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REVISED FINAL

RECORD OF DECISION
OPERABLE UNIT NO. 4
(SITES 41 AND 74)

MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA

CONTRACT TASK ORDER 0212

OCTOBER 17, 1995

Prepared For:

DEPARTMENT OF THE NAVY
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LIST OF ACRONYMS AND ABBREVIATIONS

AOCs	areas of concern
ARARs	Applicable or Relevant and Appropriate Requirements
AWQC	Federal Ambient Water Quality Criteria
CAIS	Chemical Agent Identification Sets
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	contaminant of concern
CWM	chemical warfare material
DoN	Department of the Navy
FFA	Federal Facilities Agreement
FS	Feasibility Study
GW	groundwater
HI	hazard index
HQ	hazard quotient
IAS	initial assessment study
ICRs	incremental cancer risks
LANTDIV	Atlantic Division Naval Facilities Engineering Command
MCB	Marine Corps Base
MCLs	maximum contaminant levels
NC DEHNR	North Carolina Department of Environment, Health and Natural Resources
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NCWQS	North Carolina Water Quality Standard
NPL	National Priorities List
NPW	Net Present Worth
O&M	operating and maintenance
OU	operable unit
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
POL	petroleum, oil and lubricants
PRAP	Proposed Remedial Action Plan
RCRA	Resource Conservation and Recovery Act
RI	remedial investigation

LIST OF ACRONYMS AND ABBREVIATIONS
(Continued)

RL	Remediation Level
ROD	Record of Decision
SARA	Superfund Amendments and Reauthorization Act
TEU	Technical Escort Unit
USEPA	United States Environmental Protection Agency
UXO	unexploded ordnance

DECLARATION

Site Name and Location

Operable Unit No. 4
Sites 41 and 74
Marine Corps Base
Camp Lejeune, North Carolina

Statement of Basis and Purposes

This decision document presents the selected remedy for Operable Unit (OU) No. 4 (Sites 41 and 74), at Marine Corps Base (MCB), Camp Lejeune, North Carolina that was chosen in accordance with the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980, 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 OU No. 4.

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 Sites

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

Description of the Selected Remedy

The final actions to be completed at OU No. 4, Sites 41 and 74 are the following selected remedies:

Site 41

- Soil/Landfill Material: Institutional Controls (Alternative 41SO-2)
- Groundwater and Seep Surface Water: Institutional Controls and Monitoring (Alternative 41GW-2)

Site 74

- Soil/Landfill Material: Institutional Controls (Alternative 74SO-2)
- Groundwater: Institutional Controls and Monitoring (Alternative 74GW-2)

The selected remedial actions included in this ROD address the principal threats associated with the soil/landfill material and groundwater. The institutional control actions for Sites 41 and 74 address the principal threat caused by the soil/landfill material. Groundwater (and seep surface water)

institutional controls and monitoring address the principal threat caused by contaminated groundwater for Sites 41 and 74.

The major components of the selected remedies for the various media of concern for OU No. 4 include:

- Designating both sites as restricted areas in the Base Master Plan.
- Prohibiting invasive construction or residential use for both sites via acknowledgment within the Base Master Plan.
- Restricting groundwater usage and prohibiting the installation of any new potable water supply wells within 500 feet of Site 41 or Site 74.
- Implementing a groundwater, surface water and sediment monitoring program for Site 41 to monitor groundwater quality of existing site monitoring wells, site seeps and unnamed tributary.
- Implementing a groundwater monitoring program for Site 74 to monitor groundwater quality of existing site monitoring wells.

Statutory Determinations

The selected remedies will provide protection of human health by preventing exposure to potential contaminants and wastes within the former disposal areas at Sites 41 and 74 through institutional controls. Institutional controls will also provide protection of human health by preventing exposure to potential contaminants in groundwater by prohibiting installation of potable water supply wells within 500 feet of Sites 41 and 74.

Groundwater at Site 41 currently does not comply with State drinking water standards for iron, manganese, and lead. Iron and manganese levels are elevated throughout the Base and may not be site-related, and the degree and extent of lead contamination is very limited. At Site 74, groundwater levels do not comply with the State drinking water standard for iron. As with Site 41, the elevated iron concentrations at Site 74 are not believed to be site-related. However, because state drinking water standards are exceeded, the Department of the Navy/Marine Corps will request the State to re-classify the aquifer under Site 41 as either "RS" (Restricted Designation) or "GC" (source of water supply for purposes other than drinking water).

Iron, manganese, and mercury concentrations exceeded State surface water standards in the seeps at Site 41. However, the seeps are ephemeral in nature and do not represent a significant habitat for aquatic receptors. Only a few minor exceedances of State surface water standards were observed in the unnamed tributary at Site 41. Nevertheless, the DoN/Marine Corps will request a variance from the state in accordance with 15A NCAC 2B.0218 (Exemptions From Surface Water Quality Standards).

Institutional controls provide a cost-effective remedy since there are no significant costs associated with their implementation other than administrative-type efforts. The environmental monitoring

programs included under the selected groundwater remedies are also cost-effective compared to the treatment alternatives (Site 41), which would provide limited additional protection at a significantly higher cost.

The selected alternatives would provide permanent, long-term remedies through provision and enforcement of institutional controls in the Base Master Plan to limit site access (i.e., prohibit residential use), restrict future invasive construction activities, and prohibit potable use of groundwater.

None of the selected remedies utilize alternative treatment technologies or satisfy the preference for treatment. However, the baseline risk assessment did not result in any unacceptable risks to human health under current use of Sites 41 and 74, and the nature and extent of contamination at each site is limited. Therefore, use of treatment technologies at Sites 41 and 74 was considered to be not appropriate or necessary for providing protection of human health and the environment. The treatment alternatives evaluated for Site 41 were not considered to be cost-effective with respect to the additional protection provided.

P. H. Howard

Signature (Commanding General, MCB Camp Lejeune)

05 DEC 1995

Date

1.0 SITE NAME, LOCATION AND DESCRIPTION

Marine Corps Base (MCB), Camp Lejeune is a training base for the U.S. Marine Corps, located in Onslow County, North Carolina. MCB Camp Lejeune is located approximately 45 miles south of New Bern and 47 miles north of Wilmington, North Carolina. The facility covers approximately 236 square miles and includes 14 miles of coastline. The eastern border of MCB Camp Lejeune is the Atlantic shoreline. The western and northwestern boundaries are U.S. Route 17 and State Route 24, respectively. The City of Jacksonville, North Carolina, borders MCB Camp Lejeune to the north.

The study area, Operable Unit (OU) No. 4, is one of 14 OUs within MCB Camp Lejeune. OU No. 4 consists of Sites 41 and 74. These two sites were grouped into OU No. 4 since both have a reported history of chemical warfare materiel (CWM) disposal. Figure 1 is a Location Map of OU No. 4; while Figures 2 and 3 depict the General Arrangement of Sites 41 and 74, respectively.

Site 41, Camp Geiger Dump Near the Former Trailer Park, is located east of Highway 17 within the Camp Geiger area of MCB Camp Lejeune. The site encompasses approximately 30 acres and is situated in a topographically high area. Most of the site is heavily wooded and vegetated. Drainage from the site is received by Tank Creek to the south and an unnamed tributary to the north.

The surface of Site 41 is littered with construction or demolition debris. Two seeps are located along the northern and eastern boundaries of the disposal area. The seeps have an orange color appearance due to the presence of iron. The seeps flow into the unnamed tributary.

Site 74, Mess Hall Grease Pit Disposal Area, is located approximately one-half mile east of Holcomb Boulevard in the northeast section of MCB Camp Lejeune. Site 74 consists of two areas of concern (AOCs) in a remote area of MCB Camp Lejeune: the former grease pit disposal area and a former pest control area. Both AOCs are heavily wooded, overgrown with vegetation, and flat. The former disposal area is approximately 5 acres in size, and the former pest control area is less than one acre in size. The grease pit area and pest control area are separated by a dirt road and are situated approximately one-quarter mile apart. There are no structures in the area that are associated with the operation of the facility, with the exception of an operational supply well (HP-654). This supply well is not contaminated. Site 74 has been fenced as part of MCB Camp Lejeune institutional controls.

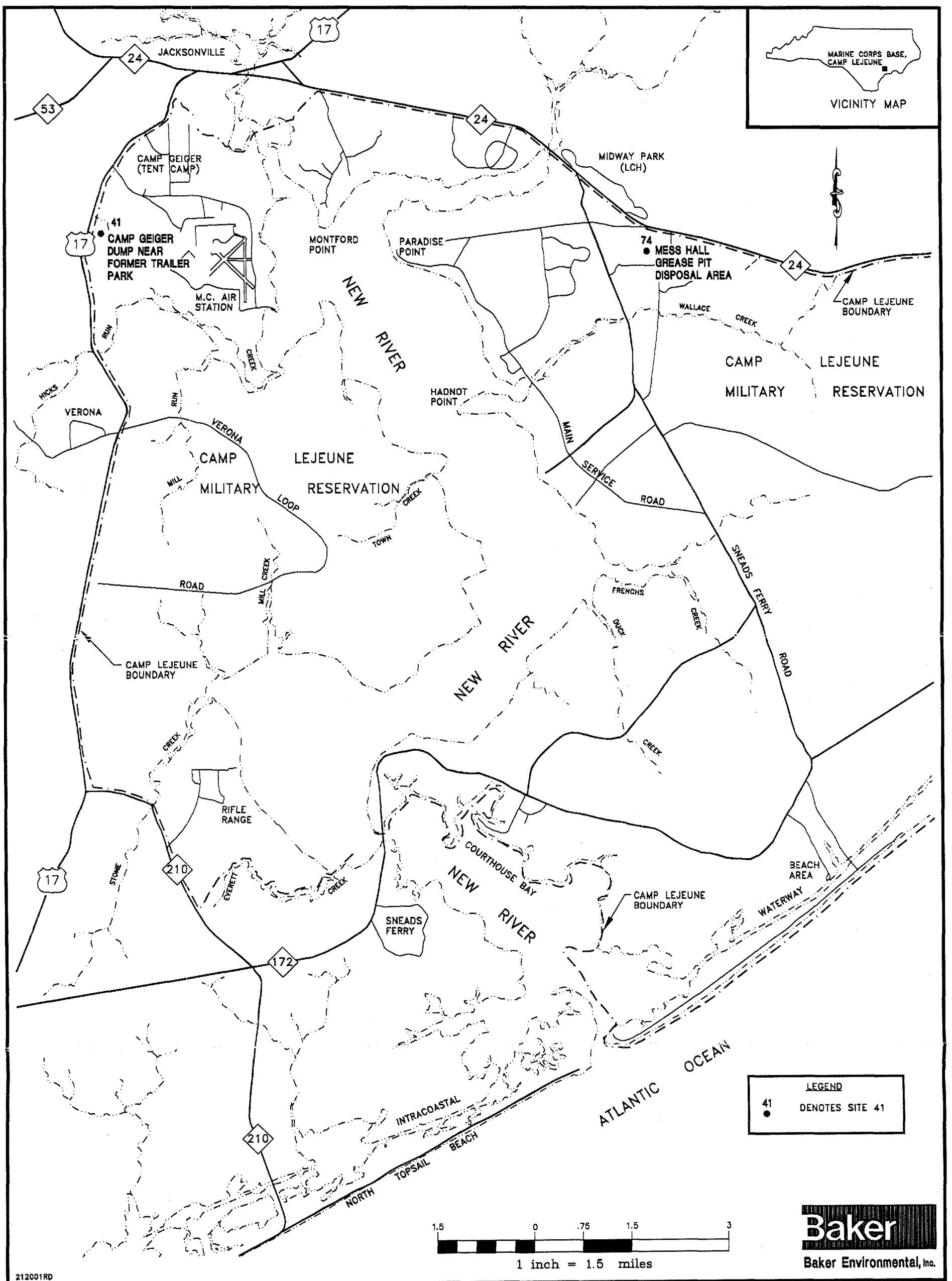

FIGURE 1
LOCATION MAP, OPERABLE UNIT No. 4
SITES 41 AND 74
RECORD OF DECISION CTO-0212
MARINE CORPS BASE, CAMP LEJEUNE
NORTH CAROLINA

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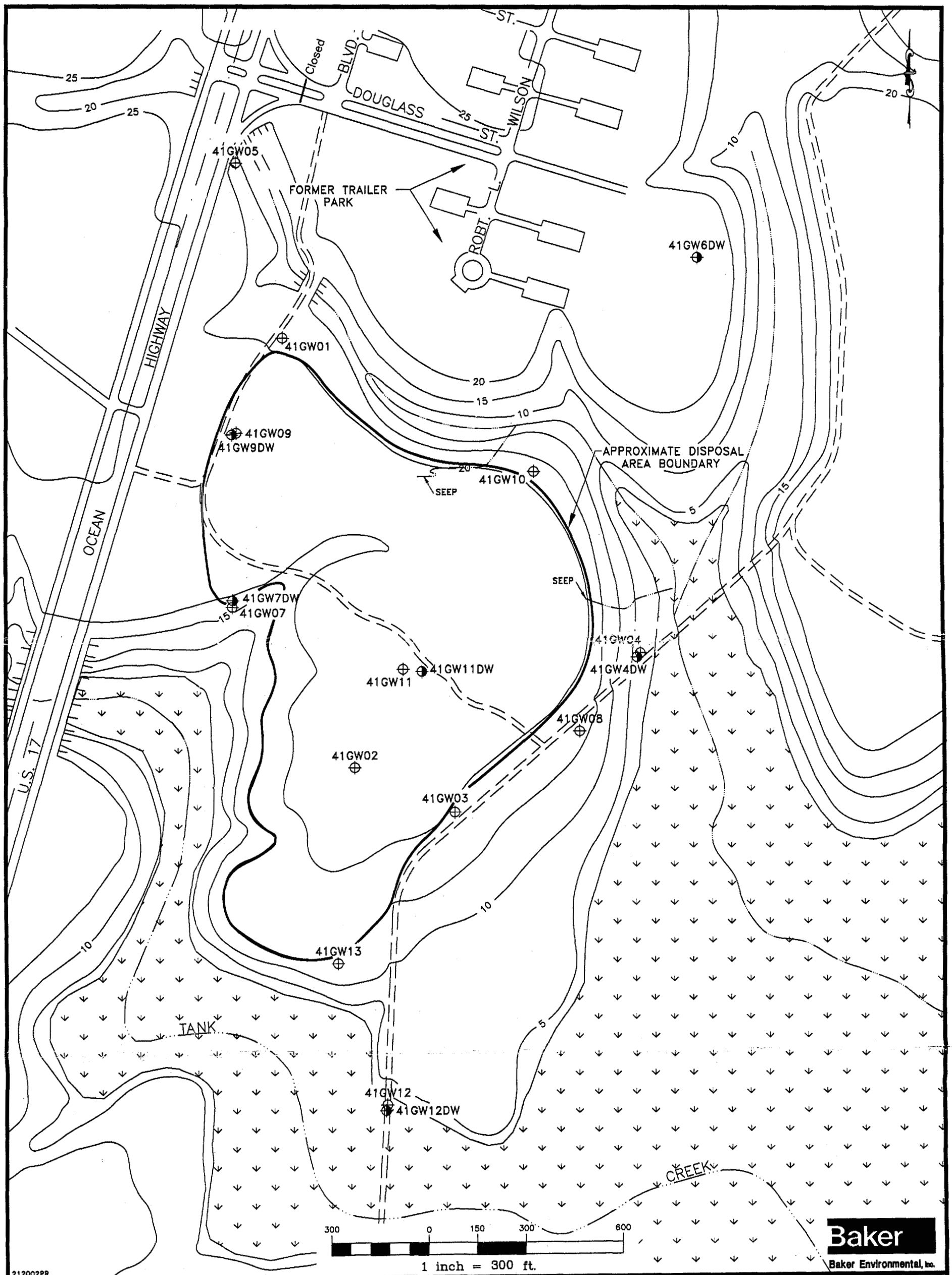
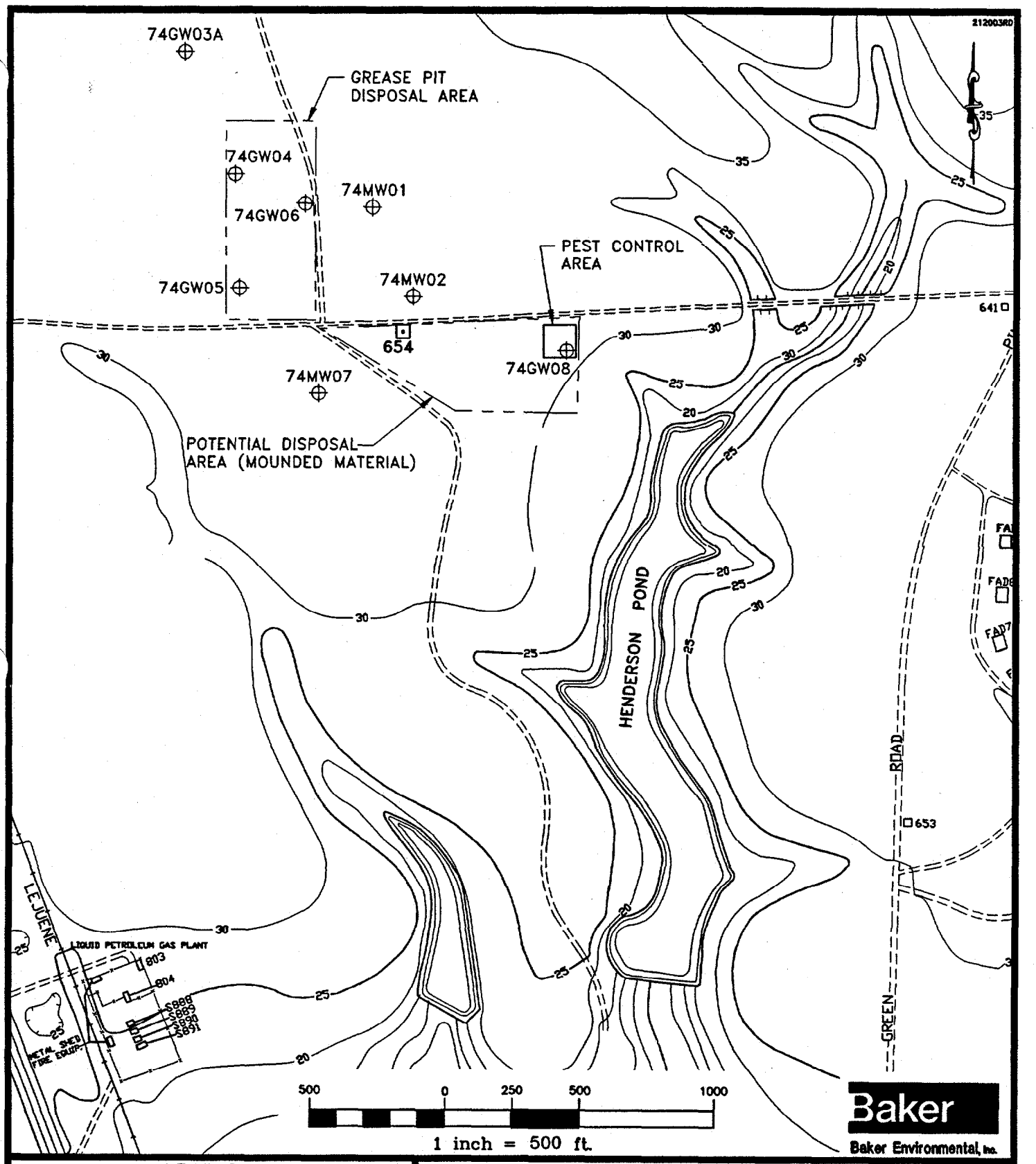


LEGEND

- 41GW01 – SHALLOW MONITORING WELL
- 41GW4DW – DEEP MONITORING WELL
- MARSH
- 5 – TOPOGRAPHIC ELEVATION LINES (FEET, MEAN SEA LEVEL)
- ROAD (IMPROVED)
- ROAD (UNIMPROVED)
- INTERMITTENT STREAM

SOURCE: LANTDIV, OCT. 1991

FIGURE 2
GENERAL ARRANGEMENT MAP
SITE 41 – CAMP GEIGER DUMP
NEAR FORMER TRAILER PARK
PROPOSED REMEDIAL ACTION PLAN CTO-0212
MARINE CORPS BASE, CAMP LEJEUNE
NORTH CAROLINA



LEGEND

74MW01 SHALLOW MONITORING WELL

654 WATER SUPPLY WELL

UNPAVED ROAD

30 TOPOGRAPHIC ELEVATION LINES (FEET, MEAN SEA LEVEL)

SOURCE: LANTDIV, FEB. 1994

FIGURE 3
GENERAL ARRANGEMENT MAP
SITE 74 – MESS HALL
GREASE PIT DISPOSAL AREA
RECORD OF DECISION CTO-0212
MARINE CORPS BASE, CAMP LEJEUNE
NORTH CAROLINA

2.0 SITE HISTORY AND ENFORCEMENT ACTIVITIES

This section of the ROD provides background information regarding the history, previous investigations and enforcement activities conducted to date at OU No. 4, Sites 41 and 74.

2.1 Site History

2.1.1 Site 41

From 1946 to 1970, Site 41 (Camp Geiger Dump Near the Former Trailer Park) was used as an open burn dump. The dump received construction debris, petroleum, oil and lubricant (POL) wastes, mirex (a pesticide), solvents, batteries and ordnance. The ordnance may have been burned prior to disposal, but may also be present as unexploded ordnance (UXO). CWM, suspected to be chemical agent identification sets (CAIS), was reportedly taken to Site 41 for disposal, as well.

2.1.2 Site 74

Site 74 (Mess Hall Grease Pit Disposal Area), was used as a disposal area from the early 1950s, until 1960. Grease was reportedly disposed of in trenches. It was reported that a volatile substance was sometimes used to ignite the grease. Drums containing polychlorinated biphenyls (PCBs) and "pesticide soaked bags" were also reportedly disposed of in trenches. One internal memorandum reported that drums, which were supposed to be taken to Site 69 (OU No. 14) for disposal, were disposed at Site 74 instead. Historical photographs of the former grease pit disposal area depict extensive trenching activities, which correspond with the history of this site. Currently, there are no apparent signs of disposal, with the exception of one area within the grease pit disposal area where a small depression in the ground surface was observed.

The former pest control area is believed to have been used for the storage and handling of pesticides for pest control. There are no known disposal activities associated with the former pest control area at Site 74. Historical photographs depict a building, which was probably used to house and mix the pesticides. This building is no longer present on site, and the foundation is not currently discernable.

2.2 Previous Investigations and Enforcement Activities

Previous investigations of hazardous waste sites at MCB Camp Lejeune have been conducted under an Initial Assessment Study (IAS), a Confirmation Study, Pre-Remedial Investigation Activities, and Remedial Investigations. These studies/investigations and their findings, as related to Sites 41 and 74, along with the related, notable enforcement activities are summarized chronologically below.

An IAS was conducted by Water and Air Research in 1983. The IAS identified a number of sites at MCB Camp Lejeune as potential sources of contamination, including Sites 41 and 74. The IAS reviewed historical records and aerial photographs, and performed field inspections and personnel interviews to evaluate potential hazards at various sites within MCB Camp Lejeune. The IAS recommended performing confirmation studies at Sites 41 and 74 to evaluate the necessity of conducting remedial actions.

A Confirmation Study was conducted by Environmental Science and Engineering, Inc. from 1984 through 1987. The purpose of this Study was to investigate the potential source areas identified in the IAS, including Sites 41 and 74. The Confirmation Study was divided into two separate reports; a Verification Step performed in 1984 and a Confirmation Step conducted in 1986 through 1987. The constituents detected in various media during the confirmation study are summarized below for each site.

Site 41

- Volatilze organic benzene, dichlorodifluoromethane, trans-1,2-DCE, and vinyl chloride were detected in groundwater collected from monitoring well 41GW-2. The concentration of dichlorodifluoromethane and vinyl chloride exceeded the NCWQS established for these compounds.

- Groundwater results from the second round of sampling indicated that concentrations of methylene chloride collected from monitoring well 41GW2 exceeded the NCWQS.

- Pesticide contaminants aldrin and heptachlor were detected in groundwater collected from monitoring well 41GW5. Neither of these concentrations exceeded any State or Federal criteria.

- First round inorganic groundwater data indicates that groundwater collected from well 41GW3 had levels of cadmium which exceeded the MCL and the NCWQS. Chromium was detected in groundwater collected during both rounds from monitoring wells 41GW1, 41GW2, 41GW3, and 41GW5; and from the initial groundwater samples collected from 41GW4. Lead was detected in wells 41GW1, 41GW2, and 41GW3 during the first round. These concentrations exceed the Fedeal Action Level and the NCWQS Action Level for lead. Lead was not detected in second round groundwater samples collected from monitoring wells 41GW1 and 41GW3. Lead concentrations for well 41GW2 indicated a decrease in concentration.

- Oil and grease was detected in all groundwater samples collected during the first and second rounds.

- Phenols were detected in all five monitoring wells, with the highest concentration of phenol detected in well 41GW5.

- Analytical findings from the second round of groundwater sampling indicated that a nitroaromatic compound (RDX) was detected in well 41GW3. This positive detection indicates that groundwater may have been impacted by ordnance disposal at Site 41.

- Methylene chloride was detected in four surface water samples.

- Analytical results for the surface water samples indicated that oil and grease was present in all samples.

- Phenols were detected above North Carolina Surface Water Standards (NCSWS) for fresh water, in all four surface water samples, but below the Federal Ambient Water Quality Criteria (AWQC) standards. The highest detection of phenol was found in surface water sample 41SW4.

- The pesticide aldrin was detected in samples 41SW2, 41SW3, and 41SW4. All three concentrations exceed the NCSWS for aldrin. Surface water 41SW2 also had a positive detection for delta benzene hexachloride (D-BHC).

- Oil and grease was detected in all sediment samples.

- Phenols and 2,4,6-TNT were detected in samples 41SE3 and 41SE4 collected from Tank Creek.

- Chromium was detected in four sediment samples. Hexavalent chromium was detected in sediment samples 41SE2, 41SE3, and 41SE4. Lead was detected in sediment samples 41SE1 and 41SE2.

Site 74

- Analytical findings indicate that 4,4'-DDD, 4,4'-DDE, and 4,4'-DDT were present in the soil. 4,4'-DDD was reported in five of the six soil samples, while 4,4'-DDD was reported in all six samples. 4,4'-DDT was reported in all three soil samples collected from soil boring 74S1. The maximum concentration of each contaminant was reported in the sample collected closest to the surface.

- 4,4'-DDE and 4,4'-DDT were detected in monitoring well 74GW2 during the 1984 investigation.

- From the second round of sampling (during 1986/1987), 4,4'-DDD was detected in the groundwater sample collected from 74GW2. One positive detection for methylene chloride was reported in monitoring well 74GW3. (It is possible that this was due to laboratory contamination and is not a true identification of the contamination at Site 74; however, no information is available to assess the analytical methods employed or the Quality Assurance/Quality Control (QA/QC) protocols used in the laboratory and therefore, this value is reported.)

MCB Camp Lejeune was placed on the CERCLA National Priorities List (NPL) effective October 4, 1989 (54 Federal Register 41015, October 4, 1989). The USEPA Region IV, the NC DEHNR and DoN then entered into a Federal Facilities Agreement (FFA) for MCB Camp Lejeune. The primary purpose of the FFA was to ensure that environmental impacts associated with past and present activities at the Facility were thoroughly investigated and appropriate CERCLA response/Response Conservation and Recovery Act (RCRA) corrective action alternatives were developed and implemented, as necessary, to protect the public health and environment.

In July of 1992, groundwater samples were collected from Site 74 monitoring wells 74GW1 and 74GW2 as part of a Pre-Remedial Investigation sampling effort. These samples were collected to aid in characterizing current site conditions and scope data needs for the remedial investigations. Organic contaminants were not detected in the groundwater samples collected at Site 74 during the Pre-Remedial Investigation sampling effort. However, total metals detected at this site included aluminum, barium, iron, magnesium, potassium, and sodium. With the exception of iron detected in groundwater collected from monitoring well 74GW1, which exceeded the NCWQS, no other inorganic exceeded applicable State or Federal criteria.

Baker Environmental, Inc. initiated an RI field investigation to characterize potential environmental impacts and threats to human health resulting from previous storage, operational, and disposal activities. The RI field investigations were initiated in January 1994 and concluded in March 1994. In August 1994, selected monitoring wells at Sites 41 and 74 were re-sampled using a low-flow purging technique for purposes of obtaining representative groundwater samples for subsequent total and dissolved metals analysis. In addition, a second round of surface water and sediment samples was collected at Site 41 to better characterize potential ecological impacts. A Final RI Report was issued in May 1995. A summary of the nature and extent of contamination for both Sites 41 and 74, based on the RI field investigation, is presented within Section 5.0 of this ROD.

A Feasibility Study (FS) was performed from September 1994 through April 1995 to develop and evaluate remedial alternatives based on the RI findings for each site. A Final FS Report was issued May 8, 1995.

3.0 HIGHLIGHTS OF COMMUNITY PARTICIPATION

The RI and FS Reports, along with the Final Proposed Remedial Action Plan (PRAP) for OU No. 4 at MCB Camp Lejeune, North Carolina were released to the public on May 10, 1995. These documents were made available to the public at the information repositories maintained at the Onslow County Public Library and the MCB Camp Lejeune library. The notice of availability of the RI/FS Reports and the PRAP was published in the Jacksonville Daily News on Sunday, April 30, 1995 and again as a legal notice on Monday, May 3, 1995.

A public comment period regarding OU No. 4 was held from May 10, 1995 through June 10, 1995; and a public meeting regarding the same was held on May 10, 1995. During the May 10, 1995 public meeting, representatives from the DoN/Marine Corps discussed the remedial action alternatives currently under consideration.

Response to the comments received during the noted comment period are included in the Responsiveness Summary (Section 11.0) of this ROD.

4.0 SCOPE AND ROLE OF REMEDIAL ALTERNATIVES

The proposed remedial actions for Sites 41 and 74 are consistent within OU No. 4. Results of the Baseline Human Health Risk Assessment indicate that the current use of each site does not present unacceptable risks to human health. However, shallow groundwater, seep surface water and soil/landfill at Site 41; and shallow groundwater and soil at the former grease pit disposal area at Site 74 are media that could potentially pose unacceptable future human health and ecological risks. The fact Site 41 is suspected of containing UXO, and both sites are suspected to contain CWM, results in both a safety and human health risk.

The initial selection of the following proposed remedial actions for each site, as originally introduced in the FS Report, was based on the nature and extent of contamination and associated future potential risks to human health or the environment. The proposed remedial actions consist of the following alternatives:

	Proposed Soil Alternative	Proposed Groundwater Alternative
Site 41[1]	41SO-2 Institutional Controls	41GW-2 Institutional Controls and Monitoring
Site 74	74SO-2 Institutional Controls	74GW-2 Institutional Controls and Monitoring

Note: [1] For purpose of the FS Report, PRAP, and this ROD, the groundwater alternative discussed for Site 41 includes groundwater, and surface water and sediment from the identified seeps.

The proposed remedial actions identified herein would achieve the following objectives for Sites 41 and 74.

- Soil - Prevent future potential exposure to contaminated soils, including former disposal area materials.
- Groundwater - Prevent future potential exposure to contaminated groundwater.

Institutional controls for the soils would involve designation of the sites as restricted or limited-use areas in the Base Master Plan, in order to restrict the sites to nonresidential uses and prevent uncontrolled construction activities. Institutional controls for the groundwater would involve providing groundwater use restrictions in the Base Master Plan that would prohibit installation of potable water supply wells within the vicinity of the sites.

Under Alternative 41GW-2, a groundwater, surface water, and sediment monitoring (i.e., sampling) program would be implemented to track contaminant levels in these media over time. Similarly, a groundwater sampling program would be implemented under Alternative 74GW-2 to track contaminant levels over time.

5.0 SITE CHARACTERISTICS

This section of the ROD presents an overview of the major findings related to the nature and extent of contamination detected at OU No. 4, Sites 41 and 74. The suspected sources and types of contamination, as well as the affected media, are based on the results of the RI.

5.1 Site 41 Nature and Extent of Contamination

- Polycyclic aromatic hydrocarbons (PAHs) were detected in soil, which may be the result of reported burning operations during disposal activities. The extent of this contamination is within the central portion of the former disposal area. PAHs were not detected in groundwater.

- Pesticides were detected in most soil samples; however, the pesticide levels are within base-wide concentrations, which are indicative of historical pest control spraying. Low levels of pesticides were detected in isolated areas within the shallow aquifer and the upper portion of the Castle Hayne Aquifer, indicating that pesticides may have migrated to a limited extent from the soil matrix to shallow groundwater.

- Although metals concentrations exceeded background levels in many soil samples, the data do not suggest a gross metals contamination problem in either the surface or subsurface soils at the site. The majority of elevated metals concentrations did not significantly exceed two times the base background levels.

- Total iron and manganese were detected above NCWQS and Federal secondary maximum contaminant levels (MCLs) in most of the monitoring wells sampled during the RI field investigation. Total lead was also detected above the NCWQS and the USEPA Action Level in most of the wells. Monitoring well 41GW11, which is located in the central portion of the former disposal area, exhibited the highest levels of lead, iron, and manganese. The first round of samples was collected via EPA-approved bailing techniques. Due to the concern that turbidity may have influenced the first round (bailed) samples, selected shallow monitoring wells were resampled (round two) using the EPA-recommended low-flow purging technique, which is designed to minimize the amount of surging produced during sampling. Significantly lower metal concentrations were detected during this second round. However, the concentrations of lead, iron and manganese detected in well 41GW11, during round two, still exceeded drinking water standards.

- Shallow groundwater is apparently discharging from the former disposal area via two seeps. Surface water samples collected from the seeps have exhibited elevated levels of iron, lead, and manganese. However, the unnamed tributary and Tank Creek do not appear to be significantly impacted by the site or seep discharges. Downstream surface water samples exhibited slightly higher iron and lead levels than upstream samples. Sediment samples along the seep pathway primarily exhibited pesticides above EPA Region IV screening values. High iron concentrations were detected in the seep sediments, suggesting that much of the

iron in the seep surface water is being deposited in the sediments through oxidation and precipitation.

- No chemical agents were detected during borehole monitoring conducted by the U.S. Army Technical Escort Unit (TEU). In addition, no chemical surety degradation compounds were detected in soil samples. However, buried CWM, PCBs and other wastes that were not detected during the soil boring program could still be present within the former disposal area.

5.2 Site 74 Nature and Extent of Contamination

- Soil at the former pest control area exhibited pesticides above Base background levels, indicating that former pest control activities have resulted in soil contamination. The extent of soil contamination at the former pest control area is limited.

- Low levels of pesticides were detected in the shallow groundwater at the pest control area. All but one of the pesticide detection levels were below State and Federal drinking water standards. The one pesticide detection was only slightly higher than the State drinking water standard.

- Soil and groundwater at the former grease pit disposal area have not been significantly impacted by former disposal activities. Although organic and inorganic contaminants were detected in soil, the low concentrations and infrequent distribution of the contaminants do not suggest that there is a source area associated with former disposal areas.

- No chemical agents were detected during borehole monitoring conducted by the U.S. Army Technical Escort Unit (TEU). In addition, no chemical surety degradation compounds were detected in soil samples. However, buried CWM, PCBs and other wastes that were not detected during the soil boring program could still be present within the former disposal area.

- During the first round of sampling, shallow groundwater exhibited total manganese, iron, lead, and chromium above State and Federal drinking water standards. The contaminant levels and distribution are very similar to other sites investigated at MCB Camp Lejeune, indicating that the shallow geologic conditions and round one sampling methods (bailing) may have elevated the concentrations of total metals rather than a specific disposal event. Due to the concern that turbidity may have influenced the first round of samples, two shallow monitoring wells were resampled using the EPA-recommended low-flow purging technique, which is designed to minimize the amount of surging produced during sampling. The low-flow sampling results (round two) showed much lower total metals concentrations than those detected during the first round of sampling. During round two, iron exceeded the State and Federal drinking water standard. Dissolved (filtered samples) metals in shallow groundwater were not elevated during the low-flow sampling event.

6.0 SUMMARY OF SITE RISKS

As part of the RI, a Baseline Human Health Risk Assessment and an Ecological Risk Assessment were conducted to evaluate the current and future potential risks to human health and the environment resulting from the presence of contaminants identified at OU No. 4, Sites 41 and 74. The following sections summarize the key findings of these assessments.

6.1 Human Health Risk Assessment

Several environmental media were identified for the risk assessments conducted for each site. Soil/landfill material was identified as a medium of concern for both sites, while shallow groundwater was identified as a medium of concern for Site 74. Likewise, the combination of shallow groundwater and seep surface water was identified as a medium for concern for Site 41.

Contaminants of Concern (COCs) were selected and evaluated on the basis of frequency of detection, prevalence above background concentrations, toxicity and comparison to established criteria or standards. Table 1 lists the concentration range for the COCs of each medium of concern for both Sites 41 and 74. The COCs identified at Site 41 for soil/landfill material, groundwater, and seep surface water include polycyclic aromatic hydrocarbons (PAHs), pesticides, polychlorinated biphenyls (PCBs), and inorganics. Additionally, volatile organics were identified in the groundwater and seep surface water, and semivolatile organics were detected in the soil/landfill material at Site 41. Volatile organics, inorganics and pesticides were identified as the COCs for the soil/landfill material and shallow groundwater at Site 74.

The Baseline Human Health Risk Assessment was based on possible exposure pathways under the current and future potential exposure scenarios. Under current conditions, the exposed population considered Base personnel who may be exposed to site contaminants during military training operations. Future potential exposure scenarios involved construction activities and residential use. It should be noted; however, that the future residential exposure pathway to soil or groundwater is extremely unlikely given that Site 41 is suspected of containing UXO, and both Sites 41 and 74 are suspected of containing buried CWM.

As part of the Risk Assessment, incremental cancer risks (ICRs) and hazard indices (HIs) were calculated for each group of potentially exposed populations. An ICR refers to the cancer risk that is over and above the background cancer risk in unexposed individuals. ICRs are determined by multiplying the intake level with the cancer potency factor. The calculated risks are probabilities which are typically expressed in scientific notation (e.g., 1E-4). For example, an ICR of 1E-4 means that one additional person out of ten thousand may be at risk of developing cancer due to excessive exposure at a site if no actions are conducted. The USEPA acceptable target risk range is 1E-4 to 1E-6. Potential concern for noncarcinogenic effects of a single contaminant in a single medium is expressed as the hazard quotient (HQ). By adding the HQs for all contaminants within a medium or across all media to which a given population may reasonably be exposed, the HI can be generated. The HI provides a useful reference point for gauging the potential significance of multiple contaminant exposures within a single medium or across media. The HI refers to noncarcinogenic effects and is a ratio for the level of exposure to an acceptable level for all contaminants of potential concern. An HI greater than or equal to unity (i.e., 1.0) indicates that there may be a concern for

TABLE 1

CONCENTRATION RANGE FOR CONTAMINANTS OF CONCERN
OPERABLE UNIT NO. 4
SITES 41 AND 74
RECORD OF DECISION
MCB CAMP LEJEUNE, NORTH CAROLINA

Contaminant of Concern	Surface Soil		Subsurface Soil		Groundwater µg/L		Surface Water		Sediment	
	41	74	41	74	41	74	41	74	41	74
Volatile Organic Compounds										
Trichloroethene		2J-8J							2J	8J
Toluene									2J	
Chlorobenzene					1.49J		1J-4J			
Total 1,2-Dichloroethene					1.22					
Acetone									4J - 190	
Methylene Chloride									2J - 7J	
Semivolatile Organic Compounds										
Bis(2-chloroethyl)ether	57J - 220J									
Di-n-Octylphthalate									49J - 310J	
Di-n-Butylphthalate									48J - 370J	
3,3-dichlorobenzidine										140J
Ordnance										
1,3,5-Trinitrobenzene									1,390	
Polynuclear Aromatic Hydrocarbons										
Anthracene	41J - 510									
Benzo(a)anthracene	130J -2,400									
Benzo(a)pyrene	40J - 2,000		74J - 4,700J						57J	
Benzo(b)fluoranthene	38J - 2,500								69J	
Benzo(g,h,i)perylene	46J - 1,600		41J - 4,600J							

TABLE 1 (Continued)

CONCENTRATION RANGE FOR CONTAMINANTS OF CONCERN
OPERABLE UNIT NO. 4
SITES 41 AND 74
RECORD OF DECISION
MCB CAMP LEJEUNE, NORTH CAROLINA

Contaminant of Concern	Surface Soil		Subsurface Soil		Groundwater µg/L		Surface Water		Sediment	
	41	74	41	74	41	74	41	74	41	74
Polynuclear Aromatic Hydrocarbons (continued)										
Benzo(k)fluoranthene	50J - 1,700								58J	
Chrysene	49J - 2,300									
Fluoranthene	40J - 2,500J		46J - 260J						100J	
Phenanthrene	72J - 2,600		39J - 260J							
Pyrene	50J - 2,300J		52J - 290J						100J	
Naphthalene			45J - 290J							
2-Methylnaphthalene			41J - 550							
Pesticides/PCBs										
Heptachlor	0.3NJ - 7.16J	0.2NJ - 298J	0.68J - 18	0.24J - 1.59J		0.01NJ				
Heptachlor Epoxide	0.56NJ - 9.6NJ	0.21NJ - 1.43J	0.4J - 11.5J							
Dieldrin	0.2NJ - 13.03NJ	0.32J - 706NJ	0.32J - 60NJ						0.46NJ - 6.39	
4,4'-DDE	0.12J - 87.6J	0.31J - 1,730J	0.32NJ - 39.6J	1.05NJ - 21.3J					0.53J - 31.3J	0.9J - 1.85J
4,4'-DDT	0.37J - 277J	0.81J - 3,840J	0.68NJ - 302J	0.34NJ - 21.37J			0.03J		0.36NJ - 34.8J	0.82NJ
4,4'-DDD	0.37J - 92J	0.37NJ - 3,700J	0.34NJ - 1,060J	0.59J - 3.61J					0.38NJ - 73.9J	
Endrin Aldehyde	0.61J - 1.37J	0.5NJ - 2.29NJ	0.85NJ - 4.38J							1.35NJ
alpha-Chlordane	0.08J - 92.7J	0.39J - 1,160J	0.28NJ - 160J			0.02NJ			0.34J - 3.72	
gamma-Chlordane	0.06NJ - 93.5J	0.45J - 1,680J	0.31J - 170J						0.4J - 6.35J	
gamma-BHC							0.02J			
Endosulfan II	0.45NJ - 5.01J		0.5NJ - 25.2NJ			0.02J			0.64NJ - 8.22	0.63J - 0.8J

TABLE 1 (Continued)

CONCENTRATION RANGE FOR CONTAMINANTS OF CONCERN
OPERABLE UNIT NO. 4
SITES 41 AND 74
RECORD OF DECISION
MCB CAMP LEJEUNE, NORTH CAROLINA

Contaminant of Concern	Surface Soil		Subsurface Soil		Groundwater µg/L		Surface Water		Sediment	
	41	74	41	74	41	74	41	74	41	74
Pesticides/PCBs (continued)										
Aldrin			0.7J - 12.8J							
Endrin			0.35J - 28.3J							
Endosulfan I			0.78NJ - 2.92NJ							
PCB-1254			36.7J - 214J						68J	
PCB-1260			34.6J - 317J							
PCB-1248									63J - 140J	
alpha-BHC					0.01J					
Methoxychlor									0.91J - 21.7J	0.83J
Endrin Ketone									0.66NJ	
Inorganics										
Arsenic	671 - 4,420	621J - 1,160	518 - 3,020	538J - 2,760	2.1 - 53.5	2.86J - 18.1			617 - 9,300	
Barium	3,140 - 82,200	2,890 - 54,700	3,150 - 186,000	2,770 - 17,500	18.2 - 836	28.2 - 117	17.9 - 442		1,400 - 161,000	5,730 - 13,000
Beryllium	187 - 344		187 - 310		0.954 - 37.4	0.842 - 2.25			235 - 1,020	
Cadmium	854 - 7,440				2.58 - 37.5					
Chromium	2,190 - 41,400	1,890 - 10,600	2,100 - 40,500J	1,920 - 9,910	12.1 - 166	15.9 - 56.6	8.52		2,320J - 16,500J	1,800 - 3,130
Cobalt					15.6 - 106					
Copper	4,170 - 132,000		3,770 - 39,800						6,130 - 19,900	
Lead	2,570 - 341,000J		894J - 829,000		2.3 - 145	3.1J - 15.3	1.13J - 36.8	1.62J - 6.04J	1,100 - 59,400J	2,670J - 6,060
Nickel	7,360 - 35,300	3,150 - 4,780			22.8 - 177				3,790 - 6,120	

TABLE 1 (Continued)

CONCENTRATION RANGE FOR CONTAMINANTS OF CONCERN
OPERABLE UNIT NO. 4
SITES 41 AND 74
RECORD OF DECISION
MCB CAMP LEJEUNE, NORTH CAROLINA

Contaminant of Concern	Surface Soil		Subsurface Soil		Groundwater µg/L		Surface Water		Sediment	
	41	74	41	74	41	74	41	74	41	74
Inorganics (continued)										
Manganese	1,670 - 6,000,000J	1,440 - 96,200	1,630 - 244,000	1,550-21,700	24.5 - 766	8.47 - 115	12.3 - 1,700		1,300 - 3,600	2,760 - 5,270
Mercury	74 - 768		57 - 312				0.101 - 0.56		460-630	
Selenium		609 - 1,200			10.3J				629J - 862J	
Thallium									1,190J	
Vanadium	4,620 - 39,800	4,030 - 15,100	4,790 - 25,700	3,930 - 14,200	10.6 - 179	14.3 - 301			3,500 - 30,000	4,400
Zinc	3,770 - 14,600,000	2,270 - 33,900	2,810J - 407,000	2,510 - 11,900	41.6 - 675	19.1 - 417J	16.3 - 235		5,500 - 155,000	12,600
Cyanide		1,050 - 1,370	1.06 - 1.63	1,050 - 1,250						

The inorganic concentrations noted for Site 41 are Round Two results.

Concentrations expressed in microgram per kilogram (µg/kg), unless otherwise noted.
J - Estimated value.
JB - Value estiamted is greater than instrument detection limit.
NJ - Estimated/tentative value.

noncarcinogenic health effects. Table 2 presents a summary of total ICRs and HIs calculated for various media at Sites 41 and 74.

6.1.1 Site 41

Under the current use of Site 41, the identified media of concern do not present unacceptable risks to human health. The soil/landfill material, shallow groundwater and seep surface water could; however, pose unacceptable future human health risks. Concentrations of several groundwater constituents (primarily metals) have exceeded, State and Federal drinking water standards; therefore, future consumption of groundwater at Site 41 could result in an unacceptable risk to human health. The ICR and HI values presented on Table 2 for Site 41 are driven by the presence of total metals (arsenic, chromium, and manganese) within the groundwater. Soil/landfill material would pose potential unacceptable risks or hazards under future construction or residential land use due solely to the suspected UXO and CWM buried on site.

6.1.2 Site 74

The identified media of concern do not pose unacceptable risks to human health for the current site use. Shallow groundwater and soil/landfill material could; however, potentially pose unacceptable future human health risks. The shallow groundwater has exhibited elevated total metals, and to a limited degree, pesticides. Therefore, future consumption of groundwater at Site 74 could result in an unacceptable risk to human health. The ICR and HI values presented on Table 2 for Site 74 are driven by the presence of total metals (arsenic, beryllium, and manganese) within the groundwater. Similar to Site 41, the soil/landfill material from Site 74 would pose potentially unacceptable risks under future construction and residential land use due solely to the suspected presence of buried CWM.

6.2 Ecological Health Risks

As previously noted, an Ecological Risk Assessment was conducted for Sites 41 and 74. The objective of the Ecological Risk Assessment was to determine if past reported disposal activities are adversely impacting the ecological integrity of the aquatic and terrestrial habitats on or adjacent to Sites 41 and 74.

Overall, metals and pesticides appear to be the most significant COCs that have the potential to affect the integrity of the aquatic ecosystems; while metals alone appear to be the most significant COCs potentially affecting the terrestrial ecosystems at OU No. 4. At Site 41, the seep surface water exhibited total metals, which exceed Federal Ambient Water Quality Criteria (AWQC) for the protection of aquatic organisms and NCWQSs for surface water. Due to the nature of the seeps; however, the seeps do not serve the purpose of providing an ecological habitat. Metal concentrations in surface water and sediment samples taken in the unnamed tributary and Tank Creek are similar to levels found in other streams throughout MCB Camp Lejeune.

The Ecological Risk Assessment concluded that potential adverse impacts to threatened or endangered species are low due to the absence of critical habitats and low levels of contaminants at Sites 41 and 74.

TABLE 2

TOTAL SITE INCREMENTAL LIFETIME CANCER RISK AND HAZARD INDICES
OPERABLE UNIT NO 4 - SITES 41 AND 74
RECORD OF DECISION
MCB CAMP LEJEUNE, NORTH CAROLINA

Receptors	Site 41		Site 74	
	Total ICR	HI	Total ICR	HI
Current Military Personnel	6E-07	0.02	8E-08	<0.01
Child Resident (Future)	6E-04	16	2E-04	8
Adult Resident (Future)	1E-03	8	3E-04	3.0
Construction Worker (Future)	1E-07	0.2	2E-08	<0.01

Notes: ICR: Incremental Lifetime Cancer Risk
HI: Hazard Index

Shaded areas indicate that risk level exceeds acceptable levels.

6.3 Remediation Levels

The final remediation levels (RLs) chosen by the risk manager for the COCs associated with the groundwater at Site 41 are addressed in the Feasibility Study and this ROD. These numbers are considered required levels for the remedial actions to achieve, if possible. The final COCs for Site 41 and their associated RLs are presented in Table 3.

TABLE 3

GROUNDWATER COCs THAT EXCEEDED REMEDIATION LEVEL AT SITE 41 OPERABLE UNIT NO. 4 - SITES 41 AND 74 RECORD OF DECISION MCB CAMP LEJEUNE, NORTH CAROLINA

Contaminant of Concern	RL[1]
Arsenic	50
Beryllium	4
Cadmium	5
Chromium	50
Lead	15
Nickel	100

Notes: [1] RL = Remediation Level
Groundwater RLs expressed as µg/L (ppb).

7.0 DESCRIPTIONS OF ALTERNATIVES

Six primary remedial alternatives were developed for Site 41 and four similar remedial alternatives were developed for Site 74. A description of each alternative, as well as the estimated capital costs, annual operation and maintenance (O&M) costs, net present worth (NPW) and an approximate timeframe to implement the alternative, are presented below. NPW costs were calculated over a 30-year period based on a 5 percent interest rate.

No contaminant or capping alternatives have been selected for either Site 41 or Site 74 due to several factors. Although capping is often considered as an alternative for sites which are former disposal areas or landfills, the unique physical and chemical nature of Sites 41 and 74 rendered capping alternatives as not feasible. The rationale for eliminating capping alternatives are as follows:

- Based on the chemical characteristics of both Sites 41 and 74, there appears to be little soil contaminaiton that would continue to cause impacts to groundwater quality.

- Based on the results of the human health and ecological risk assessments, there is no adverse impacts due to exposure of surface soils under current site usage conditions.

- Capping would require extensive clearing, grubbing, and potentially grading activities. These activities may pose significant risks during construction due to the reported presence of CWM buried at each site.

- Capping would provide limited protection to groundwater due to the high water table and absence of a confining layer at each site. At Site 41 for example, some landfilled debris is believed to be below the water table.

7.1 Site 41 Alternatives

7.1.1 Soil/Landfill Material Alternatives

- **Alternative 41SO-1: No Action**

  Similar to all of the No Action Alternatives presented in this ROD, this alternative is required by the NCP to provide a baseline comparison for other remedial alternatives. Under 41SO-1, no further action at OU No. 4, Site 41 would be implemented.

  Capital Costs: $0
  Annual O&M Costs: $0
  NPW: $0
  Implementation Timeframe: None

- **Alternative 41SO-2: Institutional Controls**

  Institutional Controls would include providing restrictions on the future use of the site and on invasive construction activities in the Base Master Plan.

  Capital Costs: $0
  Annual O&M Costs: $0
  NPW: $0
  Implementation Timeframe: Within 1 year

7.1.2 Groundwater and Seep Surface Water Alternatives

- **Alternative 41GW-1: No Action**

  As described for Alternative 41SO-1, this alternative is required by the NCP as a baseline comparison for other remedial alternatives. Under 41GW-1, no further actions would be taken to contain or treat potentially contaminated groundwater and associated seep surface water.

  Capital Costs: $0
  Annual O&M Costs: $0
  NPW: $0
  Implementation Timeframe: None

- **Alternative 41GW-2: Institutional Controls and Monitoring**

  A groundwater, surface water and sediment sampling program would be initiated at Site 41 under this alternative. The groundwater and surface water sampling would initially be conducted semi-annually. Once a stable or decreasing trend in contaminant levels was observed, sampling would be reduced to an annual basis. Additionally, institutional controls would include providing restrictions in the Base Master Plan on groundwater usage and on the installation of potable water supply wells within a 500-foot radius of the site boundary.

  Capital Costs: $0
  Annual O&M Costs: $38,500
  NPW: $592,000
  Implementation Timeframe: Within 1 year

- **Alternative 41GW-3: Seep Collection and Treatment with Institutional Controls and Monitoring**

  Collection of the seeps in subsurface drains and routing, by gravity, the flow to a treatment system prior to discharge to the unnamed tributary is the main objective of Alternative 41GW-3. Two subalternatives are included to provide various means of seep water treatment. The subalternatives include 41GW-3a: Physical/Chemical Treatment, and 41GW-3b: Constructed Wetlands Treatment.

Both subalternatives (41GW-3a and 41GW-3b) include the installation of approximately 400 feet of seep collection trenches, 900 feet of gravity flow subsurface conduit, and upgrading the access road into the site. Subalternative 41GW-3a also includes the construction of a physical/chemical treatment plant and the extension of electrical service to this plant. Subalternative 41GW-3b includes the construction of a wetlands treatment system as opposed to a treatment plant.

Similar to Alternative 41GW-2, both of these subalternatives include a groundwater, surface water and sediment sampling program, and institutional controls. The sampling program for these subalternatives would initially incorporate semi-annual sampling. Once a stable or decreasing trend in contaminant levels was observed, sampling would be reduced to an annual basis. Sediment samples would be collected once every three years. Additionally, both subalternatives would include institutional controls to restrict site groundwater usage and/or the installation of potable supply wells within 500 feet of the site boundary.

Subalternative 41GW-3a: Physical/Chemical Treatment

Capital Costs: $618,000
Annual O&M Costs: $82,000
NPW: $1,878,000
Implementation Timeframe: Designed and constructed in 1 to 1.5 years

Subalternative 41GW-3b: Constructed Wetlands Treatment

Capital Costs: $264,000
Annual O&M Costs: $49,800
NPW: $1,029,000
Implementation Timeframe: Designed and Constructed in 1 to 1.5 years

- **Alternative 41GW-4: Groundwater Extraction and Treatment with Institutional Controls and Monitoring**

This alternative includes collection of the shallow groundwater using pumping wells and discharge of the treated water to the unnamed tributary. Similar to Alternative 41GW-3, Subalternative 41GW-4a: Physical/Chemical Treatment and Sub-alternative 41GW-4b: Constructed Wetlands Treatment are included to provide various means of treatment for the extracted water.

Both Subalternatives 41GW-4a and 41GW-4b include the installation of three shallow groundwater extraction wells, 1,200 feet of influent and subsurface piping, and upgrading the access road into the site. Subalternative 41GW-4a also includes the construction of a physical/chemical treatment plant and the extension of electrical service to this plant. Subalternative 41GW-4b includes the construction of a wetlands treatment system.

Both subalternatives include a groundwater, surface water and sediment sampling program and institutional controls. Groundwater and surface water sampling would initially be conducted semi-annually. Once a stable or decreasing trend in contaminant levels was observed, sampling would be reduced to an annual basis. Sediment samples would only be collected once every three years. Both of these subalternatives would also include institutional controls to restrict groundwater usage and/or installation of a potable water supply well within 500 feet of the site boundary.

Subalternatives 41GW-4a: Physical/Chemical Treatment

Capital Costs: $675,000
Annual O&M Costs: $83,500
NPW: $1,959,000
Implementation Timeframe: Designed and constructed within 1.5 to 2 years

Subalternatives 41GW-4b: Constructed Wetlands Treatment

Capital Costs: $938,000
Annual O&M Costs: $61,800
NPW: $1,887,000
Implementation Timeframe: Designed and constructed within 1.5 to 2 years

7.2 Site 74 Alternatives

7.2.1 Soil/Landfill Material Alternatives

- **Alternative 74SO-1: No Action**

This alternative is required by the NCP to provide a baseline comparison for other remedial alternatives. Under 74SO-1, no further action at Site 74 would be implemented.

Capital Costs: $0
Annual O&M Costs: $0
NPW: $0
Implementation Timeframe: None

- **Alternative 74SO-2: Institutional Controls**

Institutional controls would include providing restrictions on the future use of the site and on invasive construction activities in the Base Master Plan.

Capital Costs: $0
Annual O&M Costs: $0
NPW: $0
Implementation Timeframe: Within 1 year

7.2.2 Groundwater Alternatives

- **Alternative 74GW-1: No Action**

  This No Action Alternative is required by the NCP as a baseline comparison for other remedial alternatives. Under 74GW-1, no further actions would be taken to contain or treat potentially contaminated groundwater.

  Capital Costs: $0
  Annual O&M Costs: $0
  NPW: $0
  Implementation Timeframe: None

- **Alternative 74GW-2: Institutional Controls and Monitoring**

  A groundwater sampling program would be conducted initially on a semi-annual basis until a stable or decreasing trend in contaminant levels is observed. Once a reliable trend is established, sampling would be reduced to an annual basis. Additionally, institutional controls would include providing restrictions in the Base Master Plan on groundwater usage and on the installation of potable water supply wells on site.

  Capital Costs: $0
  Annual O&M Costs: $22,300
  NPW: $342,000
  Implementation Timeframe: Within 1 year

8.0 SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

In order to determine the preferred alternatives, all of the remedial alternatives for soil/landfill material, groundwater and seep surface water were evaluated against nine evaluation criteria developed by the USEPA. The nine evaluation criteria are identified in the USEPA's publication entitled "Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA." The nine evaluation criteria are:

- Overall Protection of Human Health and Environment
- Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)
- Long-Term Effectiveness and Permanence
- Reduction of Toxicity, Mobility, or Volume through Treatment
- Short-Term Effectiveness
- Implementability
- Cost
- USEPA/State Acceptance
- Community Acceptance

The following information summarizes and compares the remedial alternatives against each other using the USEPA evaluation criteria.

8.1 Site 41 Soil/Landfill Material Alternatives

8.1.1 Overall Protection

The potential still exists for waste materials, CWM, and UXO to be present within the former disposal area. Alternative 41SO-1 would not reduce the risk of future invasive construction activities occurring at the site, whereas Alternative 41SO-2 would reduce this risk through the use of institutional controls. Thus, only Alternative 41SO-2 would prevent future potential exposure to CWM, UXO, and buried contaminated soil/waste.

Potential impacts of the soils and wastes on surface water and groundwater are discussed as part of the groundwater alternatives for Site 41.

8.1.2 Compliance with ARARs

There are no State or Federal contaminant-specific ARARs associated with the soils at Site 41. There are also no State or Federal location- or action-specific ARARs associated with Alternatives 41SO-1 and 41SO-2 since no remedial actions would be taken under either alternative other than institutional controls.

8.1.3 Long-term Effectiveness and Permanence

Only Alternative 41SO-2 would provide a permanent, long-term solution through revisions to the Base Master Plan to prohibit future invasive construction activities, and limit the area to non-residential and/or industrial-type uses.

8.1.4 Reduction of Toxicity, Mobility, or Volume

Neither Alternative 41SO-1 nor 41SO-2 would reduce the toxicity, mobility, or volume of contaminants in the soils through active treatment.

8.1.5 Short-term Effectiveness

Neither Alternative 41SO-1 nor 41SO-2 involve any remedial actions that would pose a risk to human health or the environment during implementation.

8.1.6 Implementability

There would be no implementability concerns associated with Alternative 41SO-1 since no actions would be taken. Alternative 41SO-2 would be both technically and administratively straightforward to implement.

8.1.7 Cost

There are no costs associated with Alternatives 41SO-1 and 41SO-2.

8.2 Site 41 Groundwater and Seep Surface Water Alternatives

8.2.1 Overall Protection

Alternatives 41GW-2, 41GW-3, and 41GW-4 would prevent future potential exposure to contaminated groundwater through institutional controls and monitoring.

Only Alternative 41GW-4 may actively restore contaminated groundwater to drinking water standards through extraction and treatment. Contaminated groundwater could migrate off site in the future under Alternatives 41GW-1, 41GW-2, and 41GW-3. However, the extent of groundwater contamination appears to be limited to the central portion of the site, and current data do not indicate offsite migration.

Alternative 41GW-2 would protect ecological receptors from future potential exposure to contaminated surface water and sediment in the sense that the surface water and sediment monitoring program would facilitate ongoing assessment of contaminant concentrations and their potential impacts on ecological receptors. Alternatives 41GW-3 and 41GW-4 would provide a greater level of ecological protection than Alternative 41GW-2, through seep collection/treatment and groundwater collection/treatment, respectively. However, the Ecological Risk Assessment concluded that potential adverse impacts threatened or endangered species are low due to the absence of critical habitats on site and low levels of contaminants in the unnamed tributary and Tank Creek.

8.2.2 Compliance with ARARs

Under Alternatives 41GW-1, 41GW-2, and 41GW-3, contaminated groundwater currently exceeds MCLs (EPA Action Level for lead) and NCWQS for lead, iron, and manganese. However, since

the extent of lead contamination is very limited and only slightly exceeds the EPA Action Level and NCWQS, the lead levels may gradually decrease below these standards through natural processes (i.e., dilution and dispersion). Alternatives 41GW-1, 41GW-2, and 41GW-3 do not propose active treatment of the shallow groundwater. Therefore, these alternatives comply with the Corrective Action requirements of Chapter 2L of the North Carolina Administrative Code (Section .0106), demonstrating that groundwater restoration using the best available technology is not required to provide protection of human health and the environment.

Alternative 41GW-4 would comply with the North Carolina Corrective Action requirements (15A NCAC 2L.0106), for using the best available technology to restore groundwater to drinking water standards. Alternative 41GW-4 may reduce lead concentrations below the EPA Action Level and NCWQS; however, the secondary MCL and NCWQS standards for iron and manganese may never be achieved since these metals are elevated throughout the Base.

Only Alternatives 41GW-3 and 41GW-4 would implement measures to reduce surface water contaminant concentrations in the unnamed tributary to the NCWQS and AWQC surface water standards.

8.2.3 Long-term Effectiveness and Permanence:

Alternative 41GW-1 would not provide a permanent, long-term solution for the site. Alternative 41GW-2 would provide a permanent, long-term solution for the site since contaminant levels are marginal, and periodic environmental sampling is a reliable means of tracking contaminant migration. Under Alternatives 41GW-2, 41GW-3, and 41GW-4, potential unacceptable risks associated with groundwater use would be permanently mitigated through provision of institutional controls.

Alternative 41GW-3 would provide a greater level of long-term protection of the unnamed tributary than Alternative 41GW-2. Alternative 41GW-4 would provide the greatest degree of long-term protection by implementing measures to protect both groundwater and surface water.

8.2.4 Reduction of Toxicity, Mobility, or Volume

No reduction of toxicity, mobility, or volume would be provided by either Alternative 41GW-1 or 41GW-2. Alternatives 41GW-3 and 41GW-4 may permanently reduce the volume and toxicity of contaminated surface water. Only Alternative 41GW-4 would permanently reduce the volume and toxicity of contaminated groundwater.

8.2.5 Short-term Effectiveness

Neither Alternative 41GW-1 nor 41GW-2 would involve remedial actions that would pose a risk to human health or the environment during implementation.

Alternatives 41GW-3 and 41GW-4 would involve disturbance of the former disposal area material and seep sediment that may pose a potential risk to aquatic receptors in the unnamed tributary during implementation. These alternatives would also pose a potential risk to workers associated with

digging through waste materials, contaminated soil, or contaminated sediment during installation of the underground piping.

8.2.6 Implementability

There would be no implementability concerns associated with Alternative 41GW-,1 since no actions would be taken. Under Alternative 41GW-2, the environmental monitoring program and institutional controls could be readily implemented. Alternative 41GW-3 would be significantly more difficult to implement than Alternative 41GW-2 since remedial construction activities and associated long-term maintenance activities would be required. Alternative 41GW-4 would be slightly more difficult to implement than Alternative 41GW-3, since the groundwater flowrate would be higher, and pumping wells would need to be installed and maintained.

8.2.7 Cost

The estimated 30-year Net Present Worth of the four alternatives are as follows:

- Alternative 41GW-1: $0
- Alternative 41GW-2: $592,000
- Alternative 41GW-3a/41GW-3b: $1,878,000/$1,029,000
- Alternative 41GW-4a/41GW-4b: $1,959,000/$1,887,000

8.3 Site 74 Soil/Landfill Material Alternatives

8.3.1 Overall Protection

The potential still exists for waste materials and chemical training agents to be present within the former disposal area. Alternative 74SO-1 would not reduce the risk of future invasive construction activities occurring at the site, whereas Alternative 74SO-2 would reduce this risk through the use of institutional controls. Thus, only Alternative 74SO-2 would prevent future, potential exposure to buried contaminated soil and waste.

8.3.2 Compliance with ARARs

There are no contaminant-specific ARARs for the soils at Site 74. There are also no State or Federal location- or action-specific ARARs associated with Alternatives 74SO-1 and 74SO-2, since no remedial actions would be taken under either alternative.

8.3.3 Long-term Effectiveness and Permanence

Only Alternative 74SO-2 would provide a permanent, long-term solution through revisions to the Base Master Plan to prohibit future invasive construction activities, and limit the area to non-residential and/or industrial-type uses.

8.3.4 Reduction of Toxicity, Mobility, or Volume

Neither Alternative 74SO-1 nor 74SO-2 would reduce the toxicity, mobility, or volume of contaminants in the soils through active treatment.

8.3.5 Short-term Effectiveness

Neither Alternative 74SO-1 nor 74SO-2 involves any remedial actions that would pose a risk to human health or the environment during implementation.

8.3.6 Implementability

There would be no implementability concerns associated with Alternative 74SO-1 since no actions would be taken. Alternative 74SO-2 should be administratively straightforward to implement.

8.3.7 Cost

There are no costs associated with Alternatives 74SO-1 or 74SO-2.

8.4 Site 74 Groundwater Alternatives

8.4.1 Overall Protection

Neither Alternatives 74GW-1 or 74GW-2 would actively restore contaminated groundwater to drinking water standards through extraction and treatment, should contaminant levels exceed NCWQS in the future. Any future contaminated groundwater would be allowed to migrate under either alternative. Only Alternative 74GW-2 would prevent future potential exposure to contaminated groundwater through institutional controls and monitoring.

8.4.2 Compliance with ARARs

Under both Alternatives 74GW-1 and 74GW-2, contaminated groundwater would most likely continue to exceed the secondary MCL and the NCWQS for iron. However, the elevated iron concentrations are believed to be associated with background concentrations.

8.4.3 Long-term Effectiveness and Permanence

Alternative 74GW-1 would not provide a permanent, long-term solution for the site. Alternative 74GW-2 would provide a permanent, long-term solution for the site since contaminant levels are marginal, and periodic environmental sampling is a reliable means of tracking contaminant migration. Potential unacceptable risks associated with groundwater use would be permanently mitigated through provision of institutional controls under Alternative 74GW-2.

8.4.4 Reduction of Toxicity, Mobility, or Volume

No reduction of toxicity, mobility, or volume would be provided by either Alternative 74GW-1 or 74GW-2.

8.4.5 Short-term Effectiveness

Neither Alternative 74GW-1 nor 74GW-2 would involve remedial actions that would pose a risk to human health or the environment during implementation.

8.4.6 Implementability

There would be no implementability concerns associated with Alternative 74GW-1, since no actions would be taken. Under Alternative 74GW-2, the environmental monitoring program and institutional controls could be readily implemented.

8.4.7 Cost

There are no costs associated with Alternative 74GW-1. The estimated 30-year Net Present Worth of Alternative 74GW-2 is $342,000.

9.0 SELECTED REMEDIES

The selected remedies for each media of concern at Site 41 and Site 74 are identified as follows:

Site 41

Soil/Landfill Material: 41SO-2 Institutional Controls
Groundwater and Seep Surface Water: 41GW-2 Institutional Controls and Monitoring

Site 74

Soil/Landfill Material: 74SO-2 Institutional Controls
Groundwater: 74GW-2 Institutional Controls and Monitoring

Based on available information and the current understanding of the conditions at Sites 41 and 74, each of the selected remedies appears to provide the best balance with respect to the USEPA evaluation criteria described in Section 8.0 of this ROD. The selected remedies are anticipated to meet the following objectives:

- Prevent future potential exposure to buried contaminated soil and waste, (Sites 41 and 74).
- Prevent future potential exposure to contaminated groundwater, (Site 41).
- Protect ecological receptors from future potential exposure to contaminated surface water, (Site 41).
- Prevent future potential use of the shallow groundwater, (Site 74).
- Cost effectiveness, (Sites 41 and 74).

The selected remedies for the various media of concern are briefly described below. Since contaminants will remain at both Sites 41 and 74, the NCP [in accordance with 40 CFR 300.430(f)(4)] requires the lead agency to review the effects of each alternative (41SO-2, 74SO-2, 41GW-2 and 74GW-2) no less often than once every five years.

9.1 Summary of the Selected Remedies

9.1.1 Sites 41 and 74 Soil/Landfill Material

As noted, the selected remedy for the soil/landfill material at Sites 41 and 74 (41SO-2 and 74SO-2, respectively), is the implementation of institutional controls. The implemented institutional controls include: designation as restricted areas and control of future site use via designation in the Base Master Plan prohibiting invasive construction and residential use. This selected remedy is anticipated to reduce the future invasive construction risks, and provide a long-term solution for restricted site use.

9.1.2 Site 41 Groundwater and Seep Surface Water

The selected remedy for groundwater and seep surface water at Site 41 (41GW-2), is the implementation of institutional controls and monitoring. A groundwater, surface water and sediment sampling program will be initiated to: periodically sample existing groundwater monitoring wells, periodically collect samples from the seeps and periodically sample upgradient and downgradient locations in the unnamed tributary. The institutional controls associated with this selected remedy will restrict groundwater usage in the vicinity of Site 41. A designation in the Base Master Plan will prohibit installation of potable water supply wells within 500 feet of the boundary of the site.

This selected remedy will prevent future potential exposure to contaminated groundwater, as well as the protection of ecological receptors from future potential exposure to contaminated surface water. A permanent, long-term solution will be provided since contaminant levels are marginal, and periodic sampling is a reliable means of tracking contaminant migration.

Because groundwater will remain untreated, a limited number of contaminants will remain at concentrations above State drinking water standards. Therefore, the DoN/Marine Corps will request the state to reclassify the groundwater under the site as either "RS" (Restricted Designation) or "GC" (Non-Potable Water Supply). In addition, the DoN/Marine Corps will request a variance from the state for surface water constituents which exceed applicable State Water Quality Standards in accordance with 15A NCAC 2B.0218.

9.1.3 Site 74 Groundwater

Institutional controls and monitoring for groundwater at Site 74 (74GW-2), will include periodic groundwater sampling of the existing monitoring wells and the implementation of institutional controls to restrict groundwater usage in the vicinity of the site. The Base Master Plan for Site 74 will officially designate a groundwater use category prohibiting installation of potable water supply wells on site.

Prevention of future potential exposure to contaminated groundwater will be achieved via this selected remedy. A permanent, long-term solution will be provided since contaminant levels are marginal, and periodic sampling is a reliable means of tracking contaminant migration.

10.0 STATUTORY DETERMINATIONS

A selected remedy must satisfy requirements of CERCLA, Section 121, including: protection of human health and the environment; compliance with ARARs; cost effectiveness; utilization of permanent solutions and alternative treatment technologies or resources recovery technologies to the maximum extent practicable; and preference for treatment that reduces toxicity, mobility, or volume as a principle element (or provide an explanation as to why this preference is not satisfied).

The evaluation of how the selected remedies for OU No. 4, Sites 41 and 74 satisfy these CERCLA requirements is presented below.

10.1 Protection of Human Health and the Environment

Institutional controls would provide protection of human health by preventing exposure to potential contaminants and wastes within the landfills at Sites 41 and 74. The selected alternatives would not provide any additional protection to the environment. However, significant contaminant levels were not detected in the surface soils at the site, and no distinct areas of contamination within the landfills were identified that may pose a threat to underlying groundwater.

Institutional controls would also provide protection of human health by preventing exposure to potential contaminants in groundwater by prohibiting installation of potable water supply wells within 500 feet of Sites 41 and 74.

The ecological risk assessment did not indicate significant site-related ecological risks to aquatic receptors in the unnamed tributary and Tank Creek at Site 41. The seeps on site are ephemeral in nature and do not represent a significant habitat for aquatic receptors. The selected alternative would protect ecological receptors from future potential exposure to contaminated surface water in the sense that the surface water and sediment monitoring program would facilitate ongoing assessment of contaminant concentrations and their potential impacts on ecological receptors. Thus, remedial actions could be conducted in the future, if necessary, based on the monitoring results.

10.2 Compliance with Applicable or Relevant and Appropriate Requirements

There are no contaminant-specific ARARs associated with the soils at Sites 41 and 74. In addition, there are no location- or action-specific ARARs associated with the selected remedy for the soils at these sites.

With respect to groundwater, iron and manganese currently exceed their respective NCWQS values at Site 41. However, these constituents are elevated throughout the Base and may not be site-related. Based on the August 1994 low-flow purging sampling round, total lead exceeded the NCWQS in only one well. Dissolved lead was not detected in any of the filtered groundwater samples during this round. The total lead concentration may be due to turbidity in the well and not a result of actual leaching from the soils to groundwater since soil results did not exhibit a lead problem. Since the extent of apparent lead contamination is very limited and only slightly exceeds the NCWQS, the lead levels may gradually decrease below this through natural dispersion.

At Site 74, groundwater would not comply with the NCWQS for iron. However, the elevated iron concentrations are elevated throughout the Base and are not believed to be site-related.

Based on the most recent sampling results (August 1994), total and dissolved iron and manganese concentrations exceeded their NCWQS values in all samples collected from the seeps at Site 41. However, the seeps are ephemeral in nature and do not represent a significant habitat for aquatic receptors.

No dissolved iron was detected above the NCWQS in upstream samples collected from the unnamed tributary at Site 41. Downstream iron concentrations in the unnamed tributary slightly exceeded the NCWQS in some samples. Only one sample in the unnamed tributary downstream of the seep discharge area exceeded the NCWQS for manganese. The ecological risk assessment did not indicate any significant site-related ecological risk to aquatic receptors in the unnamed tributary and Tank Creek at Site 41.

The above information summarizes the compliance requirements in accordance with Title 15A of the North Carolina Administrative Code, Chapter 2L, Section .0106.

Because State drinking water standards for some constituents have been exceeded, the DoN/Marine Corps will request the State to re-classify the aquifer under Site 41 as either "RS" (restricted use) or "GC" (Non-potable use). In addition, a variance from meeting surface water quality standards will be requested in accordance with 15A NCAC 2B.0218.

10.3 Cost Effectiveness

Institutional controls provide a cost-effective remedy since there are no significant costs associated with their implementation other than administrative-type efforts, which were not estimated in the FS Report. The environmental monitoring programs included under the selected groundwater remedies are also very cost-effective. Based on the nature and extent of contamination and current and expected future use of Site 41, the alternatives involving treatment would not provide significantly more protection of human health and the environment, whereas the present-worth costs estimated for these alternatives are significantly higher than the selected alternative.

10.4 Utilization of Permanent Solutions and Alternative Treatment Technologies

The selected alternatives for soils would provide permanent, long-term remedies through provision and enforcement of institutional controls in the Base Master Plan to prohibit future invasive construction activities, and limit the area to non-residential and/or industrial-type uses.

Alternative treatment technologies for soils were not considered for Sites 41 and 74 in the FS Report for the following reasons:

- The baseline risk assessment did not result in any unacceptable risks to human health from exposure to soils, since significant contaminant levels were not detected in soils at the site.

- No distinct areas of contamination within the landfills were identified that may pose a threat to underlying groundwater.

In addition, capping of the landfills was considered in the FS Report but was eliminated from further consideration due to effectiveness and implementability concerns. Although CWM was not confirmed by the RI Report, CWM may still be present within the landfills as well as UXO at Site 41. Therefore, capping, which would require extensive clearing and grubbing activities, would pose a significant risk to human health by disturbing the former disposal area contents during installation. Capping would also provide limited protection of groundwater due to the high water table and absence of a confining layer at each site.

The selected alternatives for groundwater would provide permanent, long-term remedies through provision and enforcement of institutional controls in the Base Master Plan to prohibit potable use of groundwater within a 500-foot radius of each site.

Alternative treatment technologies for groundwater were not selected for Site 41 since only iron and lead exceeded the NCWQSs during the August 1994 low-flow purging sampling round. The extent of apparent lead contamination is limited to only one well and only slightly exceeds the NCWQS. The lead concentration may gradually decrease below the NCWQS through natural dispersion.

Alternative treatment technologies for surface water were not selected for Site 41 since the seeps are ephemeral in nature and do not represent a significant habitat for aquatic receptors. In addition, the ecological risk assessment did not indicate any significant site-related ecological risks to aquatic receptors in the unnamed tributary and Tank Creek at Site 41.

Alternative treatment technologies for groundwater were not considered for Site 74 in the FS Report since risk levels based on future potential use of groundwater only slightly exceeded acceptable levels, and there were only minor exceedances of NCWQSs and MCLs in groundwater during previous sampling rounds. During the August 1994 low-flow purging sampling round, only iron exceeded the NCWQS.

10.5 Preference for Treatment as a Principal Element

None of the selected remedies for soil, groundwater, or surface water at Sites 41 and 74 satisfy the preference for treatment. For the reasons discussed in Section 10.4, use of treatment technologies at Sites 41 and 74 was considered to be not appropriate or necessary for providing protection of human health and the environment. The treatment alternatives evaluated for Site 41 were not considered to be cost-effective with respect to the additional protection provided.

11.0 RESPONSIVENESS SUMMARY

The selected remedies for OU No. 4, Sites 41 and 74 are:

Site 41

Soil/Landfill Material: 41SO-2 Institutional Controls
Groundwater and Seep Surface Water: 41GW-2 Institutional Controls and Monitoring

Site 74

Soil/Landfill Material: 74SO-2 Institutional Controls
Groundwater: 74GW-2 Institutional Controls and Monitoring

No one from the community attended the May 10, 1995 public meeting; however, written comments were received from the NC DEHNR.

Based on the lack of attendance at the May 10, 1995 public meeting, it does not appear that the community has any opposition to the selected remedies for OU No. 4, Sites 41 and 74. Additionally, the USEPA Region IV and NC DEHNR are in support of the selected remedies outlined herein.

11.1 Background on Community Involvement

A record review of the MCB, Camp Lejeune files indicates that the community involvement centers mainly on a social nature, including the community outreach programs and base/community clubs. The file search did not locate written Installation Restoration Program (IRP) concerns of the community. A review of historic newspaper articles indicated that the community is interested in the local drinking and groundwater quality, as well as that of the New River, but that there are no expressed interests or concerns specific to the environmental sites (including Sites 41 or 74). Two local environmental groups, the Stump Sound Environmental Advocates and the Southeastern Watermen's Association, have posed questions to the Base and local officials in the past regarding other environmental issues. These groups were sought as interview participants prior to the development of the Camp Lejeune, IRP, Community Relations Plan. Neither group was available for the interviews.

Community relations activities to date are summarized below:

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

- Prepared a Community relations Plan, September 1990.

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

- Prepared a Final Community Relations Plan, February 1994.
- Established two information repositories.
- Established the Administrative Record for all of the sites at the Base.
- Released the PRAP for OU No. 4 for public review in the repositories, May 1995.
- Released public notice announcing public comment and document availability of the PRAP, April 30, and May 3, 1995.
- Held a Technical Review Committee meeting on May 8, 1995, to review the PRAP and solicit comments.
- Held a public meeting on May 10, 1995, to solicit comments and provide information. No one attended.

11.2 Comments Received and Agency Response

As previously mentioned, no one attended the May 10, 1995 public meeting held to discuss the preferred alternatives for OU No. 4, Sites 41 and 74. Therefore, no community comments were generated. Written comments were received from the NC DEHNR and are summarized as follows.

NC DEHNR requested an indication of what physical barriers would be used to limit access to Site 41. The DoN/Marine Corps response to this comment includes clarification within this ROD of the misleading wording associated with "limiting access" to Site 41. The primary intent of Alternative 41SO-2 (Institutional Controls) includes designation as a restricted area, prohibiting future invasive construction activities, and limiting the area to non-residential and/or industrial-type uses within the Base Master Plan.

NC DEHNR requested that the chemicals which contributed significantly to the estimated risks and the selected remedial levels be identified within the ROD. The chemicals which significantly contributed to the estimated risks at Site 41 and Site 74 have been identified within Sections 6.1.1 and 6.1.2, respectively. Section 6.3 and Table 3 have been added to identify the remedial levels developed for the groundwater at Site 41.

NC DEHNR expressed concern over the lead levels and the impact to surface water at Site 41; and their intent to increase surface water monitoring for any potential impact. The DoN/Marine Corps response to this concern is that the selected remedy for the implementation of a semi-annual surface water monitoring program will provide sufficient protection of ecological receptors given that the ecological risk assessment did not indicate significant site-related ecological risks to aquatic receptors in the unnamed tributary and Tank Creek. In addition, the DoN/Marine Corps will request a variance from State surface water quality standards.

NC DEHNR suggested that a variance to the 2L regulations, which require control of primary and secondary sources of contamination, be acquired. In compliance with the North Carolina Corrective

Action requirements, the following information has been reiterated from Section 7.2 of the Final Proposed Remedial Action Plan (May 8, 1995).

> The following information is provided in accordance with Chapter 2L of the North Carolina Administrative Code, Section .0106 Corrective Action, for the selection of a remedial alternative at Site 41 (Alternative 41GW-2) that does not provide the best available technology for restoration of groundwater to the NCWQSs.

- Iron and manganese currently exceed their respective NCWQS values at Site 41. However, these constituents are elevated throughout the base and may not be site-related.

- Based on the August 1994 low-flow purging sampling round, total lead exceeded the NCWQS in only one well, 41GW-11, located in the center of the landfill. The lead concentration only slightly exceeded the NCWQS (26 µg/L compared to the NCWQS of 15 µg/L). No lead was detected in the perimeter wells that were sampled during this round. Dissolved lead was not detected in any of the filtered groundwater samples during this round.

- The RI did not identify a source of lead contamination within the landfill that may pose a threat to underlying groundwater, suggesting that the elevated total lead concentration in well 41GW-11 may be due to turbidity in the well and not a result of actual leaching from the soils to groundwater.

- A plume of lead contamination would suggest that a release of lead contamination is occurring or occurred at some point in the past. However, the extent of apparent lead contamination is very limited, and a lead plume was not identified at the site.

- Discharge of shallow groundwater to the on-site seeps does not appear to be adversely impacting adjacent surface waters (i.e., the unnamed tributary). The ecological risk assessment did not indicate significant site-related ecological risks to aquatic receptors in the unnamed tributary and Tank Creek at Site 41. Only a few samples collected from the unnamed tributary exceeded the NCWQSs, primarily for iron and manganese.

The DoN/Marine Corps will request the State to re-classify the aquifer under Site 41 as either "RS" (restricted use) or "GC" (Non-potable water source).