CANNOT FIND--DOCUMENTATION
6 THROUGHOUT THE BASE OF PAST EVENTS IS POOR, TO PUT IT BLUNTLY.
7 WE DID HEAR THAT THERE WAS A FUEL SPILL. AND THIS WAS THE EVENT
8 WHERE YOU TALKED ABOUT THAT THEY ACTUALLY LIT IT ON FIRE AND
9 THAT'S HOW THEY GOT RID OF IT. AND IT IS PROBABLY ASSOCIATED
10 WITH ONE OF OUR AREAS THAT WE HAD CIRCLED UP THERE THAT HAS SOIL
11 CONTAMINATION. WE THINK, ANYWAY. YOU KNOW, WE ARE NOT EVEN
12 QUITE SURE WHERE THE EXACT SPILL WAS, BUT WE THINK IT MIGHT BE
13 IN THIS ONE AREA, AND IT HAPPENS TO BE ONE OF THE AREAS THAT
14 WILL BE REMEDIATED. SO, THE DOCUMENTATION IS VERY POOR.
15 OKAY. NEAL, WOULD YOU LIKE TO SAY ANYTHING ELSE?
16 MR. PAUL: I DON'T HAVE ANYTHING ELSE.
17 WE PROBABLY WILL BE HERE FOR ANOTHER FIFTEEN OR TWENTY MINUTES.
18 SO, IF FOR SOME REASON YOU DIDN'T ASK A QUESTION IN THIS FORM,
19 FEEL FREE TO, AS WE BREAK UP AND IT'S GOING TO BE INFORMAL. WE
20 WILL PROBABLY JUST BE AROUND HERE FOR FIFTEEN OR TWENTY MINUTES.
21 SO, FEEL FREE, IF YOU HAVE ANY QUESTIONS, TO ASK US. WE WOULD
22 LOVE TO ANSWER THEM FOR YOU. AND TOMORROW NIGHT, THERE WILL
23 ALSO BE ANOTHER PUBLIC MEETING TOMORROW NIGHT FOR UNITS ONE AND
24 FIVE TO DISCUSS OUR REMEDIAL ACTION PLANS FOR THOSE AS WELL.
25 AND AGAIN, THANK YOU FOR COMING TONIGHT.

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1 (WHEREUPON, THE PUBLIC HEARING IN THE CAMP GEIGER FUEL
2 FARM PROPOSED CLEAN UP WAS CLOSED AT 8:05 P.M.)

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

James Palmer
JAMES A. PALMER, CCR

8-1-94
DATE

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