

04.09-05/08/95-01529

FINAL

**PROPOSED REMEDIAL ACTION PLAN
OPERABLE UNIT NO. 4
(SITES 41 AND 74)**

**MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA**

CONTRACT TASK ORDER 0212

MAY 8, 1995

Prepared For:

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ATLANTIC DIVISION
NAVAL FACILITIES
ENGINEERING COMMAND
*Norfolk, Virginia***

Under:

**LANTDIV CLEAN Program
Contract N62470-89-D-4814**

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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
COCs	contaminants of concern
CWM	chemical warfare materiel
DoN	Department of the Navy
EPA	Environmental Protection Agency
FFA	Federal Facilities Agreement
FS	Feasibility Study
GW	groundwater
HI	hazard index
HQ	hazard quotient
IAS	Initial Assessment Study
ICR	incremental cancer risk
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
NCWQSS	North Carolina Water Quality Standards
OU	operable unit
PAHs	polycyclic aromatic hydrocarbons
PCBs	polychlorinated biphenyls
POL	petroleum, oil and lubricants
PRAP	Proposed Remedial Action Plan
RI	Remedial Investigation
ROD	Record of Decision

**LIST OF ACRONYMS AND ABBREVIATIONS
(Continued)**

SO	soil
TEU	Technical Escort Unit
USEPA	United States Environmental Protection Agency
UXO	unexploded ordnance

1.0 INTRODUCTION

This Proposed Remedial Action Plan (PRAP) describes the Marine Corps Base (MCB) Camp Lejeune's and the Department of the Navy's (DoN) preferred remedial action for Operable Unit No. 4, Sites 41 and 74. Operable Unit (OU) No. 4 (Sites 41 and 74), is located at MCB Camp Lejeune, Onslow County, North Carolina. More specifically, 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; while 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. Figure 1 is a Location Map of OU No. 4; while Figures 2 and 3 depict the General Arrangement for Sites 41 and 74, respectively.

MCB Camp Lejeune and the DoN are the lead agencies issuing this PRAP in order to fulfill the public participation responsibility established under Section 117(a) of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA); and the Federal Facilities Agreement (FFA) between the DoN, United States Environmental Protection Agency (USEPA) Region IV and the North Carolina Department of Environment, Health and Natural Resources (NC DEHNR).

MCB Camp Lejeune and the DoN, with the assistance of the USEPA Region IV and the NC DEHNR, will select a remedy for Sites 41 and 74 following the public comment period and the review and consideration of information submitted during this time. Depending on public comments and/or new information, the Final Record of Decision (ROD) may recommend a different remedial action than is presented in this PRAP.

The primary objectives of this PRAP are: to describe the remedial options considered in the Remedial Investigation/Feasibility Study (RI/FS) Reports; to solicit public review of and comments on all of the remedial options; provide information concerning public involvement; and identify the preferred alternative for remedial actions at OU No. 4.

This PRAP summarizes information that can be found in greater detail in the RI/FS Reports prepared for OU No. 4 and other documents referenced in the RI/FS Reports. This PRAP is not intended to be a substitute for the RI/FS Reports, and the DoN encourages the public to review these documents in order to gain a more comprehensive understanding of each site. The Administrative Record file, which contains information on which the selection of the remediation action will be based, is available for public review at the Onslow County Public Library in Jacksonville, North Carolina and at MCB Camp Lejeune Building 67, Room 238, Camp Lejeune, North Carolina. The public is invited to review and comment on the Administrative Record and this PRAP.

This PRAP is organized into seven additional sections. Section 2.0 describes background information for each site, while Section 3.0 presents the scope and role of the proposed remedial actions. A summary of the site risks is provided in Section 4.0; and a summary of the RI/FS alternatives is presented in Section 5.0. The evaluation of the RI/FS alternatives is presented in Section 6.0, and Section 7.0 presents the preferred alternatives for Sites 41 and 74. Section 8.0 provides information related to community participation in the decision making process.

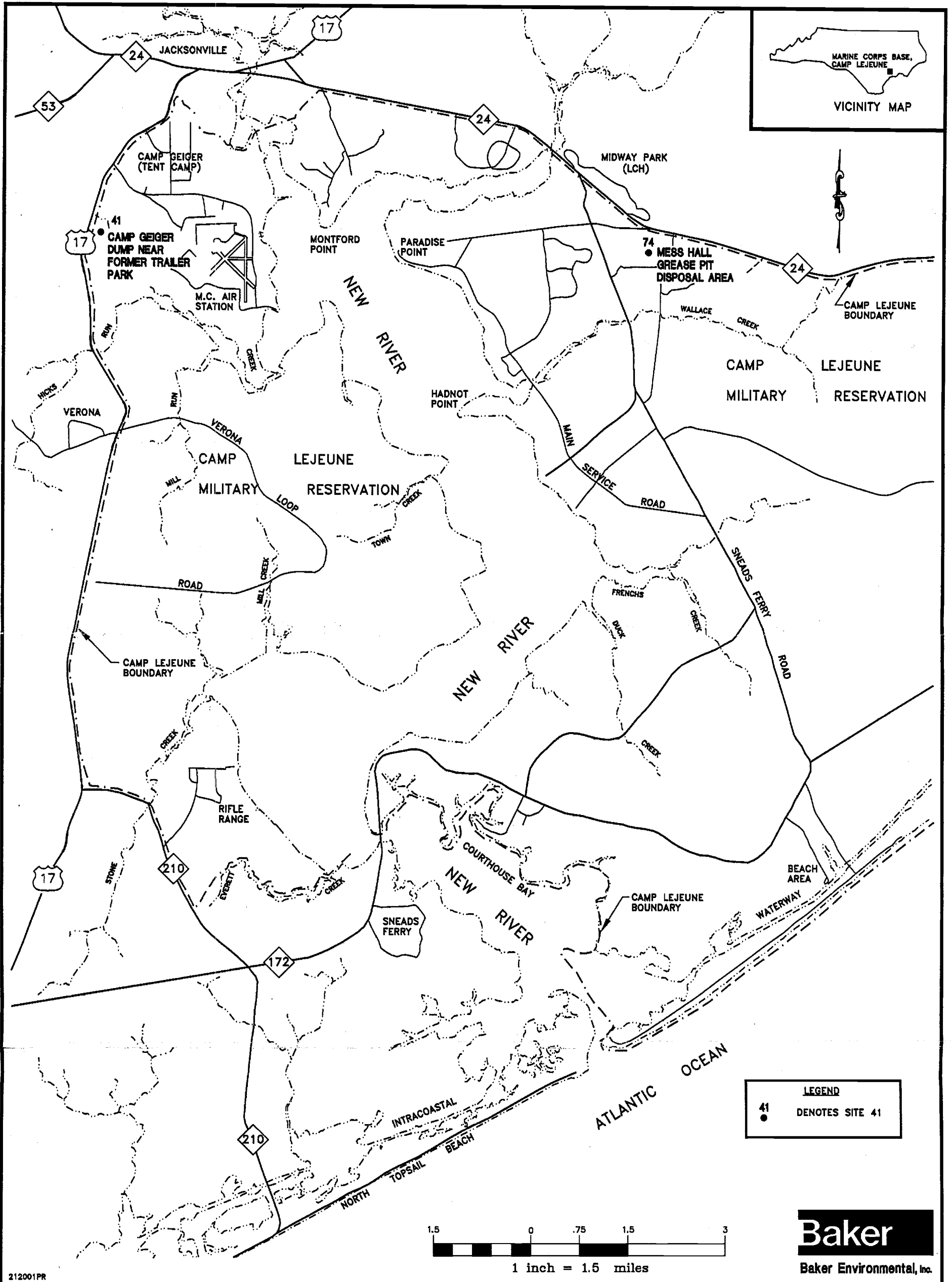
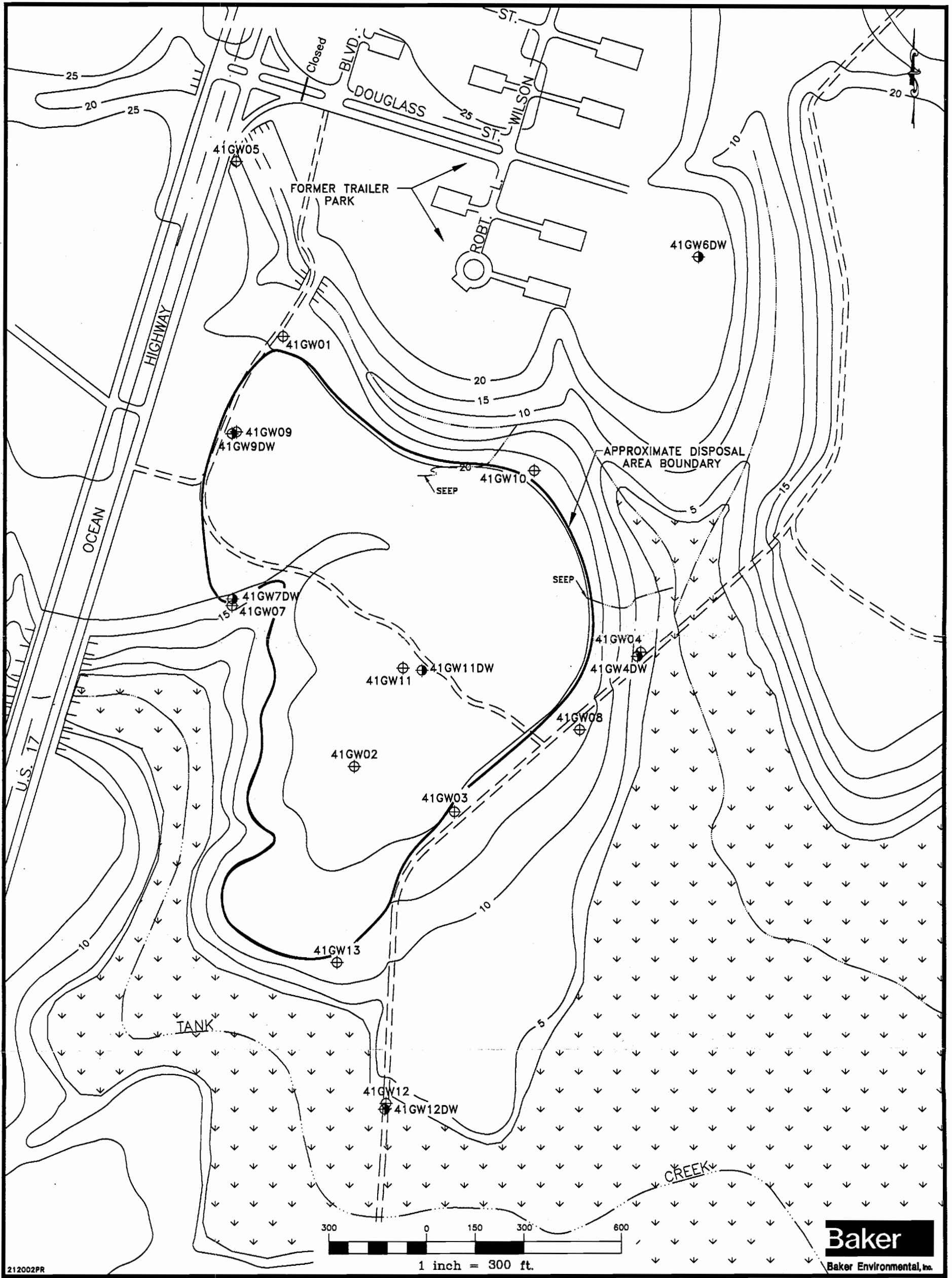


FIGURE 1
 LOCATION MAP, OPERABLE UNIT No. 4
 SITES 41 AND 74
 PROPOSED REMEDIAL ACTION PLAN CTO-0212
 MARINE CORPS BASE, CAMP LEJEUNE
 NORTH CAROLINA

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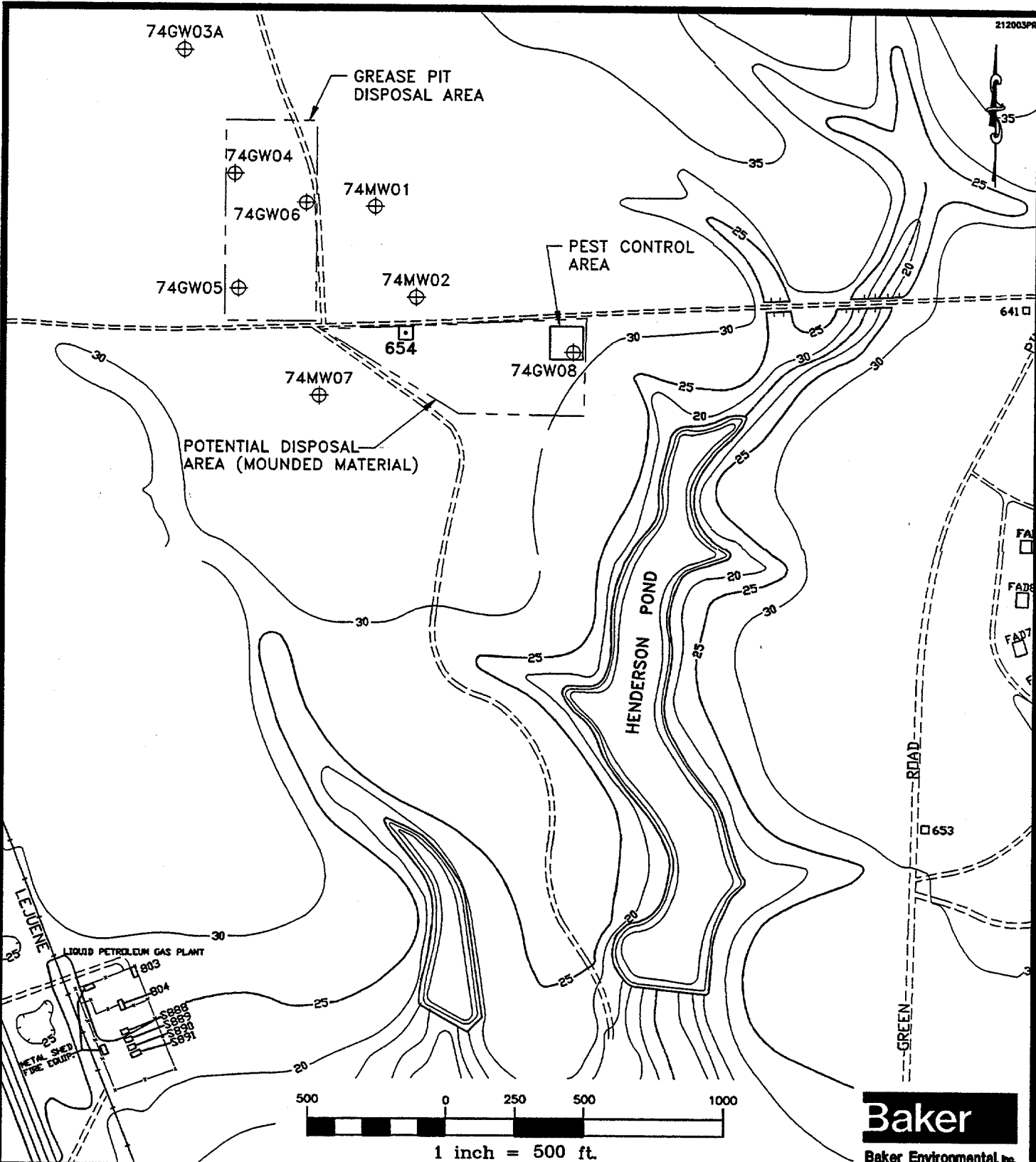
LEGEND

⊕	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

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LEGEND

- 74MW01 SHALLOW MONITORING WELL
- 654 WATER SUPPLY WELL
- UNPAVED ROAD
- TOPOGRAPHIC ELEVATION LINES (FEET, MEAN SEA LEVEL)

SOURCE: LANTDIV, FEB. 1994

FIGURE 3
GENERAL ARRANGEMENT MAP
SITE 74 - MESS HALL
GREASE PIT DISPOSAL AREA
PROPOSED REMEDIAL ACTION PLAN CTO-0212
MARINE CORPS BASE, CAMP LEJEUNE
NORTH CAROLINA

2.0 SITE BACKGROUND

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.

Operable Unit No. 4 is one of 14 OUs within MCB Camp Lejeune, and 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.

2.1 Site Descriptions and Histories

2.1.1 Site 41

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.

Site 41 was used as an open burn dump from 1946 to 1970. The dump received construction debris, petroleum, oil and lubricant (POL) wastes, mirex (a pesticide), solvents, batteries, and ordnance. The ordnance may have been buried prior to disposal, but may also be present as unexploded ordnance (UXO). Additionally, CWM [(suspected to be chemical agent identification sets (CAIS))] was reportedly taken to Site 41 for disposal.

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.

Groundwater on site currently is not used for any purpose. Potable water throughout the Base is supplied by wells located in the mid and lower regions of the Castle Hayne Aquifer. The shallow aquifer is not used as a potable water supply on Base. However, both the shallow and upper Castle Hayne Aquifers are classified as GA waters under the North Carolina Water Quality Standards (NCWQSs), which are current or potential sources of drinking water. There are no groundwater production wells located immediately downgradient of Site 41. The nearest downgradient supply wells are located approximately 1.1 miles southeast of the site.

2.1.2 Site 74

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, based on periodic sampling by the Base.

Site 74 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 in trenches. One internal memorandum reports 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. 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 discernable.

Site 74 has been fenced as part of MCB Camp Lejeune's institutional controls.

2.2 Previous Site Investigations

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. The following sections summarize the activities performed under these studies/ investigations.

2.2.1 Initial Assessment Study

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.

2.2.2 Confirmation Study

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.

2.2.3 Pre-Remedial Investigation Activities

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 to determine data needs for the RI.

2.2.4 Remedial Investigations

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.

2.3 Nature and Extent of Contamination

A summary of the nature and extent of contamination for both sites is presented in the following sections. A listing of the contaminants detected at Sites 41 and 74 is presented in Section 4.0 of this PRAP.

2.3.1 Site 41 Nature and Extent of Contamination

The major findings of the RI conducted for Site 41 are summarized below.

- 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 first round of 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. This 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 metals 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 USEPA 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 areas that were not detected by the soil boring program could still be present within the former disposal area.

2.3.2 Site 74 Nature and Extent of Contamination

The major findings of the RI conducted for Site 74 are summarized below.

- 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 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 areas that were not detected by 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, only iron exceeded the State and Federal drinking water standards. Dissolved (filtered samples) metals in shallow groundwater were not elevated during the low-flow sampling event.

3.0 SCOPE AND ROLE OF ACTION

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 material 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 and this PRAP, 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.

4.0 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.

4.1 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 COCs for each medium of concern for Sites 41 and 74. The COCs identified at Site 41 for the soil/landfill material, groundwater, and seep surface water include PAHs, pesticides, 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.

Incremental cancer risk (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 hazard index (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 noncarcinogenic health effects. Table 2 presents a summary of the total ICRs and HIs calculated for the various media at Sites 41 and 74.

TABLE 1
CONTAMINANTS OF CONCERN
OPERABLE UNIT NO. 4
SITES 41 AND 74
PROPOSED REMEDIAL ACTION PLAN
MCB CAMP LEJEUNE, NORTH CAROLINA

Contaminant of Concern	Surface Soil		Subsurface Soil		Groundwater		Surface Water		Sediment	
	41	74	41	74	41	74	41	74	41	74
Volatile Organic Compounds										
Trichloroethene		X							X	X
Toluene									X	
Chlorobenzene					X		X			
Total 1,2-Dichloroethene					X					
Acetone									X	
Methylene Chloride									X	
Semivolatile Organic Compounds										
Bis(2-chloroethyl)ether	X									
Di-n-Octylphthalate									X	
Di-n-Butylphthalate									X	
3,3-Dichlorobenzidine										X
Ordinance										
1,3,5-Trinitrobenzene									X	
Polycyclic Aromatic Hydrocarbons										
Anthracene	X									
Benzo(a)anthracene	X									
Benzo(a)pyrene	X		X						X	
Benzo(b)fluoranthene	X								X	
Benzo(g,h,i)perylene	X		X							
Benzo(k)fluoranthene	X								X	
Chrysene	X									
Fluoranthene	X		X						X	
Phenanthrene	X		X							
Pyrene	X		X						X	
Naphthalene			X							
2-Methylnaphthalene			X							

TABLE 1 (Continued)

CONTAMINANTS OF CONCERN
 OPERABLE UNIT NO. 4
 SITES 41 AND 74
 PROPOSED REMEDIAL ACTION PLAN
 MCB CAMP LEJEUNE, NORTH CAROLINA

Contaminant of Concern	Surface Soil		Subsurface Soil		Groundwater		Surface Water		Sediment	
	41	74	41	74	41	74	41	74	41	74
Pesticides/PCBs										
Heptachlor	X	X	X	X		X				
Heptachlor Epoxide	X	X	X							
Dieldrin	X	X	X						X	
4,4'-DDE	X	X	X	X					X	X
4,4'-DDT	X	X	X	X			X		X	X
4,4'-DDD	X	X	X	X					X	
Endrin Aldehyde	X	X	X							X
alpha-Chlordane	X	X	X			X			X	
gamma-Chlordane	X	X	X						X	
gamma-BHC							X			
Endosulfan II	X		X			X			X	X
Aldrin			X							
Endrin			X							
Endosulfan I			X							
PCB-1254			X						X	
PCB-1260			X							
PCB-1242									X	
alpha-BHC					X					
Methoxychlor									X	X
Endrin Ketone									X	
Inorganics										
Arsenic	X	X	X	X	X	X			X	
Barium	X	X	X	X	X	X	X		X	X
Beryllium	X		X		X	X			X	
Cadmium	X				X					
Cobalt					X					
Chromium	X	X	X	X	X	X	X		X	X
Copper	X		X						X	
Lead	X		X		X	X	X	X	X	X
Nickel	X	X			X				X	
Manganese	X	X	X	X	X	X	X		X	X

TABLE 1 (Continued)
CONTAMINANTS OF CONCERN
OPERABLE UNIT NO. 4
SITES 41 AND 74
PROPOSED REMEDIAL ACTION PLAN
MCB CAMP LEJEUNE, NORTH CAROLINA

Contaminant of Concern	Surface Soil		Subsurface Soil		Groundwater		Surface Water		Sediment	
	41	74	41	74	41	74	41	74	41	74
Inorganics (continued)										
Mercury	X		X				X		X	
Selenium		X			X				X	
Thallium									X	
Vanadium	X	X	X	X	X	X			X	X
Zinc	X	X	X	X	X	X	X		X	X
Cyanide		X	X	X						

X - Selected as risk-based and/or criteria-based COC

TABLE 2
TOTAL SITE INCREMENTAL LIFETIME CANCER RISK AND
HAZARD INDICES
OPERABLE UNIT NO 4 - SITES 41 AND 74
PROPOSED REMEDIAL ACTION PLAN
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	8.08
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.

4.1.1 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. 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.

4.1.2 Site 74

The identified media of concern do not pose unacceptable risks to human health for the current site use. As part of the Risk Assessment, ICRs and HIs were calculated for each group of potentially exposed populations. 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. 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.

4.2 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, they do not serve the purpose of providing an ecological habitat. Metal concentrations in surface water and sediment samples taken from 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 for adverse impacts to threatened or endangered species is low due to the absence of critical habitats and low levels of contamination at Sites 41 and 74.

5.0 SUMMARY OF REMEDIAL ALTERNATIVES

A detailed analysis of the possible remedial alternatives for Sites 41 and 74 was conducted as part of the FS Report.

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 landfill 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.

A summary of each remedial alternative identified in the FS report is presented below for each site.

5.1 Site 41

The following remedial alternatives were developed for Site 41:

Soil/Landfill Material (SO) Alternatives

- 41SO-1: No Action
- 41SO-2: Institutional Controls

Groundwater and Seep Surface Water (GW) Alternatives

- 41GW-1: No Action
- 41GW-2: Institutional Controls and Monitoring
- 41GW-3: Seep Collection and Treatment with Institutional Controls and Monitoring
 - ▶ 41GW-3a: Physical/Chemical Treatment
 - ▶ 41GW-3b: Constructed Wetlands Treatment
- 41GW-4: Groundwater Extraction and Treatment with Institutional Controls and Monitoring

- ▶ 41GW-4a: Physical/Chemical Treatment
- ▶ 41GW-4b: Constructed Wetlands Treatment

A brief description of each remedial alternative, as well as the estimated costs and timeframe to implement the remedial alternative, are provided below.

5.1.1 Soil/Landfill Material Alternatives

Alternative 41SO-1: No Action

Description: The No Action Alternative is required by the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) to provide a baseline comparison for other remedial alternatives. Under this alternative, no remedial action would be performed to reduce the toxicity, mobility, or volume of soil contamination or waste at Site 41.

Cost: There are no costs associated with this alternative.

Timeframe: None.

Alternative 41SO-2: Institutional Controls

Description: Under this alternative, institutional controls would be implemented to limit access and control future use of Site 41. These institutional controls would involve designation of the area as a restricted, or a limited-use area. The site would be given a land use category in the Base Master Plan that would prohibit residential use of the area, as well as, invasive construction activities. If additional control is needed, several warning signs could be posted around the site to indicate that wastes are buried and that construction activities are prohibited.

Cost: There are no capital or operation and maintenance costs associated with this alternative. Labor costs to revise the Base Master Plan have not been estimated.

Timeframe: Institutional controls could be implemented within a 1-year period.

5.1.2 Groundwater and Seep Surface Water Alternatives

Alternative 41GW-1: No Action

Description: Under this alternative, no actions would be taken to contain or treat potentially contaminated groundwater and associated surface water in the seeps at Site 41.

Cost: There are no costs associated with this alternative.

Timeframe: None.

Alternative 41GW-2: Institutional Controls and Monitoring

Under this alternative, a groundwater, surface water, and sediment sampling program would be initiated for Site 41. Potential contamination present in the former disposal area could, in the future, act as a source of groundwater, surface water, and sediment contamination. Contaminant trends would be analyzed using analytical results from groundwater and surface water/sediment monitoring programs to assess whether any portion of the former disposal area is acting as a source of groundwater contamination over the long term. Initially, surface water and groundwater sampling would be conducted on a semi-annual basis (i.e., two times per year) until a stable or decreasing trend in contaminant levels was observed. Once a reliable trend is established, the frequency of monitoring would be reduced to an annual basis.

In addition to the environmental monitoring program, institutional controls would be implemented to restrict groundwater usage in the vicinity of the site. Site 41 would be given a groundwater use category in the Base Master Plan that would prohibit installation of potable water supply wells within a 500-foot radius from the site boundary.

Cost: The estimated costs of this alternative are as follows:

- Capital: \$0
- Annual Operation and Maintenance: \$38,500
- Net Present Worth (30-year): \$592,000

Timeframe: The monitoring program and institutional controls could be implemented within a 1-year period.

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

The main intent of this alternative is to provide protection of ecological receptors from future potential exposure to contaminated surface water resulting from groundwater discharge via the seeps. Through collection and treatment of the seep water, the ecological receptors would be protected from future potential exposure.

This alternative includes collection of the seeps in subsurface drains and routing by gravity flow to a treatment system prior to discharge to the unnamed tributary. This alternative includes two subalternatives for treatment of the seep water as follows:

- Subalternative 41GW-3a - Physical/Chemical Treatment
- Subalternative 41GW-3b - Constructed Wetlands Treatment

The conceptual design developed for this alternative includes the following:

- Installation of approximately 400 linear feet of seep collection trenches along the north and east seeps.
- Installation of approximately 900 linear feet of gravity flow subsurface conduit.

- Construction of a Physical Chemical Treatment Plant (Subalternative 41GW-3a) or a Constructed Wetlands Treatment System (Subalternative 41GW-3b).
- Upgrade the access road into the site.
- Extension of electrical service to the Physical/Chemical Treatment Plant (Subalternative 41GW-3a).

As with Alternative 41GW-2, a groundwater, surface water, and sediment sampling program would be initiated for the site. In addition to the environmental monitoring program, the same institutional controls would be implemented under this alternative as described under Alternative 41GW-2.

Cost: The estimated costs of the two subalternatives included under this alternative are as follows:

Subalternative 41GW-3a

- Capital: \$618,000
- Annual Operation and Maintenance: \$82,000
- Net Present Worth (30-year): \$1,878,000

Subalternative 41GW-3b

- Capital: \$264,000
- Annual Operation and Maintenance: \$49,800
- Net Present Worth (30-year): \$1,029,000

Timeframe: Approximately 1 to 1.5 years would be required to design and construct the treatment systems under both subalternatives.

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

This alternative is intended to provide collection and treatment of shallow groundwater in order to: protect uncontaminated groundwater for future potential beneficial use; restore contaminated groundwater for future potential beneficial use; and protect ecological receptors from future potential exposure to contaminated surface water resulting from groundwater discharge.

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, this alternative includes two subalternatives for treatment of the extracted water as follows:

- Subalternative 41GW-4a - Physical/Chemical Treatment
- Subalternative 41GW-4b - Constructed Wetlands Treatment

The conceptual design developed for this alternative includes the following:

- Installation of three shallow groundwater extraction wells along the eastern edge of the former disposal area, between the north and east seeps.

- Installation of approximately 1,200 linear feet of influent and effluent subsurface piping.
- Construction of a Physical/Chemical Treatment Plant (Subalternative 41GW-4a) or a Constructed Wetlands Treatment System (Subalternative 41GW-4b).
- Upgrade the access road into the site.
- Extension of electrical service to the Physical/Chemical Treatment Plant (Subalternative 41GW-4a).

The groundwater extraction system would be used to extract and contain groundwater contaminated above the cleanup goals developed for the shallow aquifer (i.e., NCWQS). If possible, the system would be operated until groundwater cleanup goals are achieved. However, these levels may be impossible to achieve since it has been demonstrated that groundwater contaminant levels typically reach asymptotic levels, which may exceed NCWQS. Performance curves would be periodically (e.g., annually) developed to monitor the effectiveness of the groundwater remediation system. If the performance curves indicate that asymptotic levels have been reached, which exceed NCWQS for some contaminants, then the cleanup goals would be re-evaluated at that time. The re-evaluation would be conducted according to the Correction Action requirements of the DEHNR Classifications and Water Quality Standards Applicable to Groundwaters of North Carolina. Under this regulation, the DEHNR Director may authorize termination of the corrective action if it can be demonstrated that continuation of the action would not result in a significant reduction in the concentrations of contaminants, and if certain other environmental criteria can be met.

As with Alternative 41GW-2, a groundwater, surface water, and sediment sampling program would be initiated for Site 41. In addition to the environmental monitoring program, the same institutional controls would be implemented under this alternative as described under Alternative 41GW-2.

Cost: The estimated costs of the two subalternatives included under this alternative are as follows:

Subalternative 41GW-4a

- Capital: \$675,000
- Annual Operation and Maintenance: \$83,500
- Net Present Worth (30-year): \$1,959,000

Subalternative 41GW-4b

- Capital: \$938,000
- Annual Operation and Maintenance: \$61,800
- Net Present Worth (30-year): \$1,887,000

Timeframe: Approximately 1.5 to 2 years would be required to design and construct the treatment systems under both subalternatives.

5.2 Site 74

The following remedial alternatives were developed for Site 74:

Soil/Landfill Material

- 74SO-1: No Action
- 74SO-2: Institutional Controls

Groundwater

- 74GW-1: No Action
- 74GW-2: Institutional Controls and Monitoring

A brief description of each alternative, as well as, the estimated costs and timeframe to implement the alternative, are presented below.

5.2.1 Soil/Landfill Material Alternatives

Alternative 74SO-1: No Action

Description: The No Action Alternative is required by the NCP to provide a baseline comparison for other remediation alternatives. Under this alternative, no remedial action would be performed to reduce the toxicity, mobility, or volume of soil contamination or waste at Site 74.

Cost: There are no costs associated with this alternative.

Timeframe: None.

Alternative 74SO-2: Institutional Controls

Description: Under this alternative, institutional controls would be implemented to further limit access and control future use of Site 74. These institutional controls would involve designation of the area as a restricted, or limited-use area. The site would be given a land use category in the Base Master Plan that would prohibit residential use of the area, as well as, invasive construction activities. In addition to the existing fencing, warning signs could be posted around the site to indicate that wastes are buried and that construction activities are prohibited.

Cost: There are no capital or operation and maintenance costs associated with this alternative. Labor costs to revise the Base Master Plan have not been estimated.

Timeframe: Institutional controls could be implemented within a 1-year period.

5.2.2 Groundwater Alternatives

Alternative 74GW-1: No Action

Description: Under this alternative, no actions would be taken to contain or treat potentially contaminated groundwater at Site 74. The No Action Alternative is required by the NCP to provide a baseline comparison for other remedial alternatives.

Cost: There are no costs associated with this alternative.

Timeframe: None.

Alternative 74GW-2: Institutional Controls and Monitoring

Description: Under this alternative, a groundwater sampling program would be initiated for Site 74. Initially, groundwater sampling would be conducted on a semi-annual basis (i.e., two times per year) until a stable or decreasing trend in contaminant levels was observed. Once a reliable trend is established, the frequency of monitoring would be reduced to an annual basis.

In addition to the environmental monitoring program, institutional controls would be implemented under this alternative to restrict groundwater usage in the vicinity of the site. Site 74 would be given a groundwater use category in the Base Master Plan that would prohibit installation of potable water supply wells on site.

Cost: The estimated costs for this alternative are as follows:

- Capital: \$0
- Annual Operation and Maintenance: \$22,300
- Net Present Worth (30-year): \$342,000

Timeframe: A monitoring program and institutional controls could be implemented within a 1-year time frame.

6.0 EVALUATION OF ALTERNATIVES

In order to determine the preferred alternatives, the remedial alternatives were evaluated against the nine evaluation criteria identified in the USEPA's publication entitled "Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA." A summary of the nine evaluation criteria is presented in Table 3.

Two of the nine evaluation criteria are USEPA/State and Community Acceptance. Both the USEPA and NC DEHNR (the State) have reviewed this PRAP and concur with the preferred alternatives. However, based on new information and/or public comments, the DoN (in consultation with USEPA and NC DEHNR), may modify the preferred alternatives or select other remedial alternatives. Therefore, the public is encouraged to review and comment on all of the remedial alternatives, as well as other information presented herein and in the RI/FS Reports. Following a review of the public comments, the Community Acceptance criterion will be assessed in the Responsiveness Summary within the ROD.

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

6.1 Site 41 Soil/Landfill Material Alternatives

6.1.1 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.

6.1.2 Compliance with ARARs

There are no State or Federal contaminant-specific ARARs associated with 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.

6.1.3 Long-term Effectiveness and Permanence

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

6.1.4 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.

TABLE 3

**SUMMARY OF EVALUATION CRITERIA
OPERABLE UNIT NO. 4
SITES 41 AND 74
PROPOSED REMEDIAL ACTION PLAN
MCB CAMP LEJEUNE, NORTH CAROLINA**

- **Overall Protection of Human Health and Environment** - addresses whether or not an alternative provides adequate protection and describes how risks posed through each pathway are eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls.
- **Compliance with ARARs** - addresses whether or not an alternative will meet all of the applicable or relevant and appropriate requirements (ARARs) or other federal and state environmental statutes 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** - is 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 during the construction and implementation period.
- **Implementability** - is 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, and for comparative purposes, net present worth values.
- **USEPA/State Acceptance** - indicates whether, based on review of the RI and FS Reports and the PRAP, the USEPA and State concur with, oppose, or have no comments on the preferred alternative.
- **Community Acceptance** - will be addressed in the Record of Decision following a review of the public comments received on the RI and FS Reports and the PRAP.

6.1.5 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.

6.1.6 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.

6.1.7 Cost

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

6.2 Site 41 Groundwater and Seep Surface Water Alternatives

6.2.1 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 to 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.

6.2.2 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 must comply with the Corrective Action requirements of Chapter 2L of the North Carolina Administrative Code (Section .0106), demonstrating that groundwater restoration using 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 best available technology to restore groundwater to drinking water standards. Alternative 41GW-4 may reduce lead concentrations below the EPA Action Level and NCWQS standard; 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.

6.2.3 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.

6.2.4 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.

6.2.5 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.

6.2.6 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.

6.2.7 Cost

The estimated 30-year net present worth costs 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

6.3 Site 74 Soil/Landfill Material Alternatives

6.3.1 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.

6.3.2 Compliance with ARARs

There are no contaminant-specific ARARs for 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.

6.3.3 Long-term Effectiveness and Permanence

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

6.3.4 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.

6.3.5 Short-term Effectiveness

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

6.3.6 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.

6.3.7 Cost

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

6.4 Site 74 Groundwater Alternatives

6.4.1 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.

6.4.2 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.

6.4.3 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.

6.4.4 Reduction of Toxicity, Mobility, or Volume

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

6.4.5 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.

6.4.6 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.

6.4.7 Cost

There are no costs associated with Alternative 74GW-1. The estimated 30-year net present worth of Alternative 74GW-2 is \$342,000.

7.0 THE PREFERRED ALTERNATIVES

The Preferred Alternative for each medium of concern is 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 preferred alternatives appears to provide the best balance with respect to the seven CERCLA evaluation criteria described in Section 6.0 of this PRAP. Additionally, the preferred alternatives 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 preferred alternatives for the various media of concern are briefly described below.

7.1 Summary of the Preferred Alternatives

7.1.1 Sites 41 and 74 Soil/Landfill Material

As noted, the preferred alternative 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 would include: limiting site access via designation as a restricted area and control of future site use via designation in the Base Master Plan prohibiting invasive construction and residential use. This preferred alternative is anticipated to reduce the future invasive construction risks, and provide a long-term solution for restricted site use.

7.1.2 Site 41 Groundwater and Seep Surface Water

The preferred alternative 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 would 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 preferred alternative would restrict groundwater usage in the vicinity of Site 41. A designation in the Base Master Plan would prohibit installation of potable water supply wells within 500 feet of the boundary of the site.

This preferred alternative would 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 would be provided since contaminant levels are marginal, and periodic sampling is a reliable means of tracking contaminant migration.

7.1.3 Site 74 Groundwater

Institutional controls and monitoring for groundwater at Site 74 (74GW-2), would 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 would officially designate a groundwater use category prohibiting installation of potable water supply wells on site.

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

7.2 Compliance with North Carolina Corrective Action Requirements (15 NCAC 2L.0106)

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 NCWQSSs, primarily for iron and manganese.

8.0 COMMUNITY PARTICIPATION

Community involvement is a critical part of the selection of the remedial action alternatives. The information in this section of the PRAP is provided in order to obtain input from the community relating to the selection of the remedial action alternatives for MCB Camp Lejeune, OU No. 4, Sites 41 and 74.

8.1 Public Comment Period

The public comment period for this Proposed Remedial Action Plan for Sites 41 and 74 of Operable Unit No. 4, MCB Camp Lejeune will begin on May 10, 1995, and end on June 10, 1995. Written comments regarding this PRAP should be sent to:

Commander
Atlantic Division Naval Facilities Engineering Command
1510 Gilbert Street (Building N-26)
Norfolk, Virginia 23511-2699
Attention: Ms. Linda Saksvig, P.E., Code 1823

A public meeting will be held at the Onslow County Public Library on May 10, 1995 at 7:00 p.m. The purpose of the meeting will be to answer questions and accept public comments on the PRAP for Sites 41 and 74.

8.2 Information Repository

A collection of information related to OU No. 4, Sites 41 and 74, including The Administrative Record previously mentioned, is available for review at the following locations:

Onslow County Public Library
58 Doris Avenue East
Jacksonville, NC 28540
(910) 455-7350

Hours of operation:

Monday - Thursday: 9:00 a.m. to 9:00 p.m.
Friday - Saturday: 9:00 a.m. to 6:00 p.m.
Sunday: Closed

MCB, Camp Lejeune
Building 67, Room 238
Marine Corp Base
Camp Lejeune, NC 28542
(910) 451-5068

Hours of operation:

Monday - Friday: 7:00 a.m. to 4:00 p.m.
Saturday - Sunday: Closed

8.3 Operable Unit No. 4 Questions

Should any questions regarding this Proposed Remedial Action Plan for Site 41 or Site 74 arise, please contact one of the following individuals:

Commanding General
AC/S EMD (IRD)
Marine Corps Base
PSC Box 20004
Camp Lejeune, NC 28542-0004
Attention: Mr. Neal Paul
(910) 451-5068

Commander
Atlantic Division
Naval Facilities Engineering Command
1510 Gilbert Street (Building N-26)
Norfolk, Virginia 23511-2699
Attention: Ms. Linda Saksvig, P.E., Code 1823
(804) 322-4793

Remedial Project Manager
U.S. EPA, Region IV
345 Courtland Street, NE
Atlanta, Georgia 30365
Attention: Ms. Gena Townsend
(404) 347-3016

NC Department of Environment, Health, and Natural Resources
Division of Solid Waste Management
Superfund Section
P.O. Box 27687
Raleigh, North Carolina 27611-7687
Attention: Mr. Patrick Watters
(919) 733-2801

Community Information Line
Public Affairs Office
Marine Corps Base
PSC Box 2004
Camp Lejeune, North Carolina 28542-0004
Attention: Major Stephen Little
(910) 451-5782

8.4 Mailing List

If you are not currently on the mailing list and would desire to receive further publications pertaining to Operable Unit No. 4, Sites 41 and 74, please complete the requested information and mail this form to:

Commanding General
AC/S EMD (IRD)
Marine Corps Base
PSC Box 20004
Building 67
Camp Lejeune, NC 28452-0004
Attention: Mr. Neal Paul

Name: _____
Address: _____
Affiliation: _____
Phone: () _____