07.02-09/12/97-01764

FINAL

FISCAL YEAR 1998 SITE MANAGEMENT PLAN FOR MARINE CORPS BASE, CAMP LEJEUNE, NORTH CAROLINA

CONTRACT TASK ORDER 0099

SEPTEMBER 12, 1997

Prepared For:

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

Under:

LANTDIV CLEAN Program
Contract N62470-89-D-4814

Prepared by:

BAKER ENVIRONMENTAL, INC.
Coraopolis, Pennsylvania

TABLE OF CONTENTS

TABLE OF CONTENTS
(Continued)

LIST OF TABLES

LIST OF FIGURES

LIST OF ACRONYMS AND ABBREVIATIONS

AOC	Area of Concern
ADL	Administrative Deadline Lot
ARARs	Applicable or Relevant and Appropriate Requirements
AST	Aboveground Storage Tank
AWQC	Ambient Water Quality Criteria
Baker	Baker Environmental, Inc.
bgs	Below Ground Surface
BTEX	benzene, toluene, ethylbenzene, and total xylenes
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CLEAN	Comprehensive Long-Term Environmental Action Navy
CSA	Comprehensive Site Assessment
CWM	Chemical Warfare Material
DDD	dichlorodiphenyldichloroethane
DDE	dichlorodiphenyldichloroethylene
DDT	dichlorodiphenyltrichloroethane
DoN	Department of the Navy
DRMO	Defense Reutilization Office
ESD	Explanation of Significant Difference
ESE	Environmental Science and Engineering, Inc.
FFA	Federal Facilities Agreement
FSSG	Force Service Support Group
HPIA	Hadnot Point Industrial Area
IAS	Initial Assessment Study
IRA	]Interim Remedial Action
IRP	Installation Restoration Program
LANTDIV	Naval Facilities Engineering Command, Atlantic Division
MCAS	Marine Corps Air Station
MCB	Marine Corps Base
MCL	Maximum Contaminant Level
MEB	Marine Expeditionary Brigade
MEF	Marine Expeditionary Force
MORFORLANT	Marine Forces Atlantic
NACIP	Navy Assessment and Control of Installation Pollutants
NC DEHNR	North Carolina Department of Environment, Health and Natural Resources

LIST OF ACRONYMS AND ABBREVIATIONS
(Continued)

NC	North Carolina
NCP	National Oil and Hazardous Substances Pollution Control Contingency Plan
NCWQS	North Carolina Water Quality Standards
NPL	National Priorities List
OU	Operable Unit
PAH	polynuclear aromatic hydrocarbon
PCB	polychlorinated biphenyls
PCE	tetrachloroethene
POL	petroleum, oil, lubricant
ppm	part per million
PRAP	Proposed Remedial Action Plan
RA	Remedial Action
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
ROICC	Resident Officer in Charge of Construction
SARA	Superfund Amendments and Reauthorization Act
SGI	Supplemental Groundwater Investigation
SMP	Site Management Plan
STP	Sewage Treatment Plant
SVE	Soil Vapor Extraction
SVOC	Semivolatile Organic Compound
TAL	Target Analyte List
TCE	trichloroethene
TCL	Target Compound List
TCRA	Time Critical Removal Action
TPH	total petroleum hydrocarbon
µg/L	Microgram per Liter
µg/kg	Microgram per Kilogram
USEPA	United States Environmental Protection Agency
UST	underground storage tank
VOC	volatile organic contaminant
WAR	Water and Air Research

1.0 INTRODUCTION

This report presents the Fiscal Year 1998 update of the Site Management Plan (SMP) for Marine Corps Base (MCB) Camp Lejeune, North Carolina. The purpose of the SMP is to present the planned activities to be conducted at the Installation during Fiscal Year 1998 and to provide projection for long-term progress at the facility in accordance with the Department of the Navy's Installation Restoration Program (IRP). This report has been prepared by Baker Environmental, Inc. (Baker) for the Atlantic Division, Naval Facilities Engineering Command (LANTDIV).

1.1 Description of the Facility

MCB Camp Lejeune is located in Onslow County, North Carolina (see Figure 1-1). There are six major Marine Corps and two Navy Commands aboard MCB Camp Lejeune: Marine Corps Base owns all the real estate, operates entry-level formal training schools, and provides support and training for tenant commands; Headquarters, Marine Forces Atlantic (MORFORLANT), Headquarters Nucleus, II Marine Expeditionary Force (II MEF), provides command for all East Coast Marine Forces; 2d Marine Division (2d MAR DIV) is the ground combat element of the Force; 2d Force Service Support Group (2d FSSG) is the service and support element of the Force; 2d Surveillance, Reconnaissance and Intelligence Group (2d SRIG) obtains, produces, and releases information and intelligence during planning and execution of exercises and combat operations; 6th Marine Expeditionary Brigade (6th MEB) provides the planning staff for the Fleet Marine Force associated with Maritime Prepositioning Ships Squadron-I; the Naval Hospital and the Naval Dental Clinic provide primary medical and dental care to Marines and sailors stationed at Camp Lejeune and medical care to their families.

The Marine Corps Air Station (MCAS), New River, and Camp Geiger are considered as a single urban area possessing two separate missions and supported by two unrelated groups of personnel. The MCAS, New River encompasses 2,772 acres and is located in the northwestern section of the Complex and lies approximately five miles south of Jacksonville. The Air Station includes air support activities, troop housing, and personnel support facilities, all of which immediately surround the aircraft operations and maintenance areas.

Camp Geiger, located directly north of MCAS, New River contains a mixture of troop housing, personnel support, and training uses.

The installation currently covers approximately 236 square miles and is bisected by the New River which flows in a southeasterly direction and forms a large estuary before entering the Atlantic Ocean. The Atlantic Ocean forms the southeastern boundary of the facility. The City of Jacksonville, North Carolina is located immediately northwest of the facility. The western and northwestern boundaries are U.S. Route 17 and State Route 24, respectively. Within 15 miles are three large, publicly-owned tracts of land: Croatian National Forest, Hoffman Forest, and Camp Davis Forest. The remaining land use surrounding the facility is agricultural. Estuaries along the coast support commercial fishing. Tourism and residential resort areas have stimulated the regional economy. The facility is located in the Atlantic Coastal Plain on generally flat topography.

1.2 Environmental History of the Facility

The facility has been actively involved in various environmental investigation and remediation programs since 1983, beginning with the Navy Assessment and Control of Installation Pollutants

(NACIP) Program. The first study conducted under the NACIP to investigate potentially hazardous sites at MCB Camp Lejeune was an Initial Assessment Study (IAS). This study, which was conducted in 1983, identified areas of concern that may potentially cause threats to human health and the environment as a result of past storage, handling, and/or disposal of hazardous materials. Based on a review of historical records, field inspections, and personal interviews, 76 areas of concern (AOCs) were identified. The IAS concluded that, while none of the sites pose an immediate threat to human health or the environment, 22 sites warrant further investigation to assess long-term impacts. During preliminary investigation of the AOCs, an additional AOC (Site 78, Hadnot Point Industrial Area) was identified. Subsequent sampling and monitoring activities of these sites have been initiated since 1984.

The Department of Navy's IRP was initiated in 1986 following the legislation of the Superfund Amendments and Reauthorization Act (SARA). The IRP, which was implemented to follow the requirements of SARA, replaced the NACIP.

MCB Camp Lejeune was placed on the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) National Priorities List (NPL) effective October 4, 1989 (54 Federal Register 41015, October 4, 1989). Following the listing of MCB Camp Lejeune on the NPL, a Federal Facilities Agreement (FFA) between the United States Environmental Protection Agency Region IV (USEPA), the North Carolina Department of Environment, Health, and Natural Resources (DEHNR), and the Department of the Navy was signed in February 1991. The objectives of the FFA are:

- To ensure that the environmental impacts associated with past and present activities at MCB Camp Lejeune are thoroughly investigated and appropriate CERCLA response actions are developed and implemented as necessary to protect the public health, welfare and the environment;

- To establish a procedural framework and schedule for developing, implementing and monitoring appropriate response actions at MCB Camp Lejeune in accordance with CERCLA, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), and EPA policy relevant to remediation at MCB Camp Lejeune; and

- To facilitate cooperation, exchange of information and participation of the Parties in such action.

The FFA covers 23 sites at MCB Camp Lejeune. These sites are required to be investigated in accordance with the NCP, CERCLA, and SARA, under the terms and conditions of the FFA. Since then, additional sites have been added, based on the conclusions and recommendations identified by Site Inspections of other existing or newly-identified sites throughout MCB Camp Lejeune.

1.3 Purpose of the Site Management Plan

This Fiscal Year 1998 SMP is one of the primary documents identified in the FFA. The SMP documents the decisions and evaluations made during the project planning and scoping process for MCB Camp Lejeune. The SMP includes proposed deadlines for completion of primary documents, as specified in the FFA, to be submitted during Fiscal Year 1998. In addition, the SMP identifies Installation Restoration activities projected for the next five-year period (1998-2002).

1.4 Site Changes Since the Signing of the 1991 Federal Facilities Agreement

The FFA identified 23 sites where Remedial Investigation/Feasibility Study (RI/FS) activities were to be conducted. Since that time, two sites (Sites 22 and Site 45) have been relisted as Underground Storage Tank (UST) sites and will not require an RI/FS at this time.

Based on the results of Site Inspections conducted at MCB Camp Lejeune during the period 1991-1993, the following sites have been included under the RI/FS phase:

- Site 3 (Old Creosote Plant)
- Site 7 (Tarawa Terrace Dump)
- Site 43 (Agan Street Dump)
- Site 44 (Jones Street Dump)
- Site 54 (Crash Crew Fire Training Burn Pit)
- Site 63 (Verona Loop Dump)
- Site 65 (Engineer Area Dump)
- Site 80 (Paradise Point Golf Course Maintenance Area)
- Site 82 (VOC Disposal Area at Piney Green Road)

Based on findings from UST investigations conducted at MCB Camp Lejeune during 1994, the following sites have been included under the RI/FS phase:

- Site 88 (Building 25, Base Dry Cleaners)
- Site 89 (STC - 868)
- Site 90 (Building BB-9)
- Site 91 (Building BB-51)
- Site 92 (Building BB-46)
- Site 93 (Building TC-942)
- Site 94 (Building 1613)

As of May 1997, a total of 42 sites are included under the IRP at MCB, Camp Lejeune. Provided on Table 1-1 is a listing of all the sites, and Table 1-2 provides a status of activities to be conducted at all IR sites during FY98.

1.5 Recommended Amendments to the 1991 Federal Facilities Agreement

LANTDIV, MCB Camp Lejeune, USEPA Region IV, and the NC DEHNR are currently assessing the need to formally amend the FFA. Upon amending the FFA, a summary of the major changes will be outlined in this section of the SMP.

1.6 Format of the Site Management Plan

This SMP consists of seven sections. Section 1.0 (Introduction) explains the history of environmental activities at MCB Camp Lejeune, the purpose of the FFA, and the purpose of the SMP. Section 2.0 (Operable Units) describes the Operable Units at MCB Camp Lejeune that will be addressed in the SMP. A summary of ongoing and planned activities associated with these Operable Units is outlined in Section 3.0 (Operable Unit Scope of Work). Section 4.0 (IRP Management Schedules) provides estimated (and amended) schedules for conducting CERCLA activities for each Operable Unit. Detailed schedules are provided for those Operable Units that are

active or will be initiated in Fiscal Year 1998. Section 4.0 also includes schedules for those Operable Units that will be studied in Fiscal Years 1998-2002 and specific target submittal dates for draft primary and secondary documents for Fiscal Year 1998 through 2002. Ongoing and/or planned Pre-Remedial Investigation activities are presented in Section 5.0. Ongoing and/or planned removal actions are discussed in Section 6.0 (Removal/Interim Remedial Actions). References are provided in Section 7.0.

SECTION 1 TABLES

TABLE 1-1

SITES INCLUDED UNDER THE INSTALLATION RESTORATION PROGRAM FOR FISCAL YEAR 1998 MCB CAMP LEJEUNE, NORTH CAROLINA

Site No.	Site Description
1	French Creek Liquids Disposal Area
2	Former Nursery/Day-Care Center
3	Old Creosote Site
6	Storage Lots 201 and 203
7	Tarawa Terrace Dump
9	Fire Fighting Training Pit at Piney Green Road
10[2]	Original Base Dump
12 [2]	Explosive Ordnance Disposal (EOD-1, formerly known as G-4A)
16	Montford Point Burn Dump
21	Transformer Storage Lot 140
22 [1]	Industrial Area Tank Farm
24	Industrial Area Fly Ash Dump
28	Hadnot Point Burn Dump
30	Sneads Ferry Road - Fuel Tank Sludge Area
35	Camp Geiger Area Fuel Farm
36	Camp Geiger Area Dump near Sewage Treatment Plant
41	Camp Geiger Dump near Former Trailer Park
43	Agan Street Dump
44	Jones Street Dump
45 [1]	Campbell Street Underground AVGAS Storage and Adjacent JP Fuel Farm at Air Station
48	MCAS New River Mercury Dump Site
54	Crash Crew Fire Training Burn Pit
63	Verona Loop Dump
65	Engineer Area Dump
68 [2]	Rifle Range Dump
69	Rifle Range Chemical Dump
73	Courthouse Bay Liquids Disposal Area
74	Mess Hall Grease Pit Area
75[2]	MCAS Basketball Court Site
76[2]	MCAS Curtis Road Site
78	Hadnot Point Industrial Area
80	Paradise Point (Golf Course Maintenance Area)
82	VOC Disposal Area at Piney Green Road
84[2]	Building 45 Area
85[2]	Camp Johnson Battery Dump
86	Tank Area AS419-AS421 at MCAS

TABLE 1-1 (Continued)

SITES INCLUDED UNDER THE INSTALLATION RESTORATION PROGRAM FOR FISCAL YEAR 1998 MCB CAMP LEJEUNE, NORTH CAROLINA

Site No.	Site Description
87[2]	MCAS Officer's Housing Area (formerly Site A)
88	Building 25
89	STC-868
90	Building BB-9
91	Building BB-51
92	Building BB-46
93	TC-942
94	Building 1613

Note: Other specific locations may be added to the above list upon identification of the need to perform an RI/FS at those locations resulting in the corresponding modification to the Scope of Work Primary Document (described in the Federal Facilities Agreement).

(1) UST Petroleum Site (UST Petroleum Investigation/Corrective Action Regulations).

(2) Pre-Remedial Investigations (Pre RIs) have been initiated. The Pre-RIs will determine the need to conduct an RI/FS.

TABLE 1-2

INSTALLATION RESTORATION ACTIVITIES ONGOING OR PLANNED FOR FISCAL YEAR 1998 MCB CAMP LEJEUNE, NORTH CAROLINA

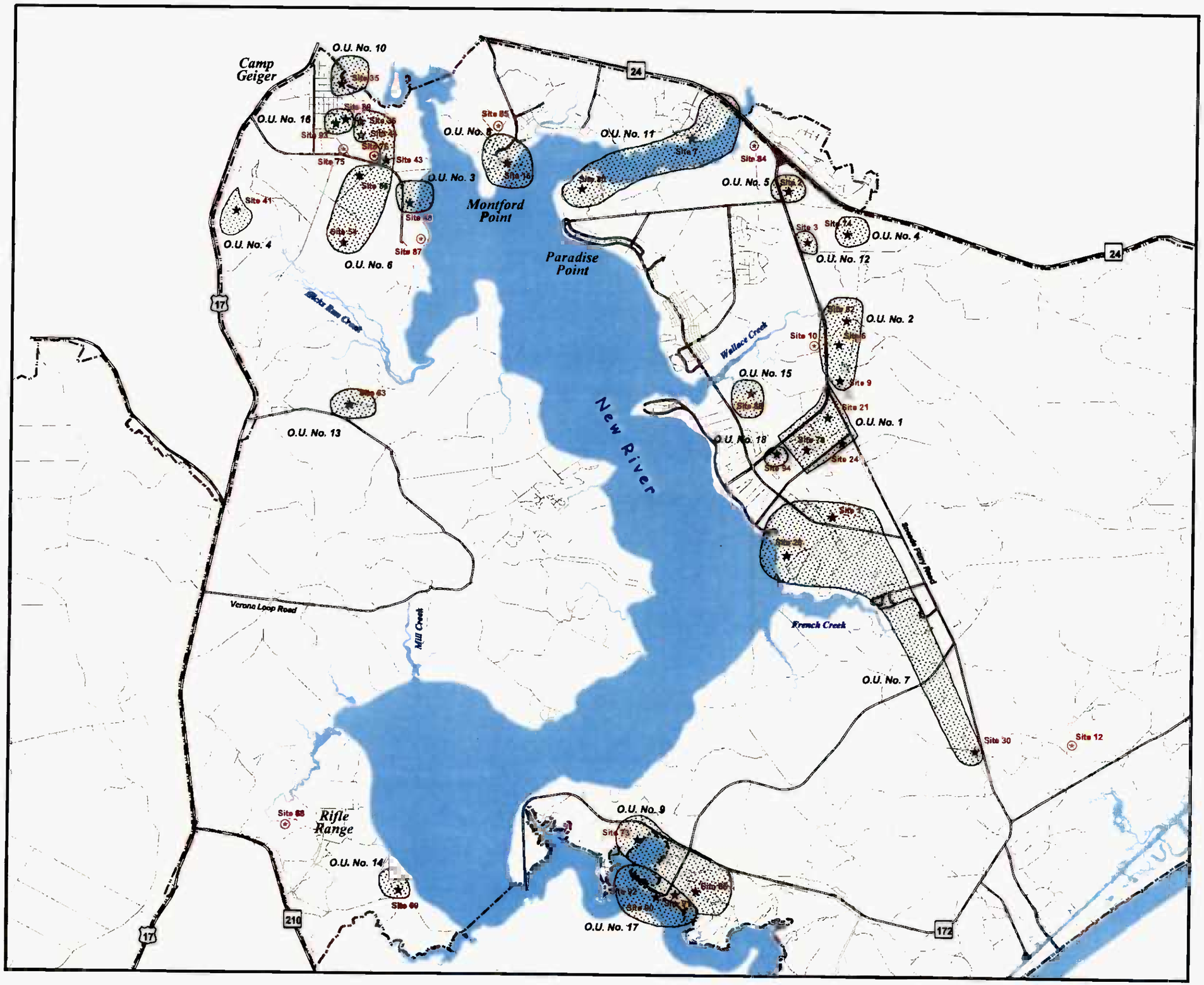
OU No.	Site No.	LTM	NFA	RA	TS	RI	FS	PRAP	ROD	EE/CA	Design
1	21		X								
	24		X								
	78	★									
2	6		X								
	9		X								
	82	★		●							
3	48		X								
4	41	★									
	74	★									
5	2	★									
6	36	★									
	43										
	44										
	54	★									
	86	★									
7	1	★									
	28	★									
	30		★								
8	16		X								
9	65							●	●		
	73						●	●	●		★
10	35			▲				●	●		★
11	7		X								
	80		X								
12	3	★		▲							
13	63		X								
14	69	★					●	●	●		●
15	88									●	●
16	89					●	●	●	●		▲
	93					●	●	●	●		▲
17	90					●		●	●		
	91					●		●	●		
	92					●		●	●		
18	94					▲					

LTM = Long-Term Monitoring
NFA = No Further Action
RA = Remedial Action
RI = Remedial Investigation
FS = Feasibility Study
PRAP = Proposed Remedial Action Plan
ROD = Record of Decision
EE/CA = Engineering Evaluation/Cost Analysis

X = No Additional Funding Required
● = Currently Funded
★ = On FY 98 Funded List
▲ = On FY 98 Spending Plan Swing List

SECTION 1.0 FIGURES

CTO 0099



LEGEND

- ★ Remedial Investigation Site
- ⊛ Pre-Remedial Investigation Site
- Operable Unit Boundary
- Secondary Highway
- Primary Highway
- Light Duty Road
- Camp Lejeune Boundary

N
W E
S

Scale
4000 0 4000 8000 12000 Feet

MARINE CORPS BASE, CAMP LEJEUNE
NORTH CAROLINA

OPERABLE UNITS and SITE LOCATIONS
FY98 SMP
CTO 0099

Baker

FIGURE 1 - 1

2.0 OPERABLE UNITS

As defined in the NCP, an "Operable Unit" means a discrete action that comprises an incremental step toward comprehensively addressing site problems. This discrete portion of a remedial response manages migration, or eliminates or mitigates a release, threat of a release, or pathway of exposure. The cleanup of a site can be divided into a number of operable units, depending on the complexity of the problems associated with the site. Operable Units (OUs) may address geographical portions of a site, specific site problems, or initial phases of an action, or may consist of any set of actions performed over time or any actions that are concurrent but located in different parts of a site."

This section identifies the OUs at MCB Camp Lejeune where IRP activities are or will be implemented. Anticipated project start-up dates for these activities are also identified. The project start-up dates coincide with the priority of the OUs with respect to their potential for groundwater contamination, proximity to receptors, contaminants verified, and potential ecological impacts.

2.1 Operable Unit Determination

In accordance with guidance provided in the NCP, the Navy/Marine Corps has recommended that the 34 of the 42 IRP sites be grouped into 18 OUs for the purposes of proceeding with RI/FS activities (see Table 2-1). These OUs are depicted in Figure 1-1 and are described below.

2.2 Operable Unit Descriptions

This section describes the OUs at MCB Camp Lejeune.

2.2.1 Operable Unit No. 1 (Sites 21, 24, and 78)

OU No. 1 consists of Site 21 (Transformer Storage Lot 140), Site 24 (Industrial Area Fly Ash Dump), and Site 78 (Hadnot Point Industrial Area).

Site 21 - Transformer Storage Lot 140

Site 21 is located within Site 78, between Ash Street and Sneads Ferry Road on Center Road. In 1950 and 1951, an on-site pit, located in the northern portion of the site, was used as a drainage receptor for oil from transformers. Sand was occasionally placed in the pit when oil was found standing in the pit bottom. The total quantity of oil drained in this manner is unknown.

Site 21 was used from 1958 to 1977 for pesticide mixing and as a cleaning area for pesticide application equipment. The mixing area for the pesticides was in the southern portion of the site. Pesticide contamination possibly occurred as a result of small spills, washout, and excess disposal. In 1977, before activities were moved to a different location, washout was estimated to be about 350 gallons per week of overland discharge.

The RI conducted at Site 21 concluded that soils within portions of the site were impacted by pesticides and Polychlorinated Biphenyls (PCBs). Pesticides were detected throughout the soil with the maximum concentrations being detected in the vicinity of the former Pesticide Mixing/Disposal Area. PCBs were detected only in the surface soil with the maximum concentrations being detected in the Former PCB Disposal Area. A soil removal action was implemented at Site 21 to remove

pesticide and PCB contaminated soil. A final Record of Decision (ROD) was signed on September 15, 1994. No additional remedial or monitoring action is planned for this site.

An initial field change directed by the Resident Office in Charge of Construction (ROICC) Office for the performance of field screening prior to the initiation of excavation activities resulted in the complete delineation of all four Areas of Concern (AOC). Initial excavation in three of the AOCs was performed in the summer of 1995.

Due to the vast extent of PCB residuals in the soils of AOC 1, an Explanation of Significant Differences (ESD) was prepared to justify modifying the remediation level for PCB contamination in the soil from 0.37 part per million (ppm) to 10 ppm. The final field activities were conducted in November 1995. The approximate final tonnages of hazardous and non-hazardous materials transported off-site to permitted facilities for disposal were 742 tons and 69 tons respectively.

Site 24 - Industrial Area Fly Ash Dump

Site 24 is located south and east of the intersection of Birch and Duncan Streets. Site 24 was used for the disposal of fly ash, cinders, solvents, used paint stripping compounds, sewage sludge, and water treatment sludge from the late 1940s to 1980. Approximately 100 acres in size, the site lies adjacent to upstream portions of Cogdels Creek.

An RI/FS was conducted at Site 24 during 1993-1994. Due to elevated pesticide, heptachlor epoxide, levels in groundwater, groundwater samples are collected on a quarterly basis to evaluate the migration and concentration level of pesticides in the groundwater. It is anticipated that during FY98 that monitoring at this site will be discontinued. It has been demonstrated through consecutive sampling events that the groundwater is absent of contamination.

Site 78 - Hadnot Point Industrial Area

The Hadnot Point Industrial Area (HPIA) is located on the east side of the New River. The HPIA is defined as that area bounded by Holcomb Boulevard to the west, Sneads Ferry Road to the north, Louis Street to the east, and the Main Service Road to the south. A transformer storage lot (Site 21) and a petroleum UST fuel tank farm (Site 22) are located within the northern portion of HPIA.

The establishment of MCB Camp Lejeune began in the early 1940s with the construction of the HPIA. The HPIA, which covers approximately 590 acres, is comprised of approximately 75 buildings/facilities. These include maintenance shops, gas stations, administrative offices, printing shops, warehouses, storage yards, and other similar industrial facilities. A steam plant and training facility occupy the southwest portion of HPIA. In addition, numerous underground storage tanks, stormwater drains, and oil/water separators are present.

An interim remedial action RI/FS was conducted at this site with respect to the shallow groundwater aquifer in 1992. Based on this study, an interim remedial action groundwater treatment system was designed. An Interim ROD was signed on September 23, 1992 and the implementation of the treatment system was initiated in 1995.

An RI/FS has been completed at Site 78 during 1993-1994. The results of this investigation indicated that organics (e.g., solvents and fuel-related compounds) and inorganics have impacted

the groundwater at several areas within the site. In addition, a limited area of soil was found to be impacted by pesticides.

After the final ROD was signed on September 15, 1994 a Remedial Action was implemented in the form of two pump and treat systems. These pump and treat systems were constructed in the northern and southern portion of the HPIA. Operation of the plants and long-term monitoring of the groundwater is currently ongoing. Groundwater samples are collected on a quarterly basis and the plant operations are evaluated to determine the effectiveness of the remediation system. During FY98 the sampling will be conducted on a semiannual basis. Plant monitoring will continue to be conducted on a monthly basis and findings incorporated into the semi-annual monitoring report.

2.2.2 Operable Unit No. 2 (Sites 6, 9, and 82)

OU No. 2 consists of three sites; Site 6 (Storage Lots 201 and 203), Site 9 (Fire Fighting Training Pit at Piney Green Road), and Site 82 (Piney Green Road VOC Area). This OU is located along Holcomb Boulevard, midway between the main entrance gate and the Hadnot Point Industrial Area.

Site 6 (Storage Lots 201 and 203)

Site 6 is the largest of the three sites, encompassing approximately 177 acres. Site 6 is comprised of Storage Lot 201, Storage Lot 203, and wooded areas which surround these storage lots. The site is bordered by Site 9 to the south and Site 82 to the north. Piney Green Road and Holcomb Boulevard border the site to the east and west, respectively.

Storage Lot 201 is currently being used for the storage of military vehicles, equipment, and supplies. This lot covers approximately 25 acres and is surrounded by a security fence. Pesticides and PCBs were reportedly disposed of in the northeast and southwest corners of Storage Lot 201. Based on the findings of the remedial investigation, pesticide-contaminated soil was detected only at the northeast corner of Lot 201. PCB contamination was not detected. In 1994, the contaminated soils were excavated and disposed of off site as part of the final cleanup plan for OU No. 2.

Storage Lot 203 encompasses approximately 46 acres and is no longer used as a storage area. Lot 203 is situated between Lot 201 to the south and Site 82 to the north. A wooded area separates the two storage lots. In addition to its former use as a storage area, Lot 203 was used as a disposal area from the 1940s to the late 1980s. Former employees have reported the disposal of various chemicals including PCBs, cleaning solvents, batteries, and POL (petroleum, oil, and lubricants) wastes. At one time, the storage lot was littered with 55-gallon drums and debris including rubber rafts, shredded tires, communication wire, wooded pallets, barbed wire fencing, and several portable aboveground storage tanks. The drums and debris have since been removed from the storage lot as part of the overall cleanup of the area. Additionally, soil contaminated with pesticides and polynuclear aromatic hydrocarbons (PAHs) have been excavated and properly disposed of.

A ravine is located in the northwest portion of Storage Lot 203. The ravine was once littered with debris including batteries, tires, empty drums (some labeled as "DDT"), wire cables, empty paint cans, lockers, commodes, and respirator cartridges. The ravine bisects Site 82 and eventually slopes downward to Wallace Creek. As part of the final cleanup action, the debris was removed from the ravine. Contaminated soil beneath the debris was excavated and disposed of offsite.

Woods and open fields surround both Storage Lots 201 and 203 and make up the remaining area of Site 6. Numerous 55-gallon drums were located throughout the wooded area, but have since been removed as part of a time-critical removal action. In addition, drums and debris (mainly wire) were excavated from the strip of woods which separate Lot 201 from Lot 203. PCB-contaminated soil was detected during the remedial investigation in the wooded area between Lot 201 and Piney Green Road. This soil was excavated and properly disposed of as part of the overall cleanup plan for OU No. 2.

A final ROD was signed on September 24, 1993.

Site 9 (Fire Fighting Training Pit at Piney Green Road)

Site 9, Fire Fighting Training Pit at Piney Green Road, is located just south of Bear Head Creek and west of Piney Green Road. The fire training area consists of an concrete-lined pit with an oil-water separator. The oil-water separator is used to capture floating product (fuel) prior to being transported off site. There were four 500-gallon aboveground storage tanks (ASTs) near the training area; which are no longer present. These tanks hold different types of fuel for training purposes. The area encompasses approximately 2.6 acres.

The fire fighting pit has been used for training since the early 1960s. Until 1981, the training exercises were conducted in an unlined pit (the pit is now asphalt-lined). Flammable liquids including heating oil, solvents, and fuels are used as an accelerant during the training exercises. It has been estimated that between 30,000 to 40,000 gallons of JP-4 and JP-5 jet fuel were ignited over the years.

Soil and groundwater samples collected during the remedial investigation did not reveal extensive contamination in either soil or groundwater. The absence of widespread soil and groundwater contamination may be due to the combustion of fuel during the training exercises. No remedial actions have been required at this site.

A final ROD was signed on September 24, 1993.

Site 82 (Piney Green Road VOC Area)

Site 82, Piney Green Road VOC Area, is situated between Storage Lot 203 and Wallace Creek. Bordering the site to the east is Piney Green Road. The site area encompasses approximately 30 acres and at one time, was completed wooded (the southeast corner has been cleared for remediation of soil and groundwater). The ravine, which begins at Storage Lot 203, traverses the area in a south to north direction towards Wallace Creek.

Based on historical aerial photographs, the southeastern portion of the site exhibited anomalies that could be associated with trenching activities. During the initial site reconnaissance in 1991, soil mounds were noted throughout this portion of the site. As a follow-up to these findings, a geophysical investigation was performed in this area to assess subsurface conditions. The survey revealed that the area contained a significant amount of buried metallic debris. Test pitting in this area verified the presence of drums and debris. A time-critical removal action was conducted for the removal of the debris in 1994. Drums and contaminated soil were excavated from this portion of the site. The soil was contaminated with POL (petroleum, oil, and lubricants) constituents.

Soil and groundwater sampling conducted during the remedial investigation revealed elevated levels of volatile organic compounds (VOCs) in soil and both shallow and deep groundwater. Groundwater is contaminated with solvent constituents such as trichloroethene (TCE), 1,2-dichloroethene, and vinyl chloride. The highest levels are present in the southeastern portion of the site where the drums and debris were excavated in 1994.

A final ROD was signed on September 24, 1993 documenting the following remedial actions for soil and groundwater. A treatment system consisting of a series of shallow and deep extraction wells and a treatment plant was designed and constructed. Initial treatment plant construction was successfully completed in February 1996 and an aquifer test conducted to verify the location and spacing of the additional extraction wells. The final eight wells and associated piping and electrical/control services were completed in June 1996 and the full system commenced operation. The treatment plant was constructed in the northeastern portion of Lot 203. Long-term monitoring of the wells associated with the treatment system and those identified in the final ROD is ongoing.

An initial drum removal activity was planned in 1993 and field activities conducted during the first half of 1994. The excavation yielded 423 tons of non-hazardous soils and debris, 65 drums of hazardous materials, 740 gallons of hazardous liquids, 13,000 gallons of non-hazardous liquids and 165 cubic yards of petroleum contaminated soils. Offsite disposal of all materials except the total petroleum hydrocarbon (TPH) contaminated soils was completed in 1995.

Soils removal activities commenced at the end of November 1994 while the approval of the construction drawings was pending. A total of 99 tons of hazardous materials from four Areas of Concern was transported to offsite permitted disposal facilities and 413 tons of non-hazardous soil and debris was transported to offsite disposal at a Subtitle D facility. An SVE system was employed to remediate an AOC exhibiting elevated levels of volatile organic contamination. The system was operated for six months and successfully remediated an area of approximately 1.1 acres.

To remediate the TPH soils, a biocell was designed and permitted during 1995. In January 1996, construction of the biocell at a location adjacent to the Groundwater Treatment Plant commenced. During the excavation of the biocell sump, debris was encountered. Both non-intrusive and intrusive methods were employed to fully investigate the debris. Samples and analyses of the debris indicated that it was non-hazardous and construction of the cell permitted to resume. The cell was completed in April 1996 and loaded with the 165 cubic yards of TPH contaminated soils in May 1996. It is anticipated that the biotreatment of these soils should be effected within a four to six month time frame.

2.2.3 Operable Unit No. 3 (Site 48)

OU No. 3 is made up of only Site 48, MCAS Mercury Dump. Site 48 is located at Marine Corps Air Station, New River along Longstaff Road. Specifically, Site 48 is situated between the New River (to the east) and Longstaff Road (to the west). An unnamed tributary to the New River borders the site to the north. The site area encompasses approximately four acres and is flat.

Site 48 consists of Building AS-804 and the lawn behind the building. Building AS-804 is currently used as a classroom training facility. During the late 1950s to the mid-1960s, Building AS-804 was used a photo lab. Mercury was somehow generated or used in the process, and periodically collected and disposed of in small quantities behind the building. It has been reported that approximately one gallon of mercury per year was disposed of in this manner. Historical aerial photographs were

obtained and evaluated in order to identify the disposal area(s). In addition, a geophysical investigation was performed to identify the presence of mercury behind the building. The geophysical investigation did not reveal anything associated with mercury disposal. A soil and groundwater investigation was conducted, focusing on the anomalies identified in the aerial photographs. The results of this study did not identify mercury in either soil or groundwater. The RI concluded that the absence of mercury at Site 48 could potentially be due to washout of the area due to periodic flooding during severe storms since the site is adjacent to the New River. In 1993, a Record of Decision (ROD) was signed calling for no further action.

2.2.4 Operable Unit No. 4 (Sites 41 and 74)

OU No. 4 is comprised of Site 41 (Camp Geiger Dump Near Former Trailer Park) and Site 74 (Mess Hall Grease Pit Disposal Area). The sites are described below.

Site 41, Camp Geiger Dump Near the Former Trailer Park, is located within the Camp Geiger area of MCB Camp Lejeune. The site is situated between Highway 17 to the west, Tank Creek to the south, an unnamed tributary to the north, and a dirt/gravel military road to the east. During the period 1946 to 1970, the area was used as an open burn dump. The dump received construction debris, POL wastes, mirex (a pesticide), solvents, batteries, and ordnance. Based on background information, the debris was burned and graded over with soil. In addition, memorandums obtained via the review of background information indicate that chemical training agents may also have been disposed at the site. As required in the final ROD a fence has been erected to limit access to the site.

The site encompasses approximately 30 acres and is located in a topographically high area. The site is heavily wooded and overgrown with vegetation. Construction debris (mainly building demolition) is littered throughout the site. A six- to ten-foot high embankment is present along the northern border of the former disposal area. This embankment was likely formed as soil was pushed and graded to cover debris in the area. Remnants of construction debris can be seen protruding from the embankment in some places. Two seeps, which discharge into the unnamed tributary, are present along the north slope of the site.

Results of the remedial investigation revealed that the site contains a significant amount of buried construction debris. Sampling results indicated that surface soil in the central portion of the landfill is contaminated with PAH constituents. The PAHs are likely the result of previous burning activities. Groundwater exhibited chromium, iron, lead, and manganese above State water quality standards for groundwater. The human health risk assessment concluded that there is no current risk to human health primarily because groundwater in this area is not used as a potable supply. The soil contamination is not significant with respect to impacting human health.

The two seeps contained metals above State and Federal water quality criteria; however, the seeps do not serve the purpose of providing an ecological habitat. In addition, the unnamed tributary, which is the receiving stream for the seeps, was not significantly impacted. The ecological risk assessment concluded that potential adverse impacts to ecological receptors are low due to the low levels of contamination in soil, sediment, and surface water.

On December 5, 1995, a ROD was signed for OU No. 4. The selected remedy for Site 41 includes: semiannual long-term groundwater and surface water monitoring; deed restrictions prohibiting development of the site; and reclassification of groundwater use as "Class RS"; and obtain a variance for meeting surface water quality for iron, manganese, and mercury. The

groundwater reclassification and surface water variance were required due to the nature of potential contamination being left in the ground that could not be remediated due to the potential risks from intrusive excavation. In August 1997, Marine Corps Base Camp Lejeune received a letter from NC DEHNR Wilmington Regional Office informing them that based on limited site contamination the groundwater reclassification and surface water variance were no longer required. The initial semiannual monitoring event was conducted in January 1997. This alternative will be reviewed every five years to determine whether the alternative is protective of human health and the environment.

Site 74 - Mess Hall Grease Disposal Area

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 just north of Henderson Pond. There are two areas of concern at this site: the former grease pit disposal area and a former pest control area. The former disposal area encompasses approximately five acres and the former pest control area is less than one acre in size. The two areas are situated about one-quarter mile apart and are separated by a dirt road. A fence has been erected around the grease pit disposal area to prevent access.

During the early 1950s through the early 1960s, grease from the mess hall was reportedly taken to the area and disposed in trenches. A volatile substance was sometimes used to ignite the grease. Hazardous substances were also known to be disposed of in this area. It has been reported that drums containing PCBs and "pesticide soaked bags" were taken to the site and buried. Chemical warfare materiel (CWM), similar to the types documented at Site 69, also were reportedly taken to Site 74.

Historical photographs of the former grease pit disposal area depict extensive trenching operations, which corresponds to the history of the site. The only remnants of the grease pit disposal area is a small surficial depression which is most likely associated with former trenching operations. The remaining area is wooded and overgrown with vegetation.

The former pest control area was used for the storage and handling of pesticides associated with base-wide pest control activities. Historical aerial photographs depict a small building, which was probably used to store and mix the pesticides. This building is no longer present. The area is wooded and heavily vegetated.

A remedial investigation was conducted at Site 74 in conjunction with Site 41. Soil sampling was conducted at the former disposal area and the pest control area. Groundwater monitoring wells also were constructed at both areas. The results of these investigations did not indicate widespread contamination. Some pesticides were detected in soil at the former pest control area, and one monitoring well exhibited low levels of a pesticide. Based on the results of the human health and ecological risk assessments, Site 74 poses no unacceptable risks.

The selected remedy for Site 74, documented in the ROD signed on December 5, 1995, includes deed restrictions, which prohibit the development of the site, and restrictions on the use of the groundwater as a potable supply and semiannual long-term groundwater monitoring. The decision to restrict development of the site is based on the potential presence of buried CWM near the grease pit disposal area. The initial semiannual monitoring was conducted in January 1997. This

alternative will be reviewed every five years to determine whether the alternative is protective of human health and the environment.

2.2.5 Operable Unit No. 5 (Site 2)

OU No. 5 consists of Site 2 (Former Nursery/Day Care Center). From 1945 to 1958 this building was used for the storing, handling, and dispensing of pesticides. The building at this location was later used as a children's day-care center. Chemicals known to have been used include chlordane, DDT, diazinon, and 2,4-D. Chemicals known to have been stored on site include dieldrin, lindane, malathion, silvex, and 2,4,5-TP. Areas of suspected contamination are the fenced playground, mixing pad, wash pad, and railroad drainage ditch. Contamination is believed to have occurred as a result of small spills, washout, and excess disposal. A preliminary soil sampling investigation conducted at this site in 1982 indicated the presence of 4,4'-DDE, 4,4'-DDD, 4,4'-DDT, and chlordane. Based on these results, the day-care activities were moved to another location. Building 712 is currently being used as a personnel office for non-appropriated funding personnel.

Based on the results of the RI/FS, elevated levels of pesticides were detected in soil near the mixing pads. In addition, a plume consisting of low levels of ethylbenzene and toluene was present in the shallow aquifer.

Field activities on this soil removal project commenced in July 1994. When it became apparent that the extent of contamination was exceeding the estimated limits of construction, a field screening technique utilizing a field laboratory equipped with a gas chromatograph was employed to fully delineate the limits of contamination in advance of the excavation activity. The final excavation activities concluded in October 1994. A total of 1049 tons of pesticide contaminated soils were routed to offsite disposal. In accordance with the ROD signed on September 15, 1994. Long-term quarterly monitoring of the groundwater was instituted as part of the final remedial action in August 1995. The initial monitoring was conducted by Central Virginia laboratories and in July 1996 turned over to Baker Environmental. In January of 1997 due to the absence or reduced levels of contamination the long-term sampling interval was modified to semiannual. The initial semiannual event was conducted in April 1997.

2.2.6 Operable Unit No. 6 (Sites 36, 43, 44, 56, and 86)

OU No. 6 consists of five sites; Site 36 (Camp Geiger Dump Area), Site 43 (Agan Street Dump), Site 44 (Jones Street Dump), Site 56 (Crash Crew Fire Training Burn Pit), and Site 86 (Tank Area AS419-AS421).

Site 36 - Camp Geiger Area Dump Near Sewage Treatment Plant

The Camp Geiger Area Dump (Site 36) is located approximately 1,000 feet east of Camp Geiger and 500 feet west of the New River, adjacent to the Camp Geiger Sewage Treatment Plant (STP). Camp Geiger is situated directly north of MCAS, New River, approximately 3 miles southwest of Jacksonville, North Carolina. Site 36 was estimated to be approximately 1.5 acres in size. Based upon a review of aerial photographs and observations recorded during the RI site scoping visit, the size of the site was adjusted to include nearly 20 acres.

Site 36 is reported to have been used for the disposal of municipal wastes and mixed industrial wastes including trash, waste oils, solvents, and hydraulic fluids that were generated at MCAS, New

River. The dump was active from the late 1940s to the late 1950s. Most of the material was first burned and then buried, however, some unburned material was buried. Less than five percent of all waste hydrocarbon material generated at the air station was disposed of at Site 36. The remaining waste oil was reportedly used for dust control on roads or went directly into storm drains.

The RI field investigation for Site 36 commenced on February 20, 1995 and continued through May 10, 1995. Deep monitoring well was installed and a second round of groundwater samples were collected in July of 1995. Additional soil borings and two sediment samples were collected in October of 1995.

Soil borings were advanced to assess suspected waste disposal at Site 36. Nine of the boring locations were advanced within the Former Disposal Area, including one monitoring well test boring. Fourteen soil borings and one monitoring well test boring were advanced within a cleared area located in the southwestern portion of the study area. Within the northern portion of Site 36, soil samples from six borings and three monitoring well test borings were collected. Six soil borings and one monitoring well test boring were completed in the open field located in the central portion of Site 36. The remaining soil borings were completed at the various locations throughout the site. Three additional borings, to the west of the study area, were advanced to assess background contaminant concentrations.

Based upon their detection within areas reported or suspected of receiving waste and the number of years since disposal operations reportedly transpired, the occurrence of volatile compounds in soils at Site 36 appears to be the result of past disposal practices in specific portions of the study area. In general, volatile, semivolatile, and higher pesticide concentrations were observed in similar areas of the site.

Round one groundwater samples were collected from five existing shallow wells, six newly installed shallow wells, two temporary wells, and three newly installed deep wells. Inorganics were the most prevalent and widely distributed constituents detected in both shallow and deep groundwater at Site 36.

Positive detections of organic compounds were limited to the northern and western portions of the study area. The presence of volatile compounds in the northern portion of the study area, as indicated by the initial round of sampling results, were confirmed by results of the second sampling round.

Seven surface water and 15 sediment samples were collected at Site 36. Three of the sampling stations were located in Brinson Creek and four were located in an unnamed tributary to Brinson Creek. None of the positive metal detections exceeded either state or federal standards for surface water. A positive detection of 1,2-dichloroethene was observed among the four surface water samples retained from the unnamed tributary.

VOCs were not detected in the sediment samples collected from Brinson Creek. The pesticides 4,4'-DDE, 4,4'-DDD, and 4,4'-DDT were each detected in at least five of the six Brinson Creek sediment samples.

Tetrachloroethene (PCE) was the only volatile organic compound detected in the sediment samples collected in the unnamed tributary. The pesticides 4,4'-DDD, and 4,4'-DDT were each detected in the unnamed tributary sediment samples.

Based on the request of the NC DEHNR, additional wells were installed at Site 36. These groundwater monitoring wells were installed in locations to either bound/define the limits of the identified plumes or confirm/rule-out off-site contaminant migration.

Two additional wells were installed at Site 36 in June of 1997. The groundwater samples were analyzed for TCL volatiles, while split-spoon soil samples were collected for soil classification purposes only.

Results of the groundwater sampling indicated low levels of TCE in a well located slightly upgradient of the previously identified groundwater plume; therefore, the TCE results appear consistent with the original site understanding.

Additional, yet unrelated, activities at Site 36 includes the removal of PCB-contaminated soil which is scheduled for completion in October 1997.

Site 43 - Agan Street Dump

The Agan Street Dump (Site 43) is comprised of approximately 11 acres and is located within the operations area of MCAS, New River, two miles west of the main entrance. Vehicle access to the site is via Agan Street, from Curtis Road.

The Agan Street Dump is located at the northern terminus of Agan Street, adjacent to an abandoned sewage disposal facility. The site is bordered to the north by Edwards Creek, to the east and south by Strawhorn Creek, and to the west by Agan Street and the former sewage disposal facility. Strawhorn Creek discharges into Edwards Creek at Site 43. Edwards Creek then discharges into the New River approximately 2,000 feet north of the study area, near Site 36.

Much of the site is heavily vegetated with dense understory and trees greater than three inches in diameter. Marsh areas that are prone to flooding line both Strawhorn and Edwards Creeks. An improved gravel loop road provides access to the main portion of the study area; other unimproved paths extend outward from this road.

The Agan Street Dump reportedly received mainly inert material such as construction debris (i.e., fiberglass and lumber) and trash. Sludge from a former sewage disposal facility, located adjacent to the study area, was also dumped onto the ground surface of Site 43. The years during which disposal operations took place are not known.

A surficial metallic debris removal action was performed during July 1995. The entire site was walked and all visible surficial metallic debris was removed. An armored vehicle was dismantled and routed to recycling recovery along with all identified metallic debris. Numerous paint cans were discovered and packaged in drums for ultimate transport to disposal facilities following sampling and analyses to determine the nature of the materials. Final disposal of the four drums of waste paint as a hazardous material was performed in October 1995. Approximately 7.3 tons of metallic debris was routed to recycling recovery in July 1995.

The RI field investigation commenced on February 20, 1995 and continued through May 10, 1995.

Soil borings were advanced to assess suspected waste disposal at Site 43. Soil boring locations were advanced within the Mounded Area. Soil test borings were completed at two separate locations

identified as having partially buried containers. The remaining soil borings were completed at the various locations throughout the site shown.

Positive detections of semivolatile organic compounds (SVOCs) in soil samples obtained at Site 43 are primarily limited to a cleared portion of the study area adjacent to the gravel access road. A total of 20 semivolatile contaminants, including 14 PAH compounds, were identified during the soil investigation at Site 43. The 14 PAH compounds were identified in both surface and subsurface soil samples. A majority of maximum semivolatile detections were observed in surface samples obtained from the first 12 inches below ground surface.

The pesticides 4,4'-DDE and 4,4'-DDT appear to be scattered throughout the study area. The pesticide 4,4'-DDE was the most prevalent. In general, higher concentrations of pesticides were observed in samples obtained from a small portion of the study area with partially buried containers.

Inorganic analytes were detected in both surface and subsurface soil samples throughout the study area. In general, higher concentrations of inorganic analytes were detected in soil samples obtained from two separate portions of the study area with partially metal buried containers.

Groundwater samples were collected from existing shallow wells, the newly installed shallow well, four temporary wells, and the newly installed deep wells. The groundwater sampling round was conducted at Site 43 in April of 1995.

Total metals were the most prevalent and widely distributed constituents in groundwater. Concentrations of TAL total metals were generally higher in groundwater samples obtained from the shallow aquifer, rather than in samples obtained from the deeper aquifer.

A single positive detection of one organic compound, 4-methylphenol, was limited to a temporary monitoring well located in the northern portion of the study area. No other organic compounds were detected among groundwater samples obtained from the shallow and deep aquifers.

Surface water and sediment samples were collected with each sampling station yielding one surface water and two sediment samples. Sampling stations were located in Edwards Creek and were located in Strawhorn creek, a tributary to Edwards Creek.

A positive detection of one volatile organic compound was observed among the two surface water samples obtained from Edwards Creek. 1,2-dichloroethene was detected at a location along the northern-most portion of the study area.

The pesticides 4,4'-DDE and 4,4'-DDD were detected at trace concentrations. Twelve of 23 TAL total metals were positively identified among the surface water samples obtained from Edwards Creek. Positive detections of two pesticide compounds were observed among the four surface water samples obtained from Strawhorn Creek. Carbon disulfide was the only VOC detected among the four sediment samples obtained from Edwards Creek. One SVOC was detected in three of the four sediment samples obtained from Edwards Creek. The pesticide 4,4'-DDD was detected in each of the four sediment samples obtained from Edwards Creek. Carbon disulfide was the only volatile organic compound detected among the eight sediment samples obtained from Strawhorn Creek. Two semivolatile compounds were identified in sediment samples obtained from Strawhorn Creek. The pesticides 4,4'-DDE, endrin, 4,4'-DDD, 4,4'-DDT, alpha-chlordane, and gamma-chlordane were detected in sediment samples obtained from Strawhorn Creek.

Site 44 - Jones Street Dump

The Jones Street Dump (Site 44) encompasses approximately 5 acres and is situated within the operations area of MCAS New River. Vehicle access to the site is via Baxter Street, from Curtis Road. Site 44 is located at the northern terminus of Baxter Street, behind base housing units along Jones Street.

The site is partially surrounded by a six-foot cyclone fence, a portion of the site lies to the east of the fenced compound. The site is bordered to the north and west by Edwards Creek, to the south by base housing units along Jones Street, and to the east by woods and an unnamed tributary to Edwards Creek. Edwards Creek flows east from the study area toward Site 43, which is located about 2,000 feet to the east of Site 44.

A majority of the site is comprised of a gently dipping open field that slopes toward Edwards Creek. The field is covered with high grass, weeds, and small pine trees that are less than two inches in diameter. Surrounding the open field is a mature wooded area with dense understory.

Site 44 was reportedly in operation during the 1950s. Although the quantity of waste is not known, the IAS report stated that debris, cloth, lumber, and paint cans were disposed of at the site. The IAS report also referred to minor quantities of potentially hazardous waste as having been disposed of at Site 44, however, the report made no mention of what type of waste that included.

The RI field investigation of Site 44 commenced on February 20, 1995 and continued through May 10, 1995.

Soil borings were advanced to assess suspected waste disposal at Site 44; three borings were utilized for the installation of monitoring wells. Boring locations were completed in an area immediately surrounding monitoring well 44-GW03. The remaining soil borings were completed at the various locations throughout the site.

A total of four semivolatile contaminants, including two PAH compounds, were identified during the soil investigation at Site 44.

The pesticides 4,4'-DDE, 4,4'-DDD, and 4,4'-DDT appear to be the most widely distributed compounds in the soil. Inorganic analytes were detected in both surface and subsurface soil samples throughout the study area. In general, however, inorganic analytes in subsurface soils were detected at concentrations within base-specific background levels.

Groundwater samples were collected from existing shallow wells, the newly installed shallow wells, a temporary well, and the newly installed deep wells. The groundwater sampling round was conducted in April of 1995.

Inorganics were the most prevalent and widely distributed constituents in groundwater at Site 44. Concentrations of TAL total metals were generally higher in shallow groundwater samples than in samples collected from the deeper aquifer.

Positive detections of organic compounds were limited to a temporary monitoring well and an existing shallow monitoring well. Of the eight organic compounds detected in only

tetrachloroethene and naphthalene concentrations exceeded state or federal screening standards. Only one of the three volatile compounds detected, vinyl chloride, exceeded criteria.

Surface water and sediment samples were collected during the initial sampling event in May of 1995. Each sampling station yielding one surface water and two sediment samples. Sampling stations were located in Edwards Creek and in an unnamed tributary to Edwards Creek. Additional samples were collected to more adequately assess the extent of surface water contamination in Edwards Creek. The samples from Edwards Creek were submitted in September of 1995 for laboratory analysis of volatile organic compounds only.

A total of 6 VOCs were detected among the 13 surface water samples obtained from Edwards Creek. Both 1,2-dichloroethene (total) and trichloroethene were detected in samples obtained from Edwards Creek. The maximum concentrations of 1,2-dichloroethene (total) and trichloroethene were 150 and 66 µg/L. Vinyl chloride and 1,1,2,2-tetrachloroethane were next most prevalent VOCs detected among Edwards Creek surface water samples. Vinyl chloride was detected in eight surface water samples with a maximum concentration of 38 µg/L. The volatile compound 1,1,2,2-tetrachloroethane was detected in 12 of the samples obtained from Edwards Creek with a maximum concentration of 42 µg/L. Nine of the 1,1,2,2-tetrachloroethane detections exceeded the NCWQS screening value of 10.8 µg/L. None of the other positive VOC detections exceeded applicable screening values. Lastly, the VOCs 1,1-dichloroethene and 1,1,2-trichloroethane were also detected among the surface water samples at maximum concentrations of 2 and 1 µg/L, respectively.

Positive detections of two volatile organic compounds were observed among the three surface water samples obtained from the unnamed tributary to Edwards Creek. The VOCs 1,2-dichloroethene and trichloroethene were detected at a concentrations of 5 and 2 µg/L, located approximately 150 feet upstream of the Edwards Creek confluence.

Volatile organic compounds were not detected in any of the ten sediment samples obtained from Edwards Creek. The pesticides 4,4'-DDE and 4,4'-DDD were detected in each of the ten sediment samples obtained from Edwards Creek. Twenty of 23 TAL total metals were positively identified among the ten Edwards Creek sediment samples (antimony, mercury, and thallium were not detected). Acetone was the only volatile organic compound detected among the six unnamed tributary sediment samples. The pesticides 4,4'-DDD, and 4,4'-DDE were detected in each of the six unnamed tributary sediment samples.

Site 54 - Crash Crew Fire Training Burn Pit

The Crash Crew Fire Training Burn Pit (Site 54) is located near the southwest end of runway 5-23, within the operations area of MCAS New River. The burn pit is approximately 50 feet in diameter and is situated at the center of this 1.5 acre site. An 8,000-gallon underground storage tank (UST) lies to the northwest of the burn pit. Fire training exercises are conducted within the burn pit using JP-type fuel, which is stored in the nearby UST. An oil and water separator, located approximately 100 feet to the southeast of the burn pit, is used for temporary storage and collection of the spent fuel.

An improved gravel surface surrounds the burn pit, the remaining portion of the site is comprised of maintained lawn area. The ground surface slopes away from the central portion of the study area toward the south, southwest, and southeast. Two drainage ditches lead away from the burn pit area

toward the south, on either side of an improved road. During periods of heavy precipitation, the ditches serve as channels for surface water runoff.

According to the IAS, Site 54 has served as a fire training burn pit since the mid-1950s. Waste fuels, oils, and solvents were used to simulate fire conditions that would result from aircraft crashes. Fire training at Site 54 was originally conducted on the ground surface, within a bermed area. In 1975 a lined burn pit was constructed. The same burn pit remains in operation today, however, only JP-type fuels are currently used during training exercises.

The RI field investigation for Site 54 commenced on February 20, 1995 and continued through May 10, 1995.

Soil borings were completed to assess the suspected impact of burn pit operations; two of those borings were utilized for the installation of monitoring wells.

SVOCs were identified in both surface and subsurface soil samples from the southern and southwestern portions of the study area. The majority of SVOCs detected in soil samples were PAH compounds.

Inorganic analytes were detected in both surface and subsurface soil samples at concentrations above twice the average applicable base-specific background levels.

Groundwater samples were collected from existing shallow wells, the newly installed shallow wells, and temporary wells.

Inorganics were the most prevalent and widely distributed potential contaminants in groundwater. No other inorganics were detected above applicable screening standards.

Positive detections of organic compounds were limited to portions of the study area immediately adjacent to the burn pit or UST and extending southwest of the burn pit. The presence of volatile and semivolatile compounds in samples obtained from this portion of the study area is consistent with current site operations.

Based on the request of the NC DEHNR, additional wells were installed at Site 54. These groundwater monitoring wells were installed in locations to either bound/define the limits of the identified plumes or confirm/rule-out off-site contaminant migration.

Three additional groundwater monitoring wells were installed during June 1997. Split-spoon soil samples were also collected for soil classification purposes only. Two of the three wells had concentrations below their corresponding detection limits. Low levels of benzene were detected in one well. This well is located northwest of the burn pit, in the vicinity of the existing underground storage tank. This detection and location appears consistent with the understanding of the extent of contamination discussed in the Draft Final Feasibility dated April 30, 1997.

Site 86 - Tank Area AS419-AS421 at MCAS

Site 86 is located on the southwest corner of the Foster and Campbell Street intersection, within the operations area of MCAS New River. The site is comprised of a lawn area surrounded by buildings, asphalt roads, and parking lots. Concrete pylons, upon which electric and steam overhead utilities

are mounted, line the northern, western, and southern boundaries of the site. Campbell Street borders the site to the north and Foster Street lies adjacent to the east. Immediately to the south of the study area is Building AS-502, the MCAS fire station. The entrance road to the fire station borders the study area to the west.

The ground surface at Site 86 gently slopes to the south, toward a drainage ditch and culvert. Storm water drains that are located along Campbell Street receive runoff from only the northernmost portion of the study area. Stormwater from Site 86 eventually discharges into the New River, which lies approximately three quarters of a mile to the east.

Site 86 served as a storage area for petroleum products from 1954 to 1988. In 1954, three 25,000-gallon above ground storage tanks (ASTs) were installed within an earthen berm. Additionally, a small pump house was constructed to transfer fuel oil to and from the ASTs. The three tanks were reportedly used for No.6 fuel oil storage until 1979. From 1979 to 1988 the tanks were then used for temporary storage of waste oil. The three tanks were emptied in 1988 and are believed to have been removed in 1992. Today, the former location of the tanks is grass-covered and only a very slight depression remains.

The field investigation commenced on February 20, 1995 and continued through May 10, 1995.

Soil borings were completed at Site 86 to assess the suspected impact of former operations; four of those borings were utilized for the installation of monitoring wells. Borings were advanced from within and immediately adjacent to the former storage tank area. Soil samples were also obtained from monitoring well test borings collected from within and surrounding the study area. The remaining borings were collected from two separate locations where ancillary piping and equipment associated with the former storage tanks were located.

Positive detections of volatile and semivolatile organic compounds were detected in both surface and subsurface soil samples. The majority of SVOCs detected in soil samples were PAH compounds.

The pesticides dieldrin, 4,4'-DDE, 4,4'-DDD and 4,4'-DDT appear to be scattered throughout the study area. Pesticides were detected in soil samples at low concentrations and without a discernible pattern of dispersal.

Groundwater samples from existing shallow wells, existing intermediate wells, newly installed shallow wells, newly installed intermediate wells, and newly installed deep wells were submitted for laboratory analyses from Site 86.

Based on the request of the NC DEHNR, additional wells were installed at Site 86. These groundwater monitoring wells were installed in locations to either bound/define the limits of the identified plumes or confirm/rule-out off-site contaminant migration.

The additional wells were installed at Site 86 in June 1997. One well identified the presence of TCE (530 µg/L) and 1,2-DCE (56 µg/L). This TCE concentration represents the highest TCE identified to date at Site 86.

The location and TCE detection within prompted a series of searches, including past site photographs, and building site plans and layout (i.e., equipment). During the 1950s, a generating

station, a battery shop and a para loft were located at Site 86. Although none of the searches completely described or identified clues to the presence, location, and concentration of TCE, a field visit of the neighboring area located several somewhat adjacent UST monitoring wells.

Based on the desire to present NC DEHNR with a clear picture of the VOC contamination at Site 86. LANTDIV, the Activity and Baker agreed that additional sampling may provide a better understanding. A field effort (September 1997) includes collection of groundwater at two existing wells.

2.2.7 Operable Unit No. 7 (Sites 1, 28, and 30)

Operable Unit No. 7 consists of Site 1 (French Creek Disposal Area), Site 28 (Hadnot Point Burn Dump), and Site 30 (Sneads Ferry Road Fuel Tank Sludge Area).

Site 1 - French Creek Liquids Disposal Area

Site 1, the French Creek Liquids Disposal Area, is the northernmost site located within OU No. 7. The site is located approximately one mile east of the New River and one mile southeast of the HPIA. Site 1 is situated along both the north and south sides of Main Service Road near the western edge of the Gun Park Area and Force Troops Complex.

Two suspected disposal areas at the site: the northern disposal area and the southern disposal area. The site boundaries coincide with the boundaries of these disposal areas. The following subsections describe the northern and southern portions of Site 1 and the surrounding areas.

The northern portion of Site 1 is surrounded by a treeline and a motor-cross training area to the north, a vehicle storage area associated with Building FC-100 to the east, Main Service Road to the south, and a treeline to the west. Most of the area within this portion of the site contains fenced-in buildings and parking areas. The former northern disposal area is located in this portion of Site 1. The majority of the former northern disposal area now contains two fenced-in areas that are associated with Buildings FC-120 and FC-134.

Building FC-120 serves as a motor transport maintenance facility for the Second Landing Support Battalion. It is a two story brick structure with offices and several vehicle maintenance bays. Building FC-134, located to the north of Building FC-120, provides offices and communication equipment storage also for the Second Battalion. It is a brick structure with offices and one garage bay.

A number of covered material storage areas are located to the north and west of Building FC-120. These smaller covered structures are used for temporary storage of paint, compressed gasses, vehicle maintenance fluids, spent or contaminated materials, and batteries. In addition to these covered storage structures, an AST area, located adjacent to the northern side of Building FC-120, is utilized to store spent motor oil and ethylene glycol (i.e., anti-freeze). Also, a gasoline service island is located to the west of Building FC-120. The two pumps at the service island provide fuel for vehicles undergoing maintenance at Building FC-120. An underground storage tank (UST) of unknown capacity is associated with this active service island.

Two equipment wash areas are located adjacent to the northern disposal area. The first wash area is located approximately 250 feet west of Building FC-120 and the second lies approximately

100 feet east of Building FC-134. Both equipment wash areas are concrete-lined and employ an oil and water separator collection basin. A third oil and water separator is located to the northwest of Building FC-120.

There are two surface water features (a sediment retention pond and a swampy area) that influence drainage near the northern portion of the site. The retention pond, located north of Building FC-134, receives surface water runoff via a gravel drainage ditch from the parking lot, the three oil and water separators, and the surrounding areas. Surface water runoff north of Building FC-134 drains into the swampy area toward a topographic low area.

The southern portion of Site 1 is surrounded by Main Service Road to the north, Daly Road to the east, H. M. Smith boulevard to the south, and Gonzales Boulevard and a wooded area to the west. The area of the former southern disposal area now contains Buildings 739 and 816, a fenced-in vehicle and equipment Administrative Deadline Lot (ADL), and a fenced-in hazardous materials storage area.

The hazardous materials storage area, which is concrete-lined and bermed, is located north of Building 816. This storage area is used for the temporary storage of vehicle maintenance fluids, spent or contaminated materials, fuel, and batteries. In addition, a number of storage lockers are located throughout the southern portion of Site 1. These lockers are used to store paints and other flammable materials used by maintenance and machine shop personnel.

Several small buildings are located adjacent to the suspected southern disposal area. These buildings house a number of support offices, recreation facilities, machine shops, light-duty vehicle and equipment maintenance bays, and equipment storage areas. Heat is provided to the majority of these buildings by kerosene-fired stoves. Kerosene fuel is stored in ASTs located beside each building.

Two vehicle maintenance ramps are also located near the southern portion of Site 1. The first ramp is located immediately to the south of Building 739 and the second lies to the north of Building GP-19. Both maintenance ramps are constructed of concrete and are used for the upkeep of vehicles and equipment.

In addition, three oil and water separator collection basins are located near the southern portion of Site 1. One separator is located adjacent to the Building 739 vehicle maintenance ramp, one separator is located southeast of Building GP-19, and one separator is located approximately 100 feet south of Building 816, adjacent to an equipment wash area. Discharge from the separators and wash areas flows into a stormwater sewer and then into the drainage ditch adjacent to H. M. Smith Boulevard.

Besides receiving discharge from the separators, the drainage ditch also receives surface water runoff from the southernmost portions of the site and nearby parking lots. Although it is a site-related surface water feature, the ditch is mainly dry year round. The ditch starts within the site boundaries, flows west toward the HPIA Sewage Treatment Plant (adjacent to Site 28), then empties into Cogdels Creek. Cogdels Creek eventually discharges into the New River which is located approximately one mile west of Site 1.

Site 1 had been used by several different mechanized, armored, and artillery units since the 1940s. Reportedly, liquid wastes generated from vehicle maintenance were routinely poured onto the ground surface. During motor oil changes, vehicles were driven to a disposal point and drained of

used oil. In addition, acid from dead batteries was reportedly hand carried from maintenance buildings to disposal points. At times, holes were reportedly dug for waste acid disposal and then immediately backfilled. Thus, the disposal areas at Site 1 are suspected to contain POL and battery acid.

The total extent of both the northern and southern disposal areas is estimated to be between seven and eight acres. The quantity of POL waste disposed at the areas is estimated to be between 5,000 and 20,000 gallons; the quantity of battery acid waste is estimated to be between 1,000 and 10,000 gallons.

Site 1 continues to serve as a vehicle and equipment maintenance/staging area.

In 1994, an RI was conducted at Site 1. VOCs were not found in surface soils, but were detected limited subsurface soil samples. TCE and toluene were detected at low concentrations in samples from the northern central portion of the study area.

Semivolatile organic compounds were not encountered in surface soils, but were detected in a number of subsurface soil samples.

The pesticides dieldrin, 4,4'-DDE, 4,4'-DDD, 4,4'-DDT, endrin aldehyde, alpha-chlordane, and gamma-chlordane were detected in the soil. The pesticide 4,4'-DDT was the most prevalent.

The PCBs Aroclor 1254 and Aroclor 1260 were each detected once within the subsurface soil. Aroclor 1254 was detected on the southern portion of the site. Aroclor 1260 was detected near the center of the northern disposal area.

Positive detections of VOCs in groundwater were limited to the northern portion of the study area. TCE was detected in samples obtained from the shallow aquifer. Vinyl chloride was also detected at concentration exceeded the state and federal drinking water standards.

Like VOCs, the positive detections of SVOCs were limited to the northern portion of the study area.

Inorganics were the most prevalent among contaminants detected in the groundwater at Site 1. However, the positive detections of inorganics were distributed sporadically throughout the site. As a result, most of the inorganics did not appear to be site related.

In the final ROD signed on May 16, 1996, Institutional Controls were the recommended remedy for Site 1. Institutional controls consist of the following:

- A long-term groundwater monitoring plan in which groundwater samples are collected semiannually and analyzed for volatile organic compounds. Aquifer use restrictions that will prohibit the future use of the aquifer under the site as a potable water source. The restrictions will be implemented via the Base Master Plan.

- Deed restrictions that will limit the future use of land at the site, including placement of wells. The restrictions will be implemented via the Base Master Plan.

The long-term monitoring at Site 1 began in July 1997 and will continue through the five-year review period. After five years, the data will be reviewed to determine if monitoring will be required, be modified, or an alternative remedial option is warranted.

Site 28 - Hadnot Point Burn Dump

Site 28, the Hadnot Point Burn Dump, is the westernmost site located within OU No. 7. The site is located along the eastern bank of the New River and is approximately one mile south of the HPIA on the Mainside portion of MCB, Camp Lejeune.

Site 28 is surrounded by the Hadnot Point Sewage Treatment Plant (STP) to the north, wooded and marshy areas to the east and south, and the New River to the west. Cogdels Creek flows into the New River at Site 28 and forms a natural divide between the eastern and western portions of the site. Vehicle access to the site is via Julian C. Smith Boulevard near its intersection with O Street. The eastern and western portions of the site are served by an improved gravel road.

A majority of the estimated 23 acres that constitute Site 28 are used for recreation and physical training exercises. The site is predominantly comprised of two lawn and recreation areas, known collectively as the Orde Pond Recreation Area, that are separated by Cogdels Creek. Picnic pavilions, playground equipment, and a stocked fish pond (Orde Pond) are located within this recreation area. They are regularly used by Base personnel and their families. In addition, field exercises and physical training activities frequently take place at the recreation area.

The Hadnot Point STP is located on and adjacent to Site 28. A portion of the STP facility (the equalization lagoon) extends across Cogdels Creek, from west to east. The STP operates a number of clarifying, settling, and aeration ponds that are located on either side of Cogdels Creek. Both operational areas of the STP are fenced with six-foot chain link. The treated water from the STP discharges into the New River approximately 400 feet from the shoreline via an outfall pipe.

Site 28 operated from 1946 to 1971 as a burn area for a variety of solid wastes generated on the Base. Reportedly, industrial waste, trash, oil-based paint, and construction debris were burned then covered with soil. In 1971, the burn dump ceased operations, and was graded and seeded with grass.

The total volume of fill within the dump is estimated to be between 185,000 and 375,000 cubic yards. This estimate was based upon a surface area of 23 acres and a depth ranging from five to ten feet.

In 1994, an RI was conducted at Site 28. VOCs were found in the surface soil and subsurface soil at very low concentrations. The VOCs benzene, PCE, and 1,1,1-trichloroethane were each detected once. Based upon their wide dispersion, infrequent detection, and low concentration, the occurrence of VOCs in soils are not a significant problem resulting from previous disposal practices.

SVOCs appeared to be the most directly linked to past disposal practices. Several SVOCs were identified in both surface and subsurface soil samples, primarily from the western disposal area. A majority of SVOCs detected in soil samples were PAH compounds, most probably resulting from past burning of waste material or refuse.

The pesticides dieldrin, 4,4'-DDE, 4,4'-DDD, 4,4'-DDT, alpha-chlordane, and gamma-chlordane appeared to be the most widely scattered compounds within surface and subsurface soils at Site 28.

In general, higher concentrations of those pesticides more frequently detected were limited to the western portion of the site around the picnic area.

Three PCBs, Aroclor 1242, Aroclor 1254, and Aroclor 1260, were detected in subsurface soil samples. The maximum concentration was detected at a location in the center of the site on the northern side of the fence surrounding the treatment plant.

Inorganics were detected in both surface and subsurface soil samples from the western portion of the study area at concentrations greater than one order of magnitude above Base-specific background levels.

Positive detections of VOCs in groundwater were limited to the central western portion of the study area.

SVOCs were detected in five of ten shallow groundwater samples obtained during the first sampling round from the western portion of the study area. SVOC analyses of groundwater samples were not performed as part of the second sampling round.

The pesticides 4,4'-DDE, 4,4'-DDD, 4,4'-DDT, and gamma-chlordane were each detected at least once within samples obtained from six shallow monitoring wells located on the western portion during the first sampling round. A second round of groundwater samples was obtained from those monitoring wells that presented evidence of pesticide contamination during the first sampling round. However, groundwater samples obtained during the second sampling round did not contain pesticides. This was most likely the result of a low-flow sampling technique used during the second round.

Inorganics were the most prevalent and widely distributed contaminants in groundwater at Site 28 and were found distributed throughout the site. Concentrations of inorganics, in samples obtained during both sampling rounds, were generally higher in shallow groundwater samples than in samples collected from the deeper aquifer.

Documented in the ROD signed on May 16, 1996, Institutional Controls were selected as the preferred remedy. Institutional controls included the following actions:

- A long-term groundwater monitoring plan in which groundwater samples are collected semiannually and analyzed for volatiles, lead, and manganese.

- Aquifer use restrictions that will prohibit the future use of the aquifer under the site as a potable water source. The restrictions will be implemented via the Base Master Plan.

- Deed restrictions that will limit the future use of land at the site, including placement of wells. The restrictions will be implemented via the Base Master Plan.

The long-term monitoring at Site 28 began in July 1997 and will continue through the five-year review period. After five years the data will be reviewed to determine if monitoring will be required, modified, or if an alternative remedial action is warranted.

Site 30 - Sneads Ferry Road Fuel Tank Sludge Area

Site 30, the Sneads Ferry Road Fuel Tank Sludge Area, is the southernmost site located within OU No. 7. The site is situated along a tank trail which intersects Sneads Ferry Road from the west, approximately 1 mile south of the intersection with Marines Road, and roughly 4-1/2 miles south of the HPIA. The site is located adjacent to the Combat Town Training Area. The surrounding training areas and adjacent artillery ranges are used to prepare specialized personnel for various tactical operations and to simulate amphibious assault conditions.

The site boundary coincides with the approximate extent of a suspected sludge disposal area. The majority of the Site 30 area is wooded containing trees of less than three inches in diameter and dense understory. Unimproved paths are found within and around the site. The tank trail that leads to the suspected disposal area is occasionally used as part of field training exercises. One of two streams which comprise the headwaters of Frenchs Creek lies approximately 1,500 feet west of Site 28. Surface water runoff and groundwater flow directions are generally to the west and north toward Frenchs Creek.

Site 30 was reportedly used by a private contractor as a cleaning area for emptied fuel storage tanks from other locations. The tanks were used to store leaded gasoline that contained tetraethyl lead and related compounds. Since fuel residuals remaining in the emptied tanks were reportedly washed out at Site 30, the disposal area is suspected to contain fuel sludge and wastewater from the washout of the tanks.

The suspected disposal area measures approximately 7,500 square yards. It is estimated that, at a minimum, 600 gallons of sludge were removed from tanks and drained onto the ground surface during the cleaning process. This estimate was based on the projected volume of material remaining in two 12,000 gallon tanks and the amount of material below their outflow ports. Supplemental information suggests that the site may have been used for the disposal of similar wastes from other tanks. The quantity and composition of the waste is unknown. However, it is suspected to have contained tetraethyl lead and cleansing compounds.

In 1994, an RI was conducted at Site 30. The VOC 1,1,1-trichloroethane was the only organic compound detected in surface soil samples. No other positive detections of VOCs or SVOCs were observed among surface soil samples.

Inorganics were detected in the surface soil samples. However, none of the positive detections of inorganics exceeded Base-specific background levels for surface soil.

The VOC 1,1,1-trichloroethane was the only organic compound detected in subsurface soil samples at Site 30. No other positive detections of VOCs or SVOCs were observed among subsurface soil samples.

Chromium was the only inorganic detected in subsurface soil at concentrations greater than Base-specific background levels. The detections were scattered throughout the study area.

Chloroform was the only organic compound detected in the shallow groundwater during the first sampling round. During the second sampling round, chloroform was once again detected in a groundwater sample. No other VOCs were detected.

Inorganics, both total and dissolved fractions, were detected in samples obtained from each of the monitoring wells at Site 30.

Lead and mercury were the only inorganics identified in surface water at concentrations in excess of EPA Region IV screening values. Both lead and mercury detections were observed in a sample located upgradient of the study area. No other total inorganics concentrations were in excess of screening values. Further, VOCs and SVOCs were not detected in any of the three surface water samples.

VOCs were not detected among the six sediment samples retained for analysis from Frenchs Creek. No inorganics concentrations among the six sediment samples exceeded screening values.

Based on the findings of the RI/FS, a No Action Alternative was presented in the ROD signed on May 16, 1996.

The "no action" plan involves taking no further remedial actions (this includes conducting no further environmental investigations or sampling) at the site. The site and all of the environmental media located within the site will remain as they currently are.

2.2.8 Operable Unit No. 8 (Site 16)

OU No. 8 (Site 16), the Former Montford Point Burn Dump area is located southwest of the intersection of Montford Landing Road and Wilson Drive in the Montford Point area of Camp Lejeune. The study area is approximately 4 acres in size. Northeast Creek is approximately 400 feet southeast from the boundary of the burn dump. The remainder of the study area is bordered by wooded areas.

Most of the site is currently a cleared area that is used to park military vehicles; the other areas are comprised of pine trees. There is an opening in the wooded area in the southeast corner of the study area which leads to Northeast Creek. An apparent storm sewer line, located to the southeast of the burn dump, runs in a northeast-southwest direction. There is also a storm sewer line that runs from the intersection with Coolidge Road and Harding Road, and connects to the storm line southeast of the site. A four-foot wide ditch, believed to be a fire break is evident advancing from the storm sewer line to the southwest of the study area and extending around the western side of the former burn dump. There are no permanent structures at this site.

Limited information is available concerning the operational history of the burn dump. Practices at other burn dumps at MCB, Camp Lejeune indicate that this dump may have accepted municipal waste/trash from the surrounding area housing and activity buildings. Records indicate that small amounts of liquids (waste oils) were also disposed of at this site. Previously existing asbestos (less than one cubic yard) has been removed from the site. Typically, the debris was burned, then graded to the perimeter of the disposal area so that more debris could be dumped and burned. Currently, the study area is being used for staging vehicles and for vehicle training exercises. In the center of the study area is a mock-up jet aircraft. This aircraft is used to train in refueling exercises by tank truck operations. During these exercises; however, no fuel is used.

A soil investigation was conducted at Site 16 to characterize soil quality at the site and to determine the presence or absence of waste materials within the boundary of the former burn dump. In addition to the soil investigation, four trenches were also performed at Site 16 as part of the

subsurface soil investigation. The trenches were excavated within the boundary of the former burn dump to inspect subsurface conditions.

A confirmatory surface soil investigation which included collecting and analyzing surface soil samples was completed in the northern area of the dump.

A groundwater investigation was conducted at Site 16 to determine the presence or absence of contamination in the surficial aquifer resulting from past burning and disposal activities. Shallow groundwater monitoring wells were drilled and installed as part of the investigation. One well was placed in an upgradient (background) location. Three wells were installed downgradient of Site 16 to assess off-site groundwater quality. Two wells were installed within the boundary of the former burn dump.

A habitat evaluation was performed at Site 16 from December 4 through 6, 1994. The evaluation focussed on the determination of terrestrial and aquatic ecosystems, along with the identification of plant and animal species. This information was used to aid in the ecological risk assessment.

A surface water investigation was conducted at Site 16 to assess the possible impact of the former burn dump on Northeast Creek. Surface water samples were collected on Northeast Creek during the period from June 26 through June 27, 1994.

A sediment investigation was conducted at Site 16 to assess the possible impact of the former burn dump on Northeast Creek. Sediment samples were collected from the sampling locations where surface water samples were collected.

The pesticides 4,4'-DDE, 4,4'-DDT, alpha-chlordane, and dieldrin are the most prevalent pesticide contaminants detected in the surface soil. Pesticide contamination is at relatively consistent concentration levels in the surface soil samples collected across the site. Pesticide contamination in the subsurface soil is less frequent than in the surface. The pesticide levels detected in the surface and subsurface soil at Site 16 are similar to levels detected at other areas within MCB Camp Lejeune.

Surface soil contamination also consists of PCBs (Aroclor 1254 and Aroclor 1260). Although not as frequent as in the surface soil, Aroclor 1254 is present in subsurface soil. The detections of Aroclor 1254 and 1260 are from sampling locations across the site. PCBs are not found in the groundwater indicating that vertical migration to the water table has not occurred.

Semivolatile compounds are infrequently encountered at low levels in the surface soil. Subsurface soil is relatively absent of semivolatile contamination. The concentration levels and presence of semivolatile compounds in the soil is random across the site. The source of the semivolatile compounds is believed to be due to historical open burning operations.

The concentrations of several inorganic constituents exceed twice the average base-specific background concentration. Comparing the results for surface and subsurface soil, it appears that there is little correlation between elevated metals concentrations in the surface and subsurface soil.

Two rounds or groundwater samples were collected from six shallow wells at Site 16.

Volatile contaminants benzene and ethylbenzene were detected in one groundwater sample collected during the first round of groundwater sampling. Volatile contaminants were absent in all groundwater samples collected as part of the second round.

Metals were the most prevalent and widely distributed contaminants in the groundwater.

Semivolatile contamination in the groundwater was limited to low levels of naphthalene (maximum concentration 4 µg/L) phenol (maximum concentration 1 µg/L), and bis(2-ethylhexyl)phthalate (maximum concentration 5 µg/L).

Pesticide and PCB contaminants were not detected in either round of sampling.

Northeast Creek is the only surface water body in the vicinity of the site. Northeast creek lies approximately 400 feet in a southeastern direction from the site. Surface water and sediment samples were collected from the creek.

Volatile contaminants detected in the surface water do not exceed state surface water quality standards. However, 1,1,2,2-tetrachloroethane exceeds the federal AWQC (0.17 µg/L) for the protection of water and organisms. No other volatile organics were detected in the surface water.

Semivolatile, pesticide, and PCB contaminants were not detected in the surface water.

Arsenic was detected in 4 out of 5 surface water samples at levels which exceed state or federal criteria.

Volatile organics carbon disulfide and toluene were infrequently detected in the sediment.

Semivolatile, pesticide, and PCB contamination is absent in the sediment.

2.2.9 Operable Unit No. 9 (Sites 65 and 73)

OU No. 9 consists of Site 65 (Engineer Area Dump) and Site 73 (Courthouse Bay Liquids Disposal Area).

Site 65 - Engineer Area Dump

Site 65 is located in the Courthouse Bay area of MCB Camp Lejeune. The Courthouse Bay area ranges in elevation from about 45 feet to sea level. The terrain at Site 65 is relatively flat with an average elevation of 40 feet within the site area. Site 65 is a local high elevation area.

The Engineer Area Dump is approximately four to five acres in size. Two separate disposal areas have been reported: a battery acid disposal area and a liquids disposal area. The types of liquids which have been disposed are reported to be petroleum, oil, and lubricant products. In addition, the dump was used to burn construction debris. The dump was in operation from before 1958 until 1972.

The Site 65 area is no longer used for dumping. The area is currently heavily wooded with a marshy area south of two ponds. A large open area abuts the dump to the east. This area is currently used for heavy equipment training exercises.

There are two small ponds situated east of Site 65 and the adjoining heavy equipment training area. A small intermittent stream runs from the southwest into the west pond. The ponds do not have specific surface water outlets, but appear to drain to a marsh area. Stormwater runoff from Site 65 and the surrounding areas eventually drains into Courthouse Bay.

There is one small building existing on Site 65. The nearest facilities are Buildings BB-201, BB-239, and BB-237 located on an access road off of Poe Road. These facilities are used to store and transfer waste oil, diesel fuel, kerosene, and product POL as part of the Camp Lejeune Engineer School located west of Site 65.

Previous studies performed at Site 65 include an SI conducted by Baker in 1993. Results of the SI identified several metals in groundwater at levels above state or federal criteria. Pesticides were detected at low levels in soil (surface and subsurface) and surface water while low levels of PAHs were detected in surface soils. A single detection of PCBs was identified in a subsurface soil sample.

Baker conducted an RI at Site 65 in 1995. Within the Draft RI report Baker concluded that there are no releases of hazardous substances from the waste disposal areas that result in a risk to human health or the environment. A "no action" Proposed Remedial Action Plan (PRAP) was submitted for Site 65 in February 1997. It is anticipated that the Final RI, Final PRAP, Draft ROD and Final ROD will be submitted in FY98.

Site 73 - Courthouse Bay Liquids Disposal Area

The Courthouse Bay Liquids Disposal Area is located within an active amphibious vehicle maintenance facility located along the northwest shore of Courthouse Bay. This AOC was used from 1946 until 1977. Available information indicates that disposal activities occurred within a 13-acre area. An estimated 400,000 gallons of waste oil were disposed of in this area. The waste oil was generated during routine vehicle maintenance. The oil drained directly on the ground surface. In addition, approximately 20,000 gallons of waste battery acid were reportedly disposed of in this area. Waste battery acid was poured into shallow hand-shoveled holes that were backfilled after disposal.

Six previous environmental investigations were performed at Site 73 to date including two site-wide studies and four UST-focused studies. Results to date have identified low levels of chlorinated organics in shallow perimeter groundwater wells and petroleum hydrocarbons in soil and groundwater samples obtained from the vicinity of the USTs.

An RI was conducted at Site 73 in 1995 by Baker. The findings from that investigation indicated the presence of volatile organic contaminants in the shallow groundwater. The analytical results indicate that the vertical and lateral extent of the contamination was not fully delineated and that a second phase of RI was necessitated. The Phase II RI was conducted in the spring of 1996. The Draft RI Report was submitted in November 1996. The report confirmed the presence of volatile organic in both shallow and deep groundwater at the site. No significant contamination was identified in off-site receptors.

A Draft FS Report and PRAP submitted in February 1997. The Draft FS considers various alternatives to be applied separately to the shallow and deep aquifer contamination at the site. These alternatives included no action, natural attenuation, groundwater extraction and treatment, air

sparging and soil vapor extraction, and in-well aeration. The Draft PRAP identified natural attenuation as the preferred alternative for the remediation of both the shallow and deep groundwater aquifers at the site.

It is anticipated that the Final ROD will be submitted in FY98. Implementation of the preferred alternative should occur in the winter of 1998.

2.2.10 Operable Unit No. 10 (Site 35)

Site 35, the dismantled Camp Geiger Area Fuel Farm is located immediately north of the intersection of G and Fourth Streets, approximately 400 feet southwest of Brinson Creek. The Fuel Farm consisted primarily of five 15,000-gallon ASTs and associated underground distribution lines, a pumphouse, a fuel loading/unloading pad, distribution island, and an oil/water separator.

The ASTs were erected in 1945 as part of the original Camp Geiger construction. Originally, the Fuel Farm was used to store and dispense No. 6 fuel oil. At a later unknown date the facility was converted to store and dispense gasoline, diesel fuel, and kerosene to government vehicles and underground storage tanks that were in use at Camp Geiger. The Fuel Farm was active until it was decommissioned in the spring of 1995 to make way for the construction of a six-lane highway.

During the active life of the Fuel Farm several releases of fuel have occurred. sometime during 1957-58, according to Camp Lejeune fire Department, a substantial release of fuel occurred at the exact volume of product released was never determined, but the magnitude of the spill was estimated to be in the thousand of gallons. To control the release, interceptor trenches were dug and the fuel was ignited.

There is evidence of a fuel release from an abandoned underground distribution line that supplied No. 6 fuel oil to a UST that fueled a boiler at the Mess Hall Heating Plant, located adjacent to "D" Street between Third and Fourth Streets. This facility was demolished in the 1970s.

In 1990 jet or diesel fuel was discovered in a drainage channel immediately north of the Fuel Farm. The source of this release was believed to be an unauthorized discharge from an unidentified tanker truck. Approximately 20 cubic yards of contaminated soil were removed.

During 1993-94 an Interim RI and comprehensive RI were conducted at the site. The Interim RI identified elevated levels of petroleum hydrocarbon contamination in soils at three locations adjacent to the Fuel Farm. The comprehensive RI identified multiple plumes of fuel and solvent related groundwater contamination in the surficial aquifer in an area adjacent to the Fuel Farm.

An Interim FS and ROD were prepared that focused on fuel impacted soils at the site. These documents resulted in the execution of soil removal and offsite disposal that was conducted in 1995 and completed in the spring of 1996.

This removal action for TPH contaminated soils utilized immunoassay field screening techniques to segregate contaminated and non-contaminated soils. Each truckload of excavated materials was sampled and analyzed and then routed to stockpile as contaminated or non-contaminated. As the size of one Area of Concern increased, additional funding was required to complete this removal action. A four month delay experienced during the field activities was due to a lack of funding.

Upon completion of field activities, a total of 15, 770 tons of petroleum contaminated soils had been routed to offsite recycling disposal.

An Interim FS and ROD were also prepared to address shallow groundwater contamination in areas between the Fuel Farm and Brinson Creek. A Remedial Design was initiated in June 1996, but has been subject to delays associated with a field pilot test of In Well Aeration technology (i.e., the preferred alternative) at another Camp Lejeune site - Site 69. Problems and delays associated with this work have lead to the development of a field pilot test of an alternative technology, In Situ Air Sparging (IAS). The pilot test was conducted in July/August 1996. A Draft Treatability Study Report was submitted in November 1996. The report recommended that an IAS system using horizontal air injection is preferred at this site to conventional vertical air injection. Due to poor site conditions, lack of access, and a lack of BTEX contamination in the area east of the proposed right-of-way, it was recommended that the system be constructed along the western edge of the proposed right-of-way. It was further recommended that the IAS system proposed be tested in a pilot phase prior to full-scale implementation.

Baker initiated the design of the IAS system in December 1996 and submitted the 100% Design Report in February 1997. The Final Design Report is anticipated to be completed in July 1997. Construction is anticipated to be initiated in August 1997.

A Supplemental Groundwater Investigation (SGI) to delineate the extent of shallow groundwater contamination to the south and west was initiated in April 1996. An amended Draft RI Report for Site 35, incorporating the results of the SGI, was submitted in November 1996. A Draft FS/PRAP was submitted in January 1997. The Draft FS considered various alternatives for the remediation of site groundwater including no action, groundwater extraction and treatment, natural attenuation, passive treatment wall, and in-well aeration. The Draft PRAP identified natural attenuation along with air sparging as the preferred alternative.

It is anticipated that the Final SGI Report, Final PRAP and Final ROD will be submitted in FY98. Implementation of the preferred alternative should occur in the winter of 1998.

2.2.11 Operable Unit No. 11 (Sites 7 and 80)

OU No. 11 consists of Site 7 (Tarawa Terrace Dump) and Site 80 (Paradise Point Golf Course Maintenance Area). These sites are described below.

Site 7 - Tarawa Terrace Dump

Site 7, the Tarawa Terrace Dump, is located northeast of the wastewater treatment plant and south of the community center between Tarawa Boulevard and Northeast Creek. The study area is approximately 5 acres in size, and public access is not restricted. A marsh area is encountered in the southern portion of the study area in the vicinity of Northeast Creek. The entire study area is dense with wooded areas and ground cover. Northeast Creek flows to the west in the direction of the New River. Two unnamed surface water bodies, within the site boundaries, flow southerly in the direction of Northeast Creek. Northeast Creek and the surface water bodies are influenced by tides. During high tide much of the marsh area is covered with ponded water.

During a March 1994 site reconnaissance, four areas of concern were apparent. Aerial photos from 1973 and 1978 indicated a potential dump area east of a utility right-of-way. Additionally, a smaller

cleared area was shown on the western side of the utility right-of-way. The area south of the community center is a concern based on elevated levels of pesticides/PCBs reported in a previous investigation. Visual debris (i.e., paint cans, motor oil cans, and other rusted cans) were observed in the wooded area east of the water treatment plant. What appeared to be a cleared area, where past dumping may have occurred was observed due east of the water treatment plant adjacent to the smaller surface water body.

Site 7 is a former dump that was used during the construction of the base housing located in Tarawa Terrace. Precise years of operation are unknown, but it has been reported that the dump was closed in 1972. Historical records do not indicate that hazardous materials were disposed of at this facility; only construction debris, water treatment plant filter media, and household trash are known to have been disposed. Aerial photos from the 1970s indicate a cleared area east of the right-of-way, and a smaller cleared area west of the right-of-way.

The RI field program at Site 7 consisted of a site survey; a soil investigation which included drilling and sampling; a groundwater investigation which included monitoring well installation and sampling; a surface water and sediment investigation; a habitat evaluation; and an earthworm bioaccumulation study. The surface water, sediment, and ecological investigation was conducted from June 22 to June 27, 1994, due to fish migration and benthic macroinvertebrate life cycles. The soil and groundwater phase of the RI field program commenced on October 10, 1994 and continued through December 12, 1994. Due to DEHNR concerns over PCBs in the soil, confirmatory surface and subsurface soils were collected during October 6 through 7, 1995. The following details the various investigation activities which were implemented at the during the RI.

The soil investigation was conducted at Site 7 to characterize soil quality at the site and to determine the presence or absence of contamination within the site boundary. For the soil investigation, Site 7 was separated into four areas of concern: Community Center Area, East Area, North Area, and South West Area. In addition to the soil investigation, five trenches were performed.

The groundwater investigation was conducted at Site 7 to determine the presence or absence of contamination in the surficial aquifer resulting from past activities. Shallow groundwater monitoring wells were drilled and installed as part of this investigation, in addition to the existing monitoring wells. Additionally, temporary wells were installed.

Surface water and sediment were collected from the west tributary to Northwest Creek, in the drainage ditch to the west tributary, the east tributary to Northeast Creek, and in Northeast Creek. Sediment samples were also collected in the marsh area.

A habitat evaluation was performed at Site 7 from December 4 through December 6, 1994. The evaluation focussed on the determination of terrestrial and aquatic ecosystems, along with the identification of plant and animal species.

Benthic macroinvertebrates were collected as part of the ecological investigation, which included sampling along the west tributary and Northeast Creek.

The earthworm bioaccumulation study was conducted at Site 7 to determine if earthworms were bioaccumulating PCBs, pesticides, and metals from the soil.

The pesticides dieldrin, 4,4'-DDE, 4,4'-DDT, and 4,4'-DDD are the most prevalent pesticide contaminants in the surface and subsurface soil. Of these, dieldrin and 4,4'-DDE are the most prevalent in the surface and subsurface soil. Surface and subsurface contamination also consists of trace levels of PCBs (Aroclor 1254 and 1260).

Semivolatile contamination was detected in the north and eastern portions of the study area. Semivolatile compounds are detected more frequently in the surface rather than subsurface.

For the exception of one detection of trichloroethene, detected at 1 µg/kg in the surface soil, surface and subsurface soil are absent of volatile contamination.

Metals are the most prevalent and widely distributed contaminants in the groundwater.

For the exception of phenol, 4-Methylphenol, and dieldrin, semivolatile and pesticide/PCB contamination is not in the groundwater.

Pesticides dieldrin and endrin ketone was detected in two surface water samples.

Arsenic, iron, and manganese are the only inorganics detected above applicable federal and state surface water criteria.

Polynuclear Aromatic Hydrocarbons (PAHs) were the most prevalent semivolatile organics in the sediment.

Pesticide and PCB contaminants were detected in the sediment. The pesticide 4,4'-DDE was the most prevalent pesticide.

Based on the findings of the RI the recommended alternative in the ROD was No Action. The ROD was signed in August 1997.

Site 80 - Paradise Point Golf Course Maintenance Area

OU No. 11 (Site 80) referred to as the Paradise Point Golf Course Maintenance Area is located in an area to the northwest of Brewster Boulevard within the Paradise Point Golf Course. Site 80 is located in the rear of a machine shop (Building 1916) and a maintenance wash area consisting of a concrete wash pad and sump. Golf course maintenance equipment is cleaned on the wash pad. The sump is used to collect the water and oil runoff generated from the cleaning of the equipment, the water and oil from the sump then travels into an oil/water separator located a few feet to the southeast of the wash pad.

Information on when the golf maintenance facility was started is unavailable, however, the facility is currently in operation.

The initial phase of the RI field investigation commenced on October 10, 1994 and continued through December 12, 1994. In addition, a subsequent soil and groundwater investigation at Site 80 commenced on June 12, 1995 and continued through July 15, 1995.

A two part soil investigation consisting of an initial and subsequent investigation, was conducted at Site 80 to determine the presence or absence of contamination within the study area. The initial

soil investigation involved the installation of soil borings and groundwater monitoring wells for the collection of surface and subsurface soils with a drill rig. The subsequent soil investigation involved the installation of additional soil borings and one groundwater monitoring well. A total of 37 locations, comprising soil borings and monitoring well borings were sampled during the initial soil investigation. The subsequent soil investigation had 21 locations, comprising soil borings and one monitoring well boring that were sampled. Pesticides appear to be the predominant contaminants at Site 80. Six of the eleven pesticides detected in surface soils at Site 80 were in at least 20 of the 55 samples analyzed. Six pesticides were detected in subsurface soil at Site 80.

A groundwater investigation was conducted at Site 80 to determine the presence or absence of contamination in both the surficial aquifer and the deeper Castle Hayne aquifer, which may have resulted from past operational activities. During the initial soil investigation conducted from November 1, 1994 through November 7, 1994, four shallow groundwater monitoring wells were installed, then sampled during November 19, 1994 through December 3, 1994. In addition, one intermediate monitoring well (i.e., installed to the top of the Castle Hayne aquifer), was installed and sampled as part of this investigation. Three on-site existing shallow monitoring wells were also sampled during the ground water investigation. Two rounds of groundwater samples was collected from the eight shallow wells and one intermediate (upper portion of the Castle Hayne aquifer) well installed at the Paradise Point Golf Course Maintenance Area. Organic and metal contamination was detected infrequently and at concentrations that did not exceed applicable State or Federal criteria.

An additional shallow groundwater monitoring well was installed on June 13, 1995. This groundwater monitoring well was installed to delineate positive pesticide detections obtained during the initial soil investigation.

A second round of groundwater samples were collected from the eight shallow wells and one intermediate well in December 1995. This sampling was conducted in response to NC DEHNR concerns with elevated inorganic levels detected in the groundwater.

A habitat evaluation was performed at Site 80 during December 4, 1994 through December 6, 1994. The evaluation focussed on the determination of terrestrial and aquatic ecosystems, along with the identification of plant and animal species.

Based on the risk assessment presented in the RI report a Time Critical Removal Action (TCRA) was performed to remove elevated pesticides in the soil. The following activities were completed as part of the TCRA. Initial project field activities included pre-excavation field screening of eight areas of concern to determine the extent of pesticide contamination. Each AOC was overlain with a ten feet by ten feet sampling grid and samples procured from each grid and analyzed in a field laboratory equipped with a gas chromatograph. Based upon the action levels, the remedial area more than doubled. Action levels were then recalculated based upon Region III Risk-Based Concentrations for industrial workers which resulted in a ten-fold increase in the action levels for dieldrin and aldrin, the drivers of the remedial effort. The excavation activities removed approximately 988 tons of contaminated soil. The contaminated soil was loaded into transport vehicles, and routed to an off-site permitted disposal facility. Excavated areas were backfilled with soils from the Base borrow area. After completion of the TCRA, a No Action Alternative was presented in the ROD signed in August 1997.

2.2.12 Operable Unit No. 12 (Site 3)

OU No. 12 (Site 3) is referred to as the Old Creosote Plant and is located on the mainside portion of MCB Camp Lejeune, approximately one quarter mile east of Holcomb Boulevard, on Sawmill Road, and one mile north of Wallace Creek. Remnants of the former creosote plant including the chimney, concrete pads, and train rails are present in the southern portion of Site 3. The cleared area in the northern portion of the Site 3 was reported to be the location of the former sawmill, which supplied the cut timbers for creosote treatment.

Site 3 area encompasses approximately 5 acres, is generally flat and unpaved, and is intersected by a dirt access road. Access to the site is unrestricted directly from Holcomb Boulevard. The Camp Lejeune Railroad lies approximately 200 feet to the west of Site 3. During periods of heavy rain the western area of the site exhibits several areas of standing water. Surface water runoff from the site flows in both an easterly and westerly direction since runoff ditches flank both the eastern and western edges of the site. To the east is a small drainage way in which ponded water is evident during periods of heavy rain. To the west of the site are drainage areas which parallel the Camp Lejeune Railroad and Holcomb Boulevard.

The old creosote plant reportedly operated from 1951 to 1952 to supply treated lumber during construction of the Base railroad. Logs were cut into railroad ties at an on-site sawmill, then pressure treated with hot creosote stored in a railroad tank car. There is no indication of creosote disposal on site, and records show that creosote remaining in the pressure chamber at the end of the treatment cycle was stored for future use. Historical information indicates that the on-site sawmill was located to the north of the current dirt access road.

The first phase of the RI field investigation commenced on September 19 through September 22, 1994. The second phase commenced on October 10, 1994 and continued through December 12, 1994. In addition, a third phase of the RI field investigation commenced on June 12 and continued through July 15, 1995.

A three-phased soil investigation was conducted to determine the presence or absence of contamination within the study area. The first phase of the soil investigation involved utilizing ELISA field screening technology on surface soils only, and the second phase involved the installation of soil borings and groundwater monitoring wells for the collection of surface and subsurface soils with a drill rig. The third phase of the soil investigation involved the installation of additional soil borings and groundwater monitoring wells.

A groundwater investigation was conducted at Site 3 to determine the presence or absence of contamination in both the surficial aquifer and the deeper Castle Hayne aquifer, which may have resulted from past operational activities. During the second phase of the soil investigation five permanent shallow groundwater monitoring wells were installed, then sampled during December 1 through December 3, 1994. In addition, one intermediate groundwater monitoring well was installed and sampled as part of this investigation. Two of the three existing on-site shallow monitoring wells were also sampled during the groundwater investigation.

Due to volatile and PAH contamination detected within the groundwater during the first round of sampling, an additional seven groundwater monitoring wells were installed to further define the vertical and horizontal extent. These wells were installed during the period June 12 through June 29,

1995. Five additional shallow wells, one intermediate well, and one deep well were installed during the Phase III soil investigation.

In order to confirm the presence or absence of contamination detected in monitoring wells, the deep well, during the Round 2 sampling, and determine the need for additional deep wells to characterize deep groundwater flow, a third round of groundwater samples were collected from all the wells.

PAH constituents were the most frequently detected organics and exhibited the greatest concentrations in the soil. These constituents are believed to be associated with past wood treating activities at the site. The highest concentrations of PAHs in soils occurred in the Treatment Area in the central portion of the site. Fuel constituents, such as ethylbenzene and xylene, were also detected in surface and subsurface soils at Site 3, primarily at the former treatment area in the central portion of the site.

No pesticides or PCBs were detected in the subsurface soil samples submitted for full TCL organics.

No inorganics were detected in the subsurface soil above base background levels.

Benzene was detected above State and/or Federal standards in the central portion of the treatment area during the first and third groundwater sampling rounds, but not during the second round. Naphthalene was the only PAH constituent detected above State and/or Federal standards in the shallow groundwater. This contaminant was detected in the Treatment Area and in the Rail Spur Area, but the detections were not consistent for the three rounds of sampling for location and concentrations.

Volatiles (fuel constituents) and semivolatiles (PAH constituents and phenols) were detected in the Castle Hayne aquifer during the three rounds of groundwater sampling. Benzene, phenols, and PAH constituents were the only organics detected in the Castle Hayne above State and/or Federal standards. Benzene was detected in an intermediate well during the first sampling round. Benzene, phenols, and PAH constituents were detected during the second round of groundwater sampling in a deep well in the Treatment Area. No contaminants were detected above State and Federal standards during the third groundwater sampling round.

Based on the findings of the RI/FS, the recommended alternative presented in the ROD signed April 3, 1997 includes excavation of contaminated soil, treatment of the soil, land use restrictions until the soil is treated, aquifer use restrictions, and groundwater monitoring.

Project plans for a Pilot-Scale Bioremediation Treatability Unit were submitted in September 1996 and are still under review.

As part of the groundwater monitoring program, a baseline sampling event was conducted in January of 1997. Some wells designated to be sampled under this program were unaccessible due to hurricane damage from the Fall of 1996.

2.2.13 Operable Unit No. 13 (Site 63)

The Verona Loop Dump (Site 63) is comprised of approximately five acres and is located nearly two miles south of the MCAS, New River operations area. Site 63 is bordered to the south by Town Point Road, to the east by an unnamed tributary to Mill Run, and to the west by a gravel access road.

Much of the site is heavily vegetated with dense understory and trees greater than three inches in diameter. A partially improved gravel road provides access to the main portion of the study area; other unimproved paths extend outward from this road. Several personnel entrenchments, used during training exercises, have been excavated throughout the study area. Earthen berms and small to medium size trees have been felled to construct protective works around many of the entrenchments.

Very little information is known regarding the history or occurrence of waste disposal practices at Site 63. The study area reportedly received wastes generated during training exercises. The type of materials generated during these exercises are described only as "bivouac" wastes. Additional information suggests that no hazardous wastes were disposed of at Site 63. The years during which disposal operations may have taken place are not known. Training exercises, maneuvers, and recreational hunting are frequently conducted in the area.

The RI field investigation of OU No. 13 commenced on November 2, 1995 and continued through November 16, 1995. The RI field program at Site 63 consisted of a site survey; a soil investigation, which involved direct-push sample collection; a groundwater investigation, which included temporary monitoring well installation, sampling, and aquifer testing; a surface water and sediment investigation; and a habitat evaluation.

The various investigations were performed at Site 63 to assess the nature and extent of contamination that may have resulted from previous waste management practices or site activities; assess the human health, ecological, and environmental risks associated with exposure to surface and subsurface soils; and characterize the geologic and hydrogeologic setting of the study area.

Styrene was detected in only one of the subsurface soil samples obtained at Site 63. No other VOCs were detected among the soil samples. Given the limited extent of styrene and the lack corroborating evidence of volatile contamination, the presence of styrene is most likely the result of a single event rather than long-term disposal operations.

The presence of SVOCs in soil is most likely the result of former or ongoing activities at Site 63. The concentration and infrequent detection of semivolatile compounds among soil samples is consistent with the historical use of the site, indicative of incidental spillage, or may be the result of ongoing maneuvers and training exercises. Semivolatile compounds were identified in both surface and subsurface soil samples obtained from the suspected disposal portion of the study area. Concentrations of SVOCs were limited to two surface and three subsurface sampling locations throughout the entire site. The positive SVOC results correspond directly to the visual identification of graded soil or construction debris observed during the field investigation. None of the positive SVOC detections exceeded applicable soil screening values for the protection of groundwater, nor do they suggest long-term disposal operations.

Positive detections of pesticides were observed in both surface and subsurface soil samples at Site 63. Pesticide concentrations were low (i.e., less than 0.1 mg/kg) and primarily limited to within and adjacent to the suspected disposal portion of the study area. The majority of pesticide detections were observed in surface soil samples. The frequency and overall concentration of pesticides in soil, nonetheless, does not suggest pesticide disposal activities.

The distribution of detected inorganic analytes among both surface and subsurface samples followed no discernible pattern. In at least one case, however, findings from the analytical program were

consistent with visual observations of buried debris and non-native surface material recorded during the field investigation.

Volatile, semivolatile, pesticide, and polychlorinated biphenyl (PCB) organic compounds were not detected in the groundwater at Site 63. Inorganic analytes were detected the groundwater at Site 63. Iron, manganese, and zinc were the only TAL total metals detected at levels in excess of either federal maximum contaminant level (MCL) or North Carolina WQS.

No organic compounds were detected among any of the five surface water samples submitted for analyses from Site 63. Aluminum was the only metal identified in the surface water.

None of the metal sampling results from Site 63 exceeded chronic sediment screening values; therefore, the extent of inorganic analytes in sediment are not addressed. Volatile, semivolatile, and PCB compounds were not detected in the sediment. The pesticides 4,4'-DDE, 4,4'-DDD, 4,4'-DDT, alpha-chlordane, and gamma-chlordane were detected in the sediment.

Based on the findings of the RI, a No Action Alternative was presented in the ROD signed on April 3, 1997. The "no action" plan involves taking no further remedial actions at the site. The site and all of the environmental media located within the site will remain as they currently are.

2.2.14 Operable Unit No. 14 (Site 69)

Site 69, the Rifle Range Chemical Dump, is located approximately one-quarter mile west of the New River in a remote area of MCB Camp Lejeune known as the Rifle Range. The site covers approximately 14 acres and is situated in a topographically high area. The former disposal area is relatively flat, but the ground surface slopes downward in all directions as you move away from the central portion of the site. The area is overgrown to the point that the disposal area boundary is not readily discernable. There are some areas within the site where former trenching operations are apparent. A fence was erected around the site to restrict access.

During the period between 1950 to 1976, the area was used to dispose chemical wastes including PCBs, solvents, pesticides, calcium hypochlorite, and drums of "gas" which possibly contain CN (i.e., tear gas) or other agents such as mustard gas. Base on background information, chemical agents may be buried at this site.

Currently, a remedial investigation is being conducted to assess the nature and extent of contamination, and the impact of this contamination on human health and the environment. To date, the RI has determined that groundwater is contaminated with solvent constituents. The groundwater contamination is believed to be centered in the south-central section of the site, and has not migrated extensively from the disposal area. Additional studies are being conducted to assess how deep the contamination has migrated.

Surface soil has not been impacted by the former disposal activities; however, it is believed that the top foot or two of soil may be cover material that was placed over the debris. No intrusive investigations were conducted due to the potential for encountering chemical agents. Geophysical investigations have indicated buried metallic objects near the groundwater source area. It is likely that the buried material consists of drums or canisters which contain spent solvents.

Surface water and sediment collected from the New River, Everett Creek, which is located south of the south, and an unnamed tributary north of the site have not been impacted by the former disposal operations.

A treatability study was initiated in March 1996 to assess the effectiveness of an innovative technology called in-well aeration. In June 1997 the UVB system, installed for the treatment of the deep aquifer, was relocated to a known area of contamination. The second phase of pilot scale test will continue through October 1998. If successful, this technology will most likely be retained for long-term treatment of the groundwater.

Due to the additional investigations required to assess the vertical extent of groundwater contamination, and the time frame associated with the treatability study, a ROD is not expected until 1998.

During preparation of the project plans, the issue of wetlands arose. The overhead power line construction was determined to be within the categories of construction activities covered by the general permit. It was necessary, however, to adjust pole spacing to avoid the four wet areas along the right-of-way in addition to the waterway crossing. Aids to aerial navigation, balls and beacons, were installed on the poles and power lines crossing the waterway. Secondary power distribution via watertight flexible conduit was provided to the two treatability test wells.

2.2.15 Operable Unit No. 15 (Site 88)

Building 25, the Base dry cleaners, is within a highly visible and densely populated area of MCB Camp Lejeune. Barracks, office buildings, and other occupied structures are adjacent to Building 25 in each direction. Aboveground and underground utilities are directly adjacent to Building 25 and more specifically within the immediate vicinity of the USTs.

The underground storage tanks were reportedly installed in the 1940s and have been used in conjunction with dry cleaning operations. The capacity for two of the USTs have been reported as 1,000 gallons, the volumes of the remaining USTs are unknown. There are two known solvents that have occupied the USTs: 1) varsol (a petroleum based product), and 2) perchloroethylene. Varsol was used from the 1940s until the 1970s when the dry cleaners switched over to using tetrachloroethene (PCE), which used until the late 1980s when the tanks were taken out of service. Currently, the facility is still using PCE in its cleaning process; however, the solvent is contained in aboveground tanks and within the confines of Building 25.

Five of the USTs were identified during excavation and sampling activities previously conducted at the site. During these activities, samples were obtained from the excavated soil and submitted for laboratory analysis. Unconfirmed analytical data indicated that concentrations of trichloroethene and PCE exceeded RCRA characteristic levels and would require management and disposal as a hazardous waste, if excavated and discarded. Subsequent to sampling, the excavation was backfilled and compacted to surface grade and seeded and mulched.

During the waste stream approval process, only five USTs were discovered versus the nine tanks which had been anticipated. Additionally, three of the tanks were installed vertically, rather than horizontally. In order to be able to remove two of the vertically installed tanks, it was necessary to relocate an air compressor which serves the dry cleaning facility (Building 25). When the tanks were later excavated, a significantly smaller quantity of contaminated soils was encountered versus the

originally envisioned quantity. At completion, a total of 2000 gallons of waste liquids and 120 tons of contaminated soils were routed to hazardous waste disposal.

The Phase I field investigation was conducted in August 1996. This investigation focused on obtaining data necessary to estimate the effects of previous site activities on soil and groundwater. This was accomplished through the acquisition of samples which were analyzed on-site with confirmation samples analyzed by a fix-based laboratory.

Three volatile organic contaminants (VOCs) were detected in the soil samples analyzed on-site, including cis-1,2-DCE, TCE, and PCE. Cis-1,2-DCE was detected in one soil sample at a concentration of 21 µg/kg, TCE was detected at concentrations ranging from 0.1 µg/kg to 8.5 µg/kg, and PCE was detected at concentrations ranging from 0.1 µg/kg to 237.6 µg/kg.

In general, the contaminated soil appears to be concentrated in the area of Building 25 and the parking lot across the street to the northwest near Building 43.

Five VOCs were detected in the groundwater including cis-1,2-DCE, trans-1,2-DCE, 1,1,1-trichloroethane (1,1,1-TCA), TCE, and PCE. PCE was the most prevalent compound and detected at the highest concentrations, PCE was detected in 19 of the 23 samples at concentrations ranging from 0.2 µg/L to 53,703 µg/L.

Like the soil, the greatest impact to groundwater is in the area of Building 25. The data suggest that the plume has extended west-northwest of the source area, in the direction of Building 43. In addition, the vertical extent of groundwater contamination has been determined to be at least 50 feet bgs in this area.

A Phase I report documenting these findings was published on November 27, 1996.

The Phase II investigation was conducted from April to June 1997. The purpose of this investigation was to complete the delineation of the soil and groundwater contamination using a series of soil and temporary well locations. When the horizontal limits of contamination were defined permanent monitoring wells consisting of shallow, intermediate, and deep clusters were installed for the purpose of delineating the vertical contamination, determining groundwater flow, and establishing monitoring points within and outside the contaminated area. The results of this study will be provided in a report which is scheduled to be submitted in October 1997. Following this report, it is anticipated that a remedial alternative and design for the alternative will be required.

A study is being conducted by Naval Facilities Engineering Service Center at this site. The first phase of this study was conducted in July 1997. The purpose of this phase was to determine if Dense Non Aqueous Phase Liquids (DNAPL) existed at the site through the installation of eleven borings. The results of this first phase indicated the presence of tetrachloroethylene (PCE) and DNAPL.

The second phase of this study was conducted in August 1997. This phase consisted of the installation of five soil borings of which two were converted to recovery wells and one to an injection well. Groundwater and soil sampling were conducted during this phase. The results of the groundwater sampling indicated elevated levels of PCE and daughter products as well as free pure product (PCE) in each well. Soil results exhibited elevated levels of PCE and daughter products.

In addition to the environmental sampling, a groundwater pump test was performed. Groundwater pumping rate in the shallow aquifer was determined to approximately 5 gallons per minute.

A dye tracer study is scheduled to be conducted in November 1997.

2.2.16 Operable Unit No. 16 (Sites 89 and 93)

OU No. 16 consists of Site 89 (STC-868) and Site 93 (TC-942). Both of these sites were formerly managed under the Underground Storage Tank (UST) program. Due to the presence of chlorinated solvents selected during the UST investigation these sites were brought under the IR program to address the chlorinated solvent contamination. Due to the geographic proximity and similar contaminant concerns these sites were grouped as an Operable Unit.

Site 89 - (STC-868)

The STC-868 site is located near the intersection of G and 8th Streets in the Camp Geiger area, MCB, Camp Lejeune. The STC-868 site, a steel 550-gallon waste oil tank, was installed in 1983 and removed in 1993. Based on elevated levels of both TPH and oil and grease at the time of removal, a release is suspected to have occurred. STC-868 was located between Building STC-867, a roofed contaminated soil storage facility, and an elevated wash rack. Two monitoring wells, presumably associated with Building STC-867, are present east and west of the STC-868 excavation.

Phase I of the Remedial Investigation at Site 89 was conducted in July through August 1996. The activities conducted under this investigation included the installation of temporary well clusters for the purpose of obtaining groundwater samples to be analyzed by an on-site laboratory. In addition, surface water and sediment samples were collected within Edwards Creek. This information was evaluated to assess the nature and extent of the contamination.

The groundwater investigation at Site 89 entailed the collection of groundwater samples from three permanent monitoring wells and 30 temporary monitoring wells.

Six separate VOCs were detected in the groundwater samples collected at Site 89 including, vinyl chloride, trans-1,2-DCE, cis-1,2-DCE, 1,1,1-TCA, TCE, and PCE. Concentrations ranged from 0.2 µg/L of 1,1,1-TCA to 818 µg/L of cis-1,2-DCE. The most frequently detected compound was TCE. The highest concentration of TCE was 744.3 µg/L.

The majority of the shallow groundwater contamination at Site 89 is concentrated in the area of the Defense Reutilization Maintenance Office (DRMO). Contamination of the shallow groundwater appears highest in the area of the DRMO and to the south in the direction of Edwards Creek. Areas to the west and north (upgradient) of the DRMO also appear to be impacted, but at lower concentrations compared to downgradient locations. Shallow groundwater in the wooded area east of the DRMO does not appear to be impacted.

VOCs at the intermediate depth exist in the area of the DRMO as was the case for the shallow samples; however, groundwater contamination in this zone appears to have migrated east and downgradient of the site into the wooded area, affecting a larger area. The furthest sample point east of Site 89 which is approximately 1,100 feet from the assumed source area (the DRMO). Four VOCs were detected in this sample, two of which exceeded both the Federal MCLs and the NC WQSs. In this sample, cis-1,2-DCE was detected at 84 µg/L, slightly greater than the state and

federal standard of 70 µg/L. The TCE also was detected at a concentration of 123.9 µg/L. This concentration is approximately two orders of magnitude greater than the federal and state groundwater standards. The presence of TCE at this concentration suggest that further definition of groundwater contamination east of the site is necessary.

In summary, the data collected during the Phase I investigation provided a reasonable estimate of the areal extent of groundwater contamination north and west of the site. The migration of the plume east of the site is evident by the data collected and has not been completely defined. Therefore, further investigative work was necessary to establish the eastern boundary of groundwater contamination. In addition, impact in the area of Edwards Creek required limited investigation to establish the relationship between the stream and contaminant migration to the south.

Six separate VOCs were detected in the surface water samples obtained from Edwards Creek including trans-1,2-DCE, cis-1,2-DCE, PCE, 1,1,2,2-TCA, and vinyl chloride. Concentrations of the VOCs ranged from a low of 0.1 µg/L of PCE to a high of 150J µg/L of 1,1,2,2-TCA. The most frequently detected compound was TCE. The sample stations recording the highest number of maximum detections were located south and downgradient of the DRMO area. The sample station located to the west of the DRMO area and at the headwaters of Edwards Creek, was the only station where VOCs were not detected. In general, sample results were consistent throughout Edwards Creek, showing little to no decrease of concentrations in the downstream direction.

It should be noted that surface water samples were obtained from Edwards Creek as part of a SI study performed by Baker in 1991 (Baker, 1991). The surface water samples collected as part of this investigation detected only one VOC at a very low concentration some distance downstream of the DRMO area near Site 44. The RI/FS investigation for Site 44 in 1995 involved further surface water sampling along Edwards Creek, surface water samples were collected from the drainage swale located on the east side of the DRMO in May 1996. The swale was constructed to alleviate drainage problems within the DRMO. The swale usually contains some standing water and appears to continually discharge small volumes of groundwater. During storm events this swale discharges significant amounts of surface water to Edwards Creek. The surface water samples collected from this drainage swale and at its discharge point into Edwards Creek, have detected similar concentrations of VOCs as those currently observed in Edwards Creek.

The detection of VOCs in Edwards Creek and the drainage swale which borders the eastern edge of the DRMO, coupled with the detection of a low concentration of PCE in the water discharging into Edwards Creek from the south, suggest that the source of the VOC contamination impacting Edwards Creek is located in the vicinity of the DRMO.

Site 93 - TC-942

Building TC-942 is located northwest of the intersection of "E" and 10th streets in the Camp Geiger Area of MCB, Camp Lejeune. UST-942 was located several feet from the southwest corner of Building TC-942. It had a capacity of 550-gallons and was utilized for used oil storage. The UST was closed by removal on December 18, 1993. The closure report indicates that no visual evidence of contamination was observed; however, laboratory results for soil samples taken below the UST (approximately six feet below ground surface [bgs]) detected an oil and grease concentration of 584 mg/kg. Additionally, a site check conducted by R.E. Wright indicated 8,126 ppb in the soil. Cadmium and lead were also detected in the groundwater at concentrations exceeding the NCWQS.

Phase I of the Remedial Investigation at Site 93 was conducted in July through August 1996. The investigation at Site 93 involved the installation of temporary monitoring wells and associated groundwater sampling. The area investigation centered around Building TC-942, with wells being placed in all four directions from the site.

The groundwater investigation at Site 93 involved the collection of groundwater samples from one existing permanent monitoring well and 14 temporary monitoring wells.

Five VOCs were detected in the shallow groundwater samples collected at Site 93 including trans-1,2-DCE, cis-1,2-DCE, 1,1,1-TCA, TCE, and PCE. Concentrations ranged from 0.1 µg/L of TCE and PCE to 175 µg/L of cis-1,2-DCE at temporary well TW01. The most frequently detected compound was TCE which was detected in 10 of the 20 samples collected from Site 93.

Only three VOCs were detected in the intermediate wells including cis-1,2-DCE, TCE, and PCE. The concentrations of the compounds ranged from 0.1 µg/L of TCE and PCE to 4 µg/L of cis-1,2-DCE.

The majority of the groundwater contamination at Site 93 appears to be concentrated in the shallow groundwater in the area near the former UST. This is supported by the fact that the highest concentrations of VOCs were located at the permanent monitoring well 93-MW05 and directly south at temporary well TW01. Groundwater contamination was not present north or east of the former UST. In addition, the intermediate groundwater samples detected only low concentrations of VOCs. Contamination of the shallow groundwater was evident to the south and west of the site, but decreased readily in these directions.

The Phase II investigation at Sites 89 and 93 was conducted from April to June 1997. The purpose of this investigation was to complete the delineation of subsurface soil and groundwater contamination by collecting environmental media from a series of temporary well locations. When the horizontal limits of the contamination were defined permanent monitoring wells consisting of shallow, intermediate, and deep clusters were installed for the purpose of delineating the vertical extent of the contamination, determining groundwater flow direction, and establishing monitoring points within and outside the contaminated area.

The results of this study will be published in an RI report scheduled to be submitted in October 1997. Following this report it is anticipated that a remedial alternative will be developed for both sites and presented in a FS after acceptance of the proposed alternative, a remedial design will be completed.

2.2.17 Operable Unit No. 17 (Sites 90, 91, and 92)

Operable Unit No. 17 consists of Sites 90, 91, and 92. These sites are all former UST program sites. These sites were placed on the IR Program list due to contamination unrelated to the UST program being detected during previous investigations. These sites were grouped together due to geographic proximity and similar contaminant concerns.

Site 90 - (BB-9)

Site 90 includes the area adjacent to Building BB-9 were three 1,000-gallon steel USTs that stored heating oil for the steam plant. All three tanks were excavated and permanently closed in

March 1993. Soil contamination was noted during the tank removal activities; however, there was no information documenting the collection of soil or groundwater to confirm or estimate the extent of the impact (Catlin, 1994). The former tank basin currently remains unpaved.

Site 90 is located in the Courthouse Bay Area of Marine Corps Base (MCB), Camp Lejeune The former UST basin is located on the east side of Peach Street between Building BB-16 (a dry cleaning distribution facility and chapel), and Building BB-9 (a heating plant). The study area associated with this investigation is approximately six acres, and is located along Peach Street between Clinton and Middle Streets.

Facilities located within the limits of the study area include an administrative office (BB-5), commissary (BB-245), restaurant (BB-245), chapel (BB-16), dry cleaning and shoe repair distribution center (BB-16), fire station (BB-8), gymnasium (BB-2), and heat plant (BB-9). Structures associated with the heat plant that are potential sources include three aboveground storage tanks (ASTs) that store diesel fuel # 2, an oil-water separator for treating storm water runoff from the AST pad, a fuel unloading area, and three tanks containing anti-corrosive materials located on the north side of Building BB-9. Open areas located in the study area are either parking lots, roadways, or maintained areas covered with grass.

The nearest surface water body is a small unnamed creek that is located approximately 400 feet directly north of the former UST basin. A storm drainage ditch is located approximately 150 feet to the east of the former UST basin, that channels storm runoff into the unnamed creek from the vicinity of Building BB-9, Building BB-16, and instructional facilities located immediately to the east of the investigation area. Bar ditches are located along Peach and Clinton Streets that also drain into the unnamed creek. The largest surface water body located in the vicinity of Site 90 is the New River, which is located approximately 800 feet southwest of the site.

The existing dry cleaning/cobbler shop facility located in Building BB-16 is a distribution center only. However, the dry-cleaning process was performed at this location for an unknown period of time and has been discontinued. During the years that dry cleaning operations were conducted at this location there was a 250-gallon AST in Building BB-16 which contained dry cleaning fluid (Catlin, 1994).

The initial investigation was a three well site check that was conducted in April 1993 by Groundwater Technology Government Services, Inc. (GTGS). To determine the subsurface soil characteristics and the extent of soils and groundwater contamination, the Leaking Underground Storage Tank Comprehensive Site Assessment, (CSA) Building BB-9 was conducted in December 1994 by Richard Catlin & Associates (Catlin), Inc. Site 90 was placed in the Installation Restoration Program (IRP) because contaminants not associated with the former UST basin were detected during the CSA.

The Remedial Investigation field activities commenced during the week of April 6, 1997. Soil and groundwater investigations were concluded on April 30, 1997.

A total of seven subsurface soil samples were collected for the purpose of determining if soils beneath the ground surface are contaminated from the past activities at the site.

No volatile or semivolatile organic compounds were detected by the mobile laboratory in the soil samples collected during the field investigation. However, acetone and toluene were detected in the

three samples submitted to the fixed-base laboratory for confirmatory analyses. Acetone was detected in soil at concentrations of 360 µg/kg, 74 µg/kg and 290 µg/kg, respectively. The origin of the acetone contamination detected in the samples is uncertain. The site has had no history of acetone use. The only remaining explanations for acetone in the soil samples would either be laboratory introduced contamination or contamination resulting from field decontamination procedures.

Toluene was detected in each of the samples submitted for conformation analysis. Soil samples contained toluene concentrations of 80 µg/kg, 22 µg/kg and 36 µg/kg. Toluene was detected in the groundwater and soil samples collected at the site during the Leaking Underground Storage Tank Comprehensive Site Assessment (CSA) conducted by Catlin.

Detectable levels of 4,4'-DDE and 4,4'-DDT at concentrations of 29 and 3.6 J µg/kg were detected in the soil. The history of the site has never included storage of pesticides (other than for retail sales in the store) and therefore the contamination is probably the result of former pest control applications conducted at the base. No PCBs were detected in any of the soil samples.

Groundwater samples were collected from existing wells and newly installed temporary monitoring wells during the Focused RI.

The mobile laboratory detected chloroform in groundwater samples. Chloroform is a common compound detected in chlorinated water. Since potable water sources were utilized for decontamination at the site, in the laboratory and in some cases, monitoring well installation, it is not unlikely that the compound will be detected in a number of samples at relatively low levels. Therefore, chloroform was not considered to be site related contamination.

Site 91 - (BB-51)

Site 91 is located in the Courthouse Bay Area of Marine Corp Base (MCB), Camp Lejeune. The 300-gallon USTs that were previously located at the site were excavated and removed in August 1992. No information was available about the age or condition of the tanks at removal. Soil samples collected during the UST closure were analyzed and revealed concentrations of TPH-oil and grease.

In 1994 four above ground storage tanks (ASTs) were located within the site boundary. Two ASTs of unknown capacity were located between buildings BB-51 and BB-73. These were used to store waste oil and antifreeze. A third AST of unknown capacity, located south of building BB-73, was used to store kerosene. A fourth AST of unknown capacity, located near building BB-239, was used to store kerosene. The former UST basin where two 30-gallon steel USTs, used to store waste oil, were previously located. associated with Building BB-51, is located at the north end of Clinton Street within the confines of the Marine Corp School of Engineering, northeast of Building BB-51. The study area associated with this investigation is approximately 8 acres in size.

The facility is currently used by the Marine Corp School of Engineering to train personnel in the operation and maintenance of heavy construction equipment. Approximately 25 % of the study area is wooded and the remaining 75% is actively used by the School of Engineering. Within the limits of the study area were three primary structures, Buildings BB-51, BB-150 and BB-73. that are actively used by the School of Engineering. Building BB-51 has small service bays for equipment maintenance and repair, and administrative offices. Building BB-150 has two service bays for larger

Groundwater samples were collected from existing wells and newly installed temporary monitoring wells during the focused RI.

Tetrachloroethene (PCE) was detected at concentrations of 0.6 µg/L and 0.1 µg/L. Neither of these concentrations exceed the NCWQS of 0.7 µg/L or the federal MCL of 5 µg/L. Tetrachloroethene was not detected in the conformation sample collected from monitoring well 91-TW04. No pesticides or PCBs were detected in any of the samples submitted for conformation analysis.

Site 92 - (BB-46)

Site 92 is located in the Courthouse Bay Area of Marine Corps Base (MCB), Camp Lejeune The former UST basin is located at the end of Front Street in confines of the Courthouse Bay Marina. BB-46, which was used as a boat house, has been replaced by Building BB-246. A concrete pad, in the vicinity of where Building BB-46 was located, is now used as a covered picnic area. Northwest of Building BB-46 and north of Building BB-246, one 1,000-gallon steel UST was used to store regular gasoline for retail use. The UST was installed in 1980, deactivated in 1989, and removed in January 1994.

A three well site check was conducted in August 1994 by R. E. Wright Associates, Inc. to identify and/or verify the suspected petroleum hydrocarbon impact to the subsurface soil and groundwater. The results of the site check indicated the presence of chlorinated hydrocarbon groundwater contamination in the vicinity of the former UST basin. Chlorinated hydrocarbons were not associated with materials stored in this UST. As a result, Site 92 was placed in the Installation Restoration Program.

The Remedial Investigation field activities commenced during the week of April 6, 1997. Soil and groundwater investigations were concluded on April 30, 1997.

A total of four subsurface soil samples were collected for the purpose of determining if soils beneath the ground surface are contaminated from the past activities at the site. Additionally, analysis of the soils in conjunction with groundwater will help determine if a source of groundwater contamination exists at the site.

No volatile organic compounds were detected in the soil samples collected from the borings and submitted to the mobile laboratory.

A single detection of the pesticide compound 4,4'-DDE was observed at a concentration of 2.7 J µg/kg. The history of the site has never included storage of pesticides (other than for retail sales in the store) and therefore the contamination is probably the result of former pest control applications conducted at the base. No PCBs were detected in any of the soil samples submitted for analysis.

Groundwater samples were collected from existing wells and newly installed temporary monitoring wells during the Focused RI.

Chloroform was detected in samples collected from temporary wells at concentrations of 0.3 and 0.2 µg/L, respectively.

A Focused RI report was submitted in August 1997. It is anticipated that a No Action PRAP and ROD will be submitted in FY98.

2.2.18 Operable Unit No. 18 (Site 94)

Investigations at this site have identified chlorinated solvent related contaminants as part of an ongoing UST program investigation and as a result were placed under the IR program. Location of this site and the UST sampling results suggest that part of Site 78 has reached the area or a separate plume exists.

Former underground storage tanks (USTs) 1613 1-4 were located northeast of Building 1613, the PCX service station, in the Hadnot Point area. The tanks consisted of one 10,000 gallon gasoline UST, two 30,000 gallon gasoline UST, and a 9,000 gallon gasoline UST. These tanks were reportedly installed during the 1950s. The tanks supplied various grades of gasoline to the service station and were removed January 13, 1995. Hydrocarbon impact to the surrounding subsurface soils was confirmed in the UST Investigation.

As part of a UST investigation, 15 Hydropunches, 12 Type II monitoring wells, three Type III monitoring wells, and one pumping well were installed. Free product, soil, and groundwater dissolved petroleum related contamination were identified from this investigation. Soil contamination was identified during a Comprehensive Site Assessment (CSA) from the former UST basin at concentrations less than State action levels. Dissolved purgeable aromatic constituents were identified and delineated in the area of the former UST basin and free product plume areas. Dissolved purgeable halocarbon compounds were identified above State groundwater standards in three isolated areas, suggesting multiple sources. In addition, the vertical extent of purgeable halocarbons is to at least 50 feet.

Concentrations of benzene (804 µg/L), toluene (6,780 µg/L), ethylbenzene (1,280 µg/L), total xylenes (9,290 µg/L), were detected in the groundwater. No detectable concentrations of purgeable aromatics were identified. Concentrations of volatile organics trans-1,2-dichloroethene and trichloroethane ranged from 1.1 µg/L to 7.6 µg/L and 1.3 µg/L to 31.6 µg/L, respectively.

three isolated areas, suggesting multiple sources. In addition, the vertical extent of purgeable halocarbons is to at least 50 feet.

Concentrations of benzene (804 µg/L), toluene (6,780 µg/L), ethylbenzene (1,280 µg/L), total xylenes (9,290 µg/L), were detected in the groundwater. No detectable concentrations of purgeable aromatics were identified. Concentrations of volatile organics trans-1,2-dichloroethene and trichloroethane ranged from 1.1 µg/L to 7.6 µg/L and 1.3 µg/L to 31.6 µg/L, respectively.

SECTION 2 TABLES

TABLE 2-1

OPERABLE UNITS FOR MARINE CORPS BASE CAMP LEJEUNE, NORTH CAROLINA
FISCAL YEAR 1998
MCB CAMP LEJEUNE, NORTH CAROLINA

Operable Unit No.	Site No(s).	Site Name(s)	Primary Reasons for OU Selection
1	21	Transformer Storage Lot 140	Sites are geographically located in the same area.
	24	Industrial Area Fly Ash Dump	
	78	Hadnot Point Industrial Area	
2	6	Storage Lots 201 and 203	Sites are geographically located in the same area.
	9	Firefighting Training Pit at Piney Green Road	
	82	Piney Green Road VOC Area	
3	48	MCAS New River Mercury Dump Site	Unique characteristics of the site involving the disposal of mercury.
4	41	Camp Geiger Dump Near Former Trailer Park	Unique characteristics of the site involving the disposal of chemical wastes generated on the base.
	74	Mess Hall Grease Disposal Area	
5	2	Former Nursery/Day Care Center	Unique characteristic of materials used at the site (pesticides).
6	36	Camp Geiger Area Dump near Sewage Treatment Plant	Similar characteristics of materials disposed (POL, waste oils, solvents) and contaminants detected (metals, VOCs, O&G). Sites are located in the Brinson Creek and Tank Creek watershed.
	43	Agan Street Dump	
	44	Jones Street Dump	
	54	Crash Crew Fire Training Burn Pit	
	86	Tank Area AS419-AS421 at Marine Corps Air Station	
7	1	French Creek Liquids Disposal Area	Sites are located near each other and are located in the French Creek watershed. Similar contaminants detected (metals, O&G).
	28	Hadnot Point Burn Dump	
	30	Sneads Ferry Road Fuel Tank Sludge Area	

TABLE 2-1 (Continued)

OPERABLE UNITS FOR MARINE CORPS BASE CAMP LEJEUNE, NORTH CAROLINA
FISCAL YEAR 1998
MCB CAMP LEJEUNE, NORTH CAROLINA

Operable Unit No.	Site No(s).	Site Name(s)	Primary Reasons for OU Selection
8	16	Montford Point Burn Dump	Isolated site which requires additional investigation.
9	65	Engineer Area Dump	Geographic proximity with similar contaminant histories involving POL and metals.
	73	Courthouse Bay Liquids Disposal Area	
10	35	Camp Geiger Area Fuel Farm	Accelerated cleanup necessary to abate impacts to Brinson Creek.
11	7	Tarawa Terrace Dump	Geographic proximity. Both sites are located in the Northeast Creek Watershed.
	80	Paradise Point (Golf Course Maintenance Area)	
12	3	Old Creosote Plant	Isolated site with unique waste source.
13	63	Verona Loop Dump	Isolated site which requires additional investigation.
14	69	Rifle Range Chemical Dump	Isolated site with unique waste source.
15	88	Building 25, Base Dry Cleaners	Isolated site which requires additional investigation.
16	89	STC - 868	Unique characteristics of the site.
	93	TC-942	
17	90	Building BB-9	Similar histories all sites are former USTs where VOCs were detected in the groundwaters.
	91	Building BB-51	
	92	Building BB-46	
18	94	Building 1613	Geographic proximity and similar contaminants as OU No. 1. However, discovered as part of UST investigation and relation to IR sites unknown.

3.0 OPERABLE UNIT SCOPE OF WORK

The purpose of this section is to summarize completed, ongoing, and planned IRP activities at each Operable Unit.

Operable Unit No. 1 (Sites 21, 24, and 78)

During Fiscal Year 1992, an interim remedial action Record of Decision (ROD) was signed for the remediation of the shallow aquifer at Site 78 (HPIA). Remedial design activities were subsequently initiated in August 1992 and completed in August 1993. Interim remedial action construction was initiated in February 1994, and start-up of the treatment system began in December 1994.

During Fiscal Year 1993, RI/FS Project Plans for Operable Unit (OU) No. 1 were initiated and completed. The RI/FS commenced in April 1993 and completed in August 1994. A Final ROD was signed in Fiscal Year 1994. Remedial design activities for soil remediation and final groundwater remediation were initiated in June 1994 and were completed in February 1995. Soil remedial action construction was initiated in May 1995.

An Explanation of Significant Difference (ESD) was submitted in July 1995. The ESD was prepared in order to explain the modification to the soil cleanup level developed for PCBs. The ESD has been signed and incorporated into the Administrative Record.

A shallow groundwater remediation system was installed in 1994. Operation of this system will continue through 1998. In addition to system operation groundwater monitoring is conducted on a semiannual basis. This monitoring is designed to determine the effectiveness of the treatment system on the groundwater contamination. Semiannual monitoring reports will be submitted in 1998.

Operable Unit No. 2 (Sites 6, 9, and 82)

The RI/FS at OU No. 2 was initiated in July 1992 and completed in September 1993 with the signing of a Final ROD. Remedial design activities for the remediation of soil and groundwater were initiated in January 1994, and completed in September 1994. Remedial action construction was initiated in December 1994. Soil remediation was completed in March 1995. Construction of the groundwater extraction system was initiated in December 1994 and is scheduled for completion by November 1995. Full-scale operation is scheduled for July 1996.

A Time-Critical Removal Action (TCRA) was initiated in Fiscal Year 1993. The removal action addressed surficial drums, stained soils (beneath the drums), and buried drums at two areas within the operable unit. The removal action was completed in April 1994.

During Fiscal Year 1997, a groundwater monitoring was initiated during treatment plant start up, this monitoring will continue for a minimum of 5 years. Operation of the plant is expected to continue through 1998. In addition, the monitoring of wells associated with monitoring the plant's performance and the migration of contamination will be conducted as long-term monitoring on a quarterly basis. Quarterly reports relating system performance and groundwater data will be provided on a quarterly basis in 1998.

Operable Unit No. 3 (Site 48)

A "no action" ROD for Site 48 was signed in September 1993. There are no other IR activities associated with this site. Site 48 will be delisted from the IR program.

Operable Unit No. 4 (Sites 41 and 74)

RI/FS Project Plans for OU No. 4 were initiated in April 1993 and finalized in December 1993. The RI/FS was initiated in December 1993 and completed in May 1995. The ROD was signed in November 1995. Remedial activities are focusing on long-term groundwater and surface water monitoring began in January 1997 and will continue on a semi-annual basis throughout 1998.

Operable Unit No. 5 (Site 2)

RI/FS Project Plans for OU No. 5 were initiated in June 1992 and completed in March 1993. The RI/FS was initiated in April 1993 and completed in September 1994 with the signing of the ROD. A TCRA was initiated in January 1994 (Plans and Specifications). The TCRA involved the excavation and off-site treatment of pesticide-contaminated soil and concrete. Institutional controls, including groundwater monitoring, are being implemented as part of the Final ROD. Quarterly groundwater monitoring was initiated in 1995 and will continue throughout the first quarter of 1997. Based on the quarterly monitoring findings, the monitoring frequency was modified to be conducted on a semiannual basis. The initial semiannual sampling was performed in April 1997. The semiannual sampling is scheduled to continue throughout 1998.

Operable Unit No. 6 (Sites 36, 43, 44, 54, and 86)

RI/FS Project Plans for OU No. 6 were initiated in March 1994 and were completed in December 1994. The RI/FS began in March 1995 initially scheduled for completion in December 1996, has been modified due to additional investigation needs at Sites 36, 54, and 86. A January 1998 date has been established for completion of the ROD.

Operable Unit No. 7 (Sites 1, 28, and 30)

RI/FS Project Plans for OU No. 7 were initiated in March 1993 and finalized in December 1993. The RI/FS phase began in March 1994 and was completed in May of 1996 with the signing of the ROD. Semiannual groundwater monitoring at Sites 1 and 28 was initiated in July 1996, continued in 1997, and is scheduled to be conducted throughout 1998.

Operable Unit No. 8 (Site 16)

The RI/FS activities at OU No. 8 were initiated in February 1994 with the preparation of RI/FS Project Plans. The RI/FS Project Plans were completed in September 1994. The ecological portion of the RI/FS was conducted in June 1994. The soil and groundwater phase of the RI/FS phase at Site 16 began in October 1994 and was completed in November 1994. A second round of groundwater samples were collected in February 1995. A confirmatory soil investigation was conducted in December 1995. The RI/FS process was completed in April 1996 with the submittal of a "no action" ROD. The ROD was signed in September 1996. There are no other IR activities planned for this site.

Operable Unit No. 9 (Sites 65 and 73)

RI/FS Project Plans for OU No. 9 were initiated in March 1994 and finalized in March 1995. The RI/FS began in March 1995. The initialed scheduled completion date of October 1996 has been modified to August 1997 due to the additional investigation needs at Site 73.

A Draft RI Report for Site 65 was submitted in November 1995. A draft report for Site 73 was submitted in November 1996.

A Draft FS/PRAP were submitted for Site 73 in February 1997. The Draft PRAP identified natural attenuation as the preferred alternative. A "no action" PRAP was submitted for Site 65 in February 1997. It is anticipated that the Final RI, PRAP, Draft ROD, and Final ROD will be submitted by FY98. It is anticipated that the Final ROD for both sites will be submitted in March 1998.

Operable Unit No. 10 (Site 35)

RI/FS Project Plans for OU No. 10 were initiated in April 1993 and finalized in December 1993. The RI/FS phase began in March 1994 and were completed in July 1995. Remedial design activities began in August 1995.

An Interim Remedial Action (IRA) RI/FS was initiated in June 1993 to address petroleum-contaminated soils. The IRA RI/FS was completed in August 1994, and the IRA ROD (soil) was signed in September 1994. The design phase was initiated in July 1994 and completed in December 1994. Remediation of the petroleum contaminated soil is scheduled to begin in May 1995 and completed by September 1995.

Baker submitted an Interim FS for shallow groundwater in the vicinity of the Fuel Farm in May 1995. This lead to the submission of a Final Interim ROD in June 1995. This project has been in the design phase since June 1995. Technical problems associated with the selected innovative alternative (In-Well Aeration) have resulted in the need to conduct a field pilot test of another technology (In Situ Air Sparging). Baker submitted draft project plans for the Air Sparging Field Pilot Test in February 1996. Final Project Plans will be submitted in May 1996 the test was conducted July through September 1996.

Baker initiated a Supplemental Groundwater Investigation (SGI) in April 1996. The purpose of the SGI was to delineate the southern and western extent of shallow groundwater contamination previously identified. A draft report describing the findings of this investigation will be submitted in November 1996. A ROD is scheduled to be completed in March 1998.

Operable Unit No. 11 (Sites 7 and 80)

Preparation of RI/FS Project Plans was initiated in February 1994 and completed in September 1994. The ecological portion of the RI/FS was conducted in June 1994. The soil and groundwater portion of the RI/FS began in October 1994 and completed in December 1994. Additional soil and groundwater investigations were conducted at Site 80 in June and July 1995. Additional soil investigation was conducted at Site 7 in October 1995. A Time Critical Removal Action at Site 80 was completed from March 1996 to August 1996. The ROD for Sites 7 and 80 was signed in August 1997.

Operable Unit No. 12 (Site 3)

Preparation of RI/FS Project Plans was initiated in February 1994 and completed in September 1994. The RI/FS was initiated in September 1994 and is schedule for completion in June 1996. Additional soil and groundwater investigations were conducted in June, July and September 1995. The ROD for this site which included a remedial alternative for soil contamination and long-term monitoring of groundwater was signed in April 1997. A draft 60% Design was submitted in August 1997. The design is scheduled to be completed in November 1997. The groundwater monitoring plan is scheduled to be completed in December 1997 followed by the initial semiannual monitoring event in January 1998.

Operable Unit No. 13 (Site 63)

RI/FS Project Plans were initiated in January 1995. The Final RI/FS Project Plans were submitted in September 1995. The RI/FS was initiated in October 1995 and completed when the "no action" ROD was signed in April 1997. There are no other IR activities associated with this site.

Operable Unit No. 14 (Site 69)

RI/FS Project Plans for OU No. 14 were prepared as part of OU No. 4 (Site 69 was recently removed from OU No. 4 and identified as a separate OU). The Project Plans were finalized in December 1993. The RI/FS was initiated in December 1993 but will not be completed until the results of the treatability study are available. A pilot-scale treatability study to evaluate the in well aeration technology was initiated in March 1996 and is expected to be completed by March 1998. The FS is projected to be completed in December 1997. The final ROD is scheduled to be submitted in May 1998.

Operable Unit No. 15 (Site 88)

Site Evaluation Project Plans were initiated in March 1996. Phase I of the site evaluation was conducted in July 1996. The Phase I Investigation Report was submitted in November 1996. Final Project Plans for Phase II of the investigation were submitted in February 1997. A Site Evaluation Report, Engineering Evaluation Cost Estimate, and a Non-Time Critical Removal Action Design are scheduled for completion in 1998.

Operable Unit No. 16 (Sites 89 and 93)

RI/FS Project Plans were initiated in August 1995. Phase I of the RI/FS was conducted in July 1996. Results of the Phase I investigation will be used to prepare the Final Work Plans, which were submitted in February 1997. Reports including a RI/FS/PRAP/ROD are scheduled to be completed in 1998.

Operable Unit No. 17 (Sites 90, 91, 92)

Phase I RI/FS Project Plans were initiated in August 1995 and completed December 1996. The Phase I Investigation was conducted in April 1997. The Focused RI report was submitted in August 1997. The RI/PRAP/ROD documents are scheduled for completion in 1998.

Operable Unit No. 18 (Site 94)

RI/FS project plan development is planned and budgeted to be completed in 1998.

Summary

Table 3-1 summarizes the ongoing and planned activities associated with Operable Units 1 through 18 for Fiscal Years 1998 through 2002. IRP activities will continue at 13 of these Operable Units through Fiscal Year 1998. No activities are planned at Operable Unit No. 3 (Site 48), Operable Unit No. 8 (Site 16), Operable Unit No. 11 (Sites 7 and 80), and Operable Unit No. 16 (Site 63), since these operable units have a "No Action" Record of Decision.

SECTION 3 TABLES

TABLE 3-1

SUMMARY OF OPERABLE UNIT IRP ACTIVITIES
FOR FISCAL YEAR 1998
MCB, CAMP LEJEUNE, NORTH CAROLINA

Operable Unit	Site No.	Activity	Scheduled Start Up	Actual Start Up	Scheduled Completion	Actual Completion	Final Submittal Date
1	78	Interim Remedial Action RI	FY 91	FY 91	FY 92	FY 92	April 16, 1992
		Interim Remedial Action FS	FY 91	FY 91	FY 92	FY 92	April 16, 1992
		Interim Remedial Action PRAP	FY 91	FY 91	FY 92	FY 92	May 8, 1992
		Interim Remedial Action ROD	FY 91	FY 91	FY 92	FY 92	September 17, 1992
		Interim Remedial Action Design	FY 92	FY 92	FY 94	FY 93	June 18, 1993
1	21, 24, and 78	Project Plans	FY 92	FY 92	FY 93	FY 93	March 11, 1993
		RI	FY 93	FY 93	FY 94	FY 94	June 23, 1994
		FS	FY 94	FY 94	FY 94	FY 94	July 22, 1994
		PRAP	FY 94	FY 94	FY 94	FY 94	July 22, 1994
		ROD	FY 94	FY 94	FY 94	FY 94	September 8, 1994
2	6, 9, and 82	Project Plans	FY 91	FY 91	FY 92	FY 92	May 18, 1992
		RI	FY 92	FY 92	FY 94	FY 93	August 20, 1993
		FS	FY 92	FY 92	FY 94	FY 93	August 20, 1993
		PRAP	FY 92	FY 92	FY 94	FY 93	August 20, 1993
		ROD	FY 92	FY 92	FY 94	FY 93	September 24, 1993
		Remedial Design	FY 94	FY 94	FY 95	FY 94	May 10, 1994
3	48	Project Plans	FY 91	FY 91	FY 92	FY 92	May 18, 1992
		RI	FY 92	FY 92	FY 94	FY 93	June 21, 1993
		PRAP	FY 92	FY 92	FY 94	FY 93	June 21, 1993
		ROD	FY 92	FY 92	FY 94	FY 93	July 26, 1993
4	41 and 74	Project Plans	FY 93	FY 93	FY 94	FY 94	December 2, 1993
		RI	FY 94	FY 94	FY 95	FY 95	May 8, 1995
		FS	FY 94	FY 94	FY 95	FY 95	May 8, 1995
		PRAP	FY 94	FY 94	FY 95	FY 95	May 8, 1995
		ROD	FY 94	FY 94	FY 95	FY 95	October 17, 1995
5	2	Project Plans	FY 92	FY 92	FY 93	FY 93	March 11, 1993
		RI	FY 93	FY 93	FY 94	FY 94	June 14, 1994
		FS	FY 93	FY 93	FY 94	FY 94	June 23, 1994
		PRAP	FY 93	FY 93	FY 94	FY 94	June 23, 1994
		ROD	FY 93	FY 93	FY 94	FY 94	September 8, 1994
6	36, 43, 44, 54, and 86	Project Plans	FY 94	FY 94	FY 95	FY 95	December 2, 1994
		RI	FY 95	FY 95	FY 97	FY 96	August 22, 1996
		FS	FY 95	FY 95	FY 97	--	--
		PRAP	FY 95	FY 95	FY 97	--	--
		ROD	FY 95	FY 95	FY 97	--	--

TABLE 3-1 (Continued)

SUMMARY OF OPERABLE UNIT IRP ACTIVITIES
FISCAL YEAR 1998
MCB CAMP LEJEUNE, NORTH CAROLINA

Operable Unit	Site No.	Activity	Scheduled Start Up	Actual Start Up	Scheduled Completion	Actual Completion	Final Submittal Date
7	1, 28, and 30	Project Plans	FY 93	FY 93	FY 94	FY 94	December 15, 1993
		RI	FY 94	FY 94	FY 95	FY 96	June 29, 1995
		FS	FY 94	FY 94	FY 95	FY 96	July 13, 1995
		PRAP	FY 94	FY 94	FY 95	FY 96	July 13, 1995
		ROD	FY 94	FY 94	FY 95	FY 96	December 13, 1995
8	16	Project Plans	FY 94	FY 94	FY 94	FY 94	October 2, 1994
		RI	FY 94	FY 94	FY 96	FY 96	January 31, 1996
		PRAP	FY 94	FY 94	FY 96	FY 96	February 15, 1996
		ROD	FY 94	FY 94	FY 96	FY 96	April 12, 1996
9	65 and 73	Project Plans	FY 94	FY 94	FY 95	FY 95	March 7, 1995
		RI	FY 95	FY 95	FY 98	FY 95	--
		FS	FY 95	FY 95	FY 98	FY 95	--
		PRAP	FY 95	FY 95	FY 98	FY 95	--
		ROD	FY 95	FY 95	FY 98	FY 95	--
		Remedial Design	FY 97	--	FY 98	--	--
10	35	Project Plans	FY 93	FY 93	FY 94	FY 94	December 20, 1993
		Interim Remedial Action FS (Soil)	FY 93	FY 93	FY 94	FY 94	July 20, 1994
		Interim Remedial Action PRAP (Soil)	FY 93	FY 93	FY 94	FY 94	July 20, 1994
		Interim Remedial Action ROD (Soil)	FY 93	FY 93	FY 94	FY 94	August 31, 1994
		Interim Remedial Action FS (Groundwater)	FY 95	FY 95	FY 95	FY 95	June 13, 1995
		Interim Remedial Action PRAP (Groundwater)	FY 95	FY 95	FY 95	FY 95	June 8, 1995
		Interim Remedial Action ROD (Groundwater)	FY 95	FY 95	FY 95	FY 95	December 5, 1995
		RI	FY 94	FY 94	FY 95	FY 95	May 3, 1995
		FS	FY 94	FY 94	FY 97	--	--
		PRAP	FY 94	FY 94	FY 97	--	--
		ROD	FY 94	FY 94	FY 97	--	--
11	7	Project Plans	FY 94	FY 94	FY 94	FY 95	October 2, 1994
		RI	FY 94	FY 94	FY 97	FY 96	February 6, 1996
		PRAP	FY 94	FY 94	FY 97	FY 96	November 27, 1996
		ROD	FY 94	FY 94	FY 97	FY 97	April 10, 1997
11	80	Project Plans	FY 94	FY 94	FY 94	FY 95	October 2, 1994
		RI	FY 94	FY 94	FY 97	FY 96	April 5, 1996
		PRAP	FY 94	FY 94	FY 97	FY 96	November 27, 1996
		ROD	FY 94	FY 94	FY 97	FY 97	April 10, 1997

TABLE 3-1 (Continued)

SUMMARY OF OPERABLE UNIT IRP ACTIVITIES
FISCAL YEAR 1998
MCB CAMP LEJEUNE, NORTH CAROLINA

Operable Unit	Site No.	Activity	Scheduled Start Up	Actual Start Up	Scheduled Completion	Actual Completion	Final Submittal Date
12	3	Project Plans	FY 94	FY 94	FY 94	FY 95	October 2, 1994
		RI	FY 94	FY 94	FY 97	FY 96	June 12, 1996
		FS	FY 94	FY 94	FY 97	FY 96	August 14, 1996
		PRAP	FY 94	FY 94	FY 97	FY 97	October 23, 1996
		ROD	FY 94	FY 94	FY 97	FY 97	January 6, 1997
		Remedial Design	FY 97	FY 97	FY 98	--	--
13	63	Project Plans	FY 95	FY 95	FY 96	FY 95	September 1, 1995
		RI	FY 96	FY 96	FY 97	FY 97	October 18, 1996
		PRAP	FY 96	FY 96	FY 97	FY 97	November 1, 1996
		ROD	FY 96	FY 96	FY 97	FY 97	January 21, 1996
14	69	Project Plans	FY 93	FY 93	FY 94	FY 94	December 2, 1993
		RI	FY 94	FY 94	FY 97	FY 97	December 5, 1997
		FS	FY 94	FY 94	FY 97	--	--
		PRAP	FY 94	FY 94	FY 97	--	--
		ROD	FY 94	FY 94	FY 97	--	--
		Remedial Design	FY 97	--	FY 98	--	--
15	88	Project Plans	FY 96	FY 96	FY 97	FY 97	February 21, 1997
		EE/CA	FY 97	FY 97	FY 98	--	--
		Remedial Design	FY 98	--	FY 98	--	--
16	89 and 93	Project Plans	FY 95	FY 95	FY 97	FY 97	February 20, 1997
		RI	FY 96	FY 96	FY 98	--	--
		FS	FY 98	--	FY 98	--	--
		PRAP	FY 98	--	FY 98	--	--
		ROD	FY 98	--	FY 98	--	--
		Remedial Design	FY 98	--	FY 99	--	--
17	90, 91, and 92	Project Plans	FY 96	FY 96	FY 97	FY 96	June 31, 1996
		RI	FY 97	FY 97	FY 98	--	--
		PRAP	FY 98	--	FY 98	--	--
		ROD	FY 98	--	FY 98	--	--
18	94	Project Plans	FY 98	--	FY 98	--	--
		RI	FY 99	--	FY 00	--	--
		FS	FY 00	--	FY 00	--	--
		PRAP	FY 00	--	FY 00	--	--
		ROD	FY 00	--	FY 00	--	--

4.0 SITE MANAGEMENT SCHEDULES

The purpose of this section is to present project schedules for each of the 18 OUs for Fiscal Years 1998 through 2002. These schedules are adjusted annually in the Site Management Plan.

Operable Units and sites that will be active during Fiscal Year 1998 are summarized below.

Operable Unit	Site	Fiscal Year 1998 Activities
1	78	Shallow groundwater remediation (source control)
2	82	Long-term operation of groundwater remediation system
3	48	No action (delisted)
4	41 and 74	Long-term monitoring of shallow groundwater and surface water
5	2	Long-term groundwater monitoring
6	36, 43, 44, 54, and 86	Complete RI/FS; Initiate Remedial Design
7	1 and 28	Long-term groundwater monitoring
8	16	No action (delisted)
9	65 and 73	Complete RI/FS; Initiate Remedial Design
10	35	Complete RI/FS and begin Remedial Action
11	7 and 80	No Action (delisted)
12	3	Initiate Remedial Design
13	63	No Action (delisted)
14	69	Complete RI/FS and TS; Initiate Remedial Design
15	88	Complete Site Evaluation
16	89 and 93	Complete RI/FS
17	90, 91, and 92	Complete RI/FS
18	94	None

The project schedules for these OUs are depicted on Tables 4-1 through 4-13. The project schedules include: a detailed listing of Fiscal Year 1998 activities for each OU; the duration (in calendar days) of each IRP activity; the deliverables (e.g., RI/FS Project Plans, RA Work Plans, etc.); and submittal dates. In addition, the project schedules include all activities through completion of the Remedial Design (RD) and startup of the Remedial Action. A listing of FY98 deliverables by Operable Unit are summarized on Table 4-14. Table 4-15 provides a list of deliverables by month associated with Fiscal Year 1998 IRP deliverables.

The project schedules for the 13 of the 18 OUs reflect Government review times specified in the FFA and Navy/Marine Corps turnaround times. These review durations are as follows.

- Draft Primary Documents: 60 days to review and 60 days to prepare and submit the Draft Final document.

- Draft Final Primary Documents: 30 days to review and 30 days to finalize. Draft Final documents will become final if no comments are received within 30 days unless an extension is requested in accordance with the FFA.

- The project schedule for RD/RA activities cannot be established until the RI/FS is completed. For remedial design activities, a project duration of 15 months has been established since Section 120(e)(2) of CERCLA requires that remedial action activities begin within 15 months following the ROD.

- The project schedule for sites where long-term monitoring has been implemented do not indicate a government review period. Reports submitted for a long-term monitoring event are used to document recommendations and modifications to the long-term sampling requirements. Government comments will be requested to implement modifications or at the five-year review period.

SECTION 4 TABLES

Table 4 - 1
Remedial Action Site Management Schedule
Operable Unit No. 1 (Site 78), MCB Camp Lejeune, North Carolina

Task Name	Days	Start	Finish
Semi-Annual Monitoring Period	183ed	7/1/97	12/31/97
Submit Semi-Annual Monitoring Report	64ed	12/31/97	3/5/98
Semi-Annual Monitoring Period	180ed	1/1/98	6/30/98
Submit Semi-Annual Monitoring Report	35ed	7/1/98	8/5/98
Semi-Annual Quarterly Monitoring Period	183ed	7/1/98	12/31/98

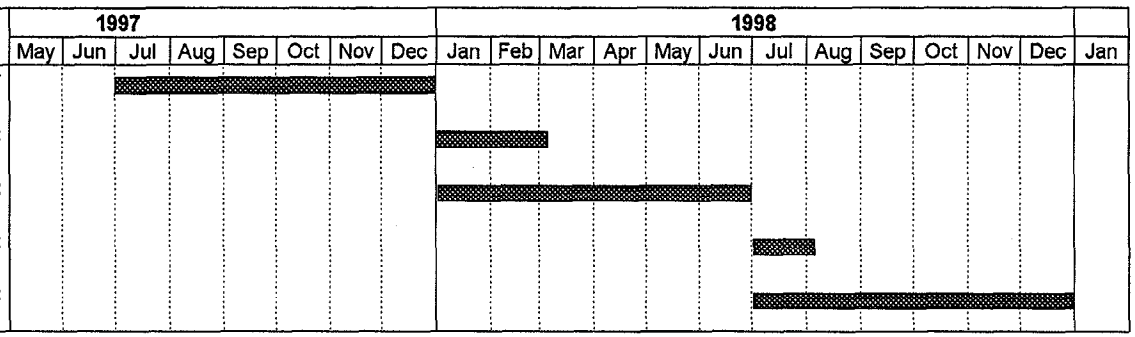


Table 4 - 2
Remedial Action Site Management Schedule
Operable Unit No. 2 (Sites 6 and 82), MCB Camp Lejeune, North Carolina

Task Name	Days	Start	Finish
Quarterly Monitoring Period	91ed	7/1/97	9/30/97
Submit Quarterly Monitoring Report	64ed	9/30/97	12/3/97
Quarterly Monitoring Period	91ed	10/1/97	12/31/97
Submit Quarterly Monitoring Report	64ed	12/31/97	3/5/98
Quarterly Monitoring Period	88ed	1/1/98	3/30/98
Submit Quarterly Monitoring Report	65ed	3/30/98	6/3/98
Quarterly Monitoring Period	90ed	4/1/98	6/30/98
Submit Quarterly Monitoring Report	64ed	6/30/98	9/2/98

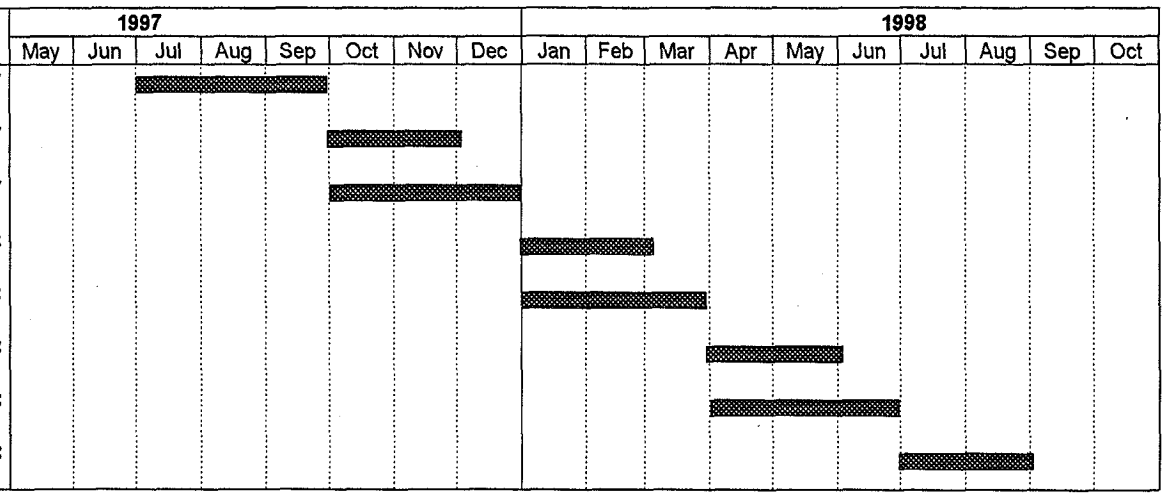


Table 4 - 3
Remedial Action Site Management Schedule
Operable Unit No. 4 (Sites 41 and 74), MCB, Camp Lejeune, North Carolina

Task Name	Days	Start	Finish
Semiannual Monitoring Period	182ed	7/1/97	12/30/97
Submit Semiannual Report	0ed	11/20/97	11/20/97
Semiannual Monitoring Period	180ed	1/1/98	6/30/98
Submit Semiannual Report	0ed	5/20/98	5/20/98
Semi-Annual Monitoring Period	182ed	7/1/98	12/30/98

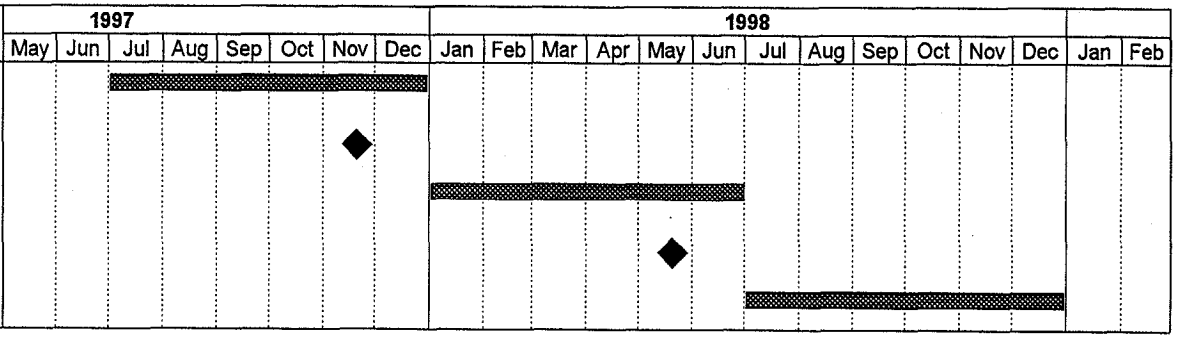


Table 4

Remedial Action Site Management Schedule
Operable Unit No. 5 (Site 2), MCB Camp Lejeune, North Carolina

Activity	Days	Start	Finish
Semiannual Monitoring Period	180ed	10/1/97	3/30/98
Submit Semiannual Monitoring Report	0ed	2/20/98	2/20/98
Semiannual Monitoring Period	180ed	4/1/98	9/28/98
Submit Semiannual Monitoring Report	0ed	8/20/98	8/20/98

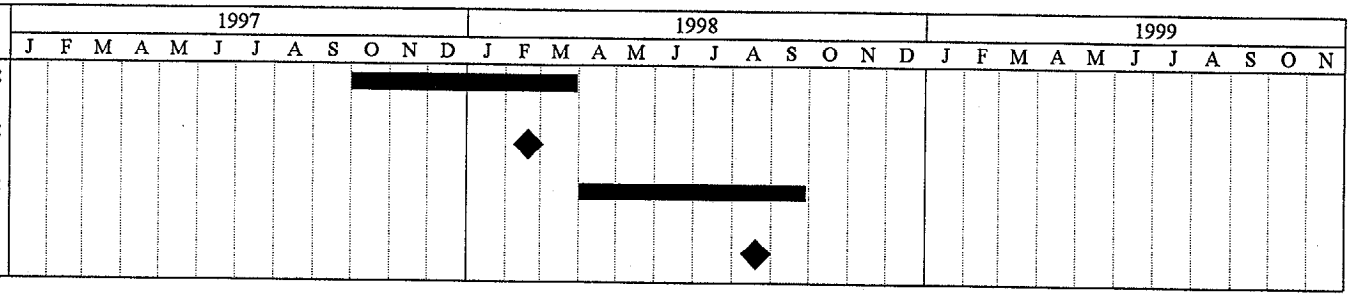


Table 5

Remedial Investigation/Feasibility Study Site Management Schedule
Operable Unit No. 6 (Sites 36, 43, 44, 54, and 86), MCB Camp Lejeune, North Carolina

Activity	Days	Start	Finish
Draft Final FS	28ed	3/23/97	4/20/97
Agency Review	141ed	4/21/97	9/9/97
Final FS/PRAP	48ed	10/10/97	11/27/97
Public Comment Period	29ed	11/27/97	12/26/97
Draft ROD	158ed	2/9/96	7/16/96
Agency Review	120ed	7/17/97	11/14/97
Final ROD	32ed	12/17/97	1/18/98
Draft CAP	26ed	2/5/98	3/3/98
Agency Review	33ed	3/4/98	4/6/98
Final CAP	17ed	4/9/98	4/26/98
Semi-annual Monitoring Period	182ed	4/1/98	9/30/98
Semi-annual Monitoring Report	0ed	8/20/98	8/20/98

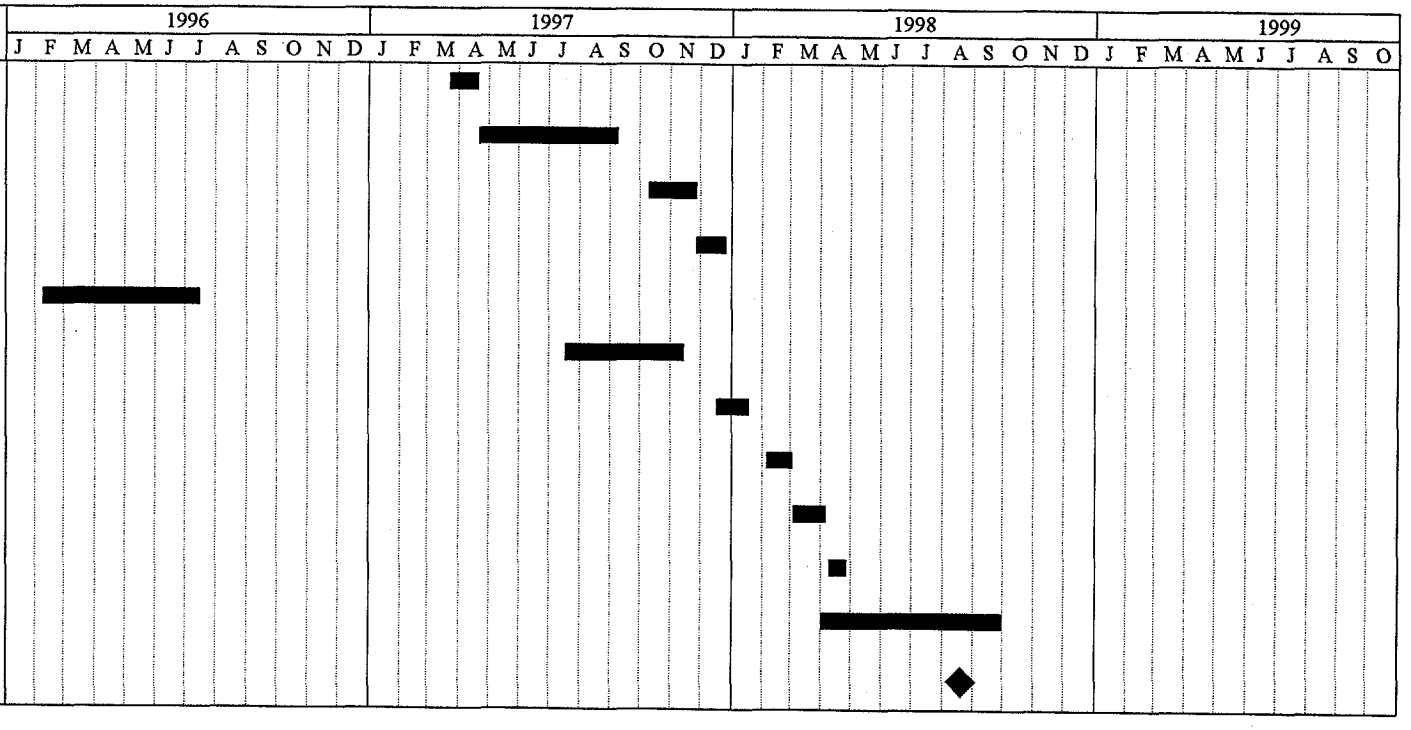


Table 4 - 6
Remedial Action Site Management Schedule
Operable Unit No. 7 (Sites 1 and 28), MCB Camp Lejeune, North Carolina

Task Name	Days	Start	Finish
Semiannual Monitoring Period	183ed	7/1/97	12/31/97
Submit Semiannual Monitoring Report	0ed	11/20/97	11/20/97
Semiannual Monitoring Period	180ed	1/1/98	6/30/98
Submit Semiannual Monitoring Report	0ed	5/20/98	5/20/98
Semiannual Monitoring Period	183ed	7/1/98	12/31/98

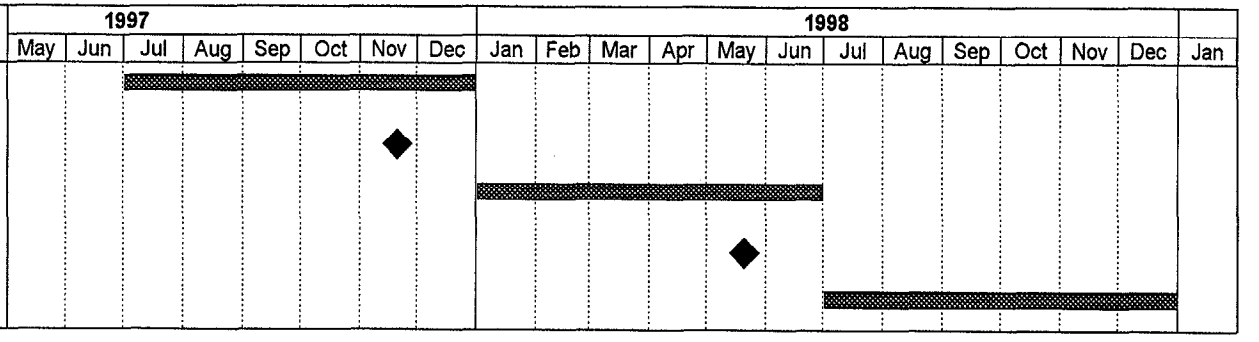


Table 7

Remedial Investigation/Feasibility Study Site Management Schedule
Operable Unit No. 9 (Sites 65 and 73), MCB, Camp Lejeune, North Carolina

Task	Days	Start	Finish
Notice to Proceed	0ed	2/27/95	2/27/95
Mobilization	34ed	2/27/95	4/2/95
Environmental Field Investigation	59ed	4/3/95	6/1/95
Sample Analysis/Validation	103ed	4/5/95	7/17/95
Data Management	28ed	7/17/95	8/14/95
Data Evaluation	140ed	7/1/95	11/18/95
Risk Assessment	99ed	8/7/95	11/14/95
RI Meeting	0ed	10/9/95	10/9/95
Draft RI Site 65	140ed	7/1/95	11/18/95
Mobilization	26ed	1/24/96	2/19/96
Additional Site 73 Investigation	41ed	2/15/96	3/27/96
Sample Analysis/Validation	80ed	2/20/96	5/10/96
Data Evaluation	61ed	5/13/96	7/13/96
Risk Assessment	121ed	5/30/96	9/28/96
RI Meeting	0ed	7/10/96	7/10/96
Draft RI Site 73	66.67d	7/11/96	11/27/96
Comment Period	252ed	11/27/96	8/6/97
Final RI Sites 65 and 73	87ed	8/6/97	11/1/97
Remedial Alt. Screen./Evaluation	42ed	11/27/96	1/8/97
RAC Review	222ed	1/7/97	8/17/97
FS Meeting	0ed	1/7/97	1/7/97
Draft FS/PRAP	42ed	1/7/97	2/18/97

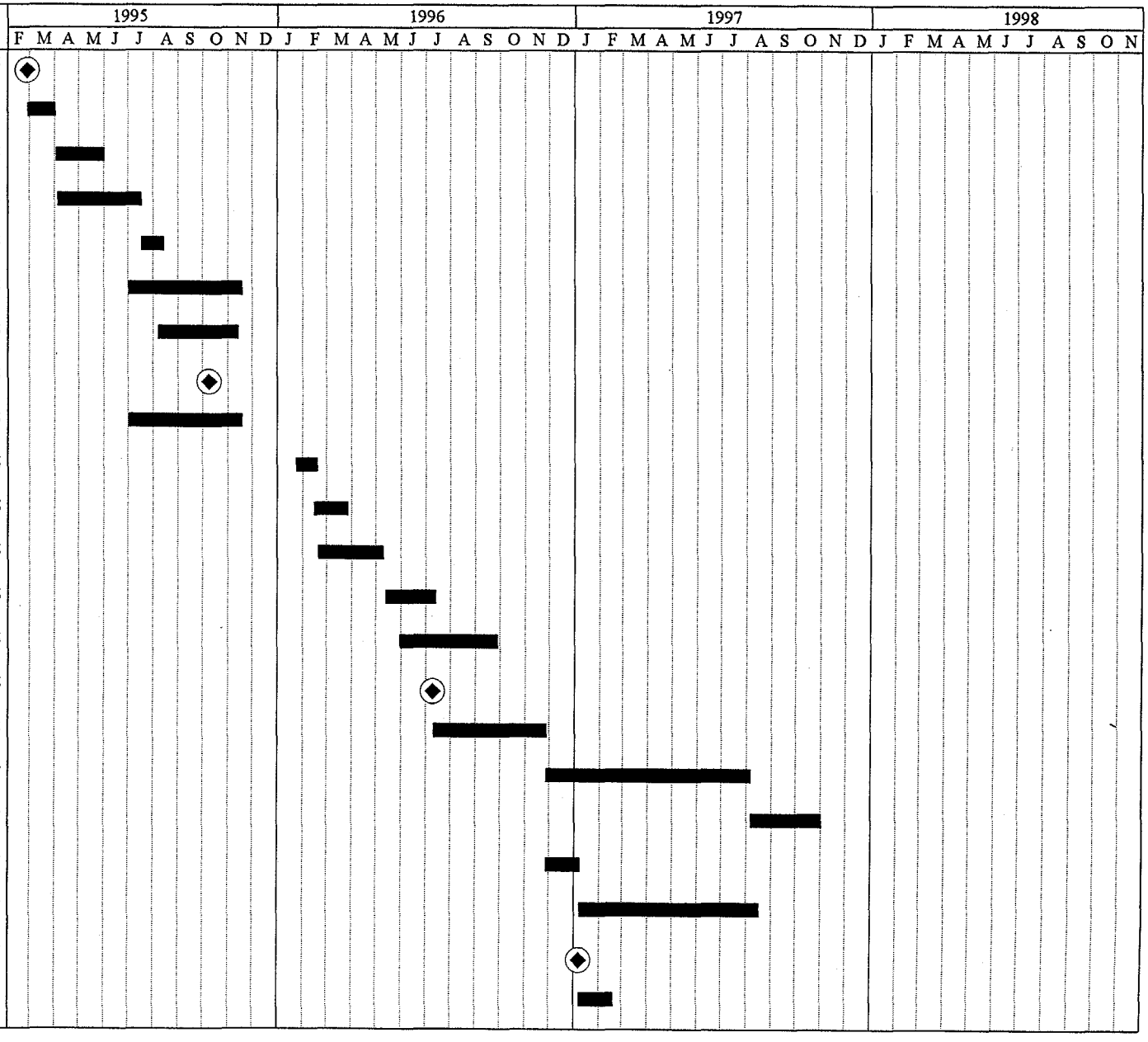


Table 7

Remedial Investigation/Feasibility Study Site Management Schedule
Operable Unit No. 9 (Sites 65 and 73), MCB, Camp Lejeune, North Carolina

Task	Days	Start	Finish
Comment Period	225ed	2/18/97	10/1/97
Final FS/PRAP	30ed	10/1/97	10/31/97
Comment Period	30ed	10/31/97	11/30/97
Draft ROD	30ed	11/2/97	12/2/97
Comment Period	60ed	12/2/97	1/31/98
Final ROD	30ed	1/31/98	3/2/98
RAC Design Review	100ed	2/1/98	5/12/98
Remedial Design	100ed	2/1/98	5/12/98
Initiate RA	0ed	6/12/98	6/12/98

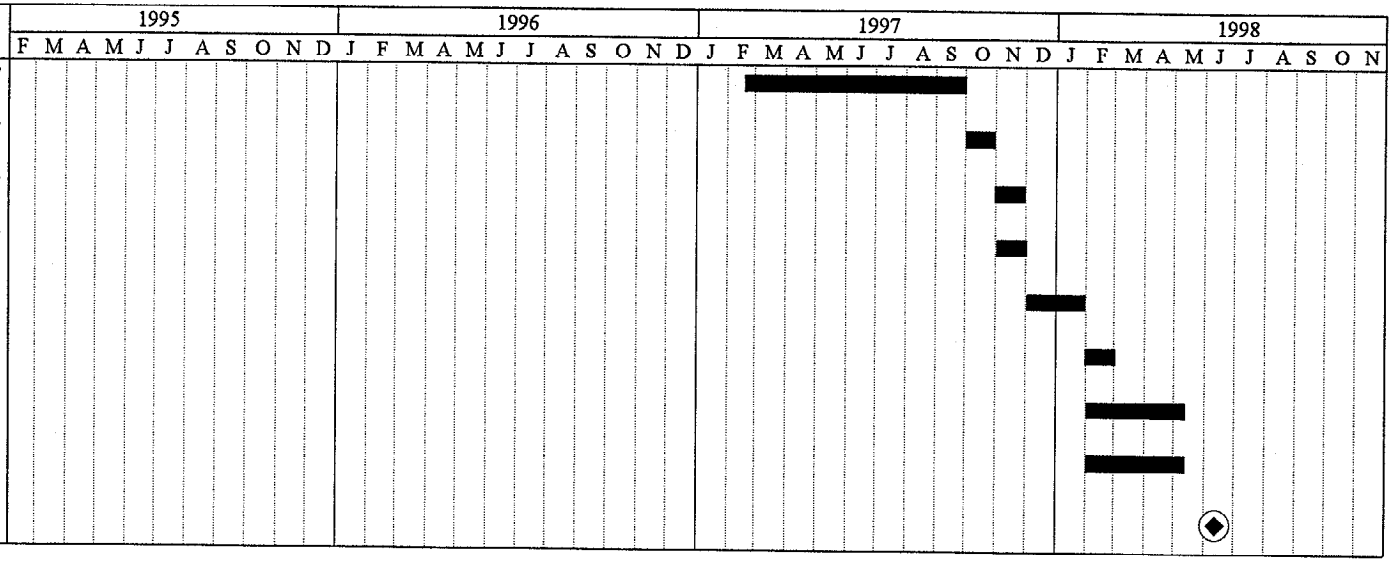


Table 4 -8
Remedial Investigation/Feasibility Study Site Management Schedule
Operable Unit No. 10 (Site 35), MCB, Camp Lejeune, North Carolina

Task Name	Days	Start	Finish
Notice to Proceed	0ed	3/14/94	3/14/94
Field Investigation	42ed	4/11/94	5/23/94
Sample Analysis/Validation	84ed	4/11/94	7/4/94
Data Evaluation	21ed	7/4/94	7/25/94
Risk Assessment	70ed	7/25/94	10/3/94
Draft RI Report	28ed	10/3/94	10/31/94
Comment Period	60ed	10/31/94	12/30/94
Draft Final RI Report	60ed	12/30/94	2/28/95
Comment Period	30ed	2/28/95	3/30/95
Final RI Report	30ed	3/30/95	4/29/95
Draft Interim FS/PRAP (Shallow GW)	28ed	10/31/94	11/28/94
Comment Period	60ed	11/28/94	1/27/95
Draft Final Interim FS/PRAP (Shallow GW)	60ed	1/27/95	3/28/95
Comment Period	30ed	3/28/95	4/27/95
Final Interim FS/PRAP (Shallow GW)	30ed	4/27/95	5/27/95
Public Comment Period	30ed	5/10/95	6/9/95
Interim ROD (Shallow GW)	185ed	1/5/95	7/9/95
Draft Interim ROD (Shallow GW)	21ed	1/5/95	1/26/95
Government Period	60ed	1/26/95	3/27/95
Draft Final Interim ROD (Shallow GW)	60ed	3/27/95	5/26/95
Comment Period	30ed	5/26/95	6/25/95
Final Interim ROD (Shallow GW)	14ed	6/26/95	7/10/95

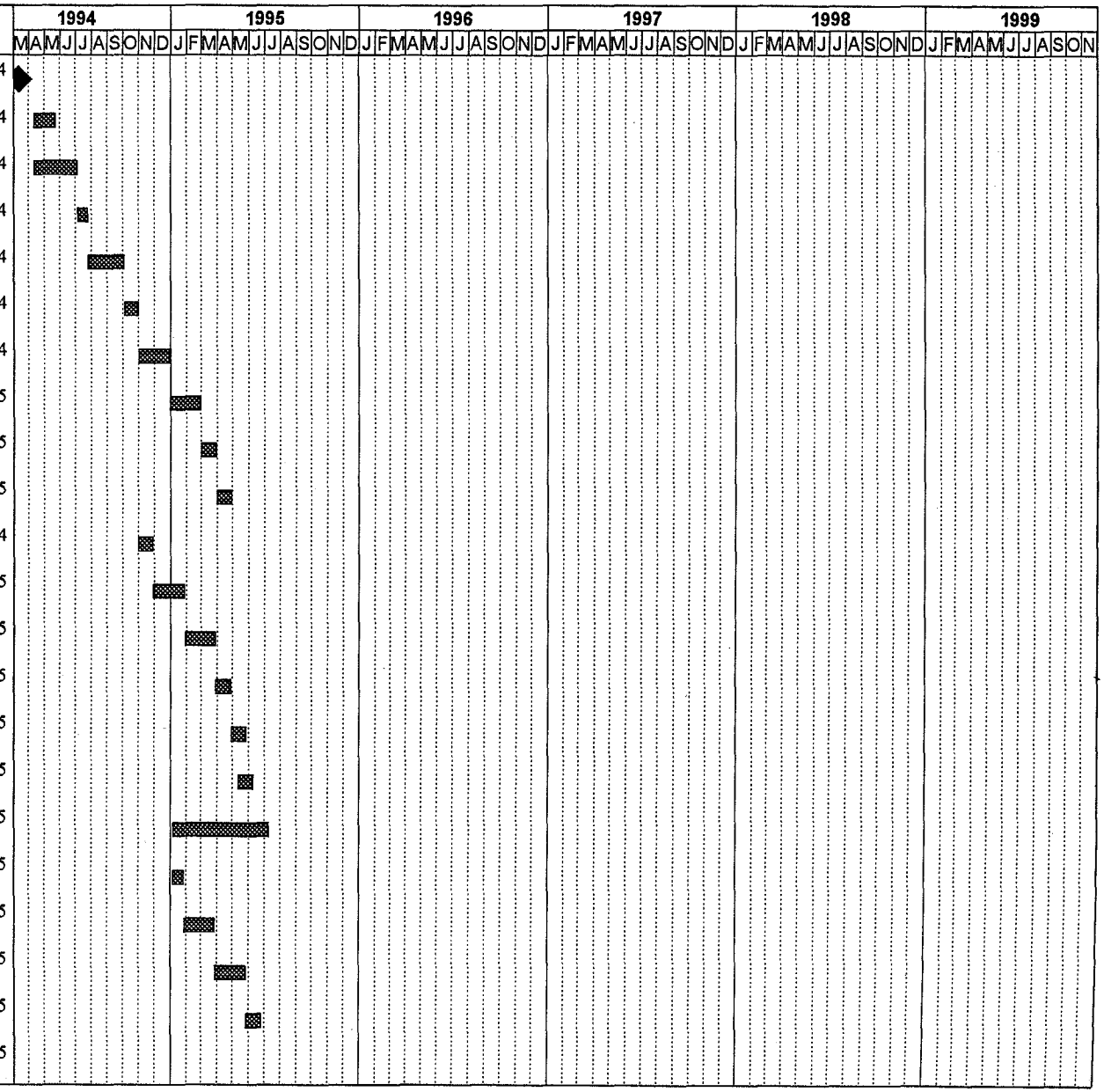


Table 4 -8
Remedial Investigation/Feasibility Study Site Management Schedule
Operable Unit No. 10 (Site 35), MCB, Camp Lejeune, North Carolina

Task Name	Days	Start	Finish
Notice to Proceed (Sup. GW Invest.)	0ed	2/27/96	2/27/96
SGI Field Work (Inc. Mob./Demob.)	52ed	3/25/96	5/16/96
SGI Sample Analysis/Validation	62ed	4/10/96	6/11/96
SGI Data Management	21ed	6/27/96	7/18/96
SGI Data Evaluation	84ed	5/16/96	8/8/96
SGI Meeting	0ed	8/8/96	8/8/96
Draft SGI Report	110ed	7/25/96	11/12/96
Comment Period	60ed	11/12/96	1/11/97
Draft Final SGI Report	30ed	1/11/97	2/10/97
Comment Period	30ed	2/10/97	3/12/97
Final SGI Report	236ed	3/12/97	11/3/97
Draft FS/PRAP	43ed	12/2/96	1/14/97
Comment Period	293ed	1/14/97	11/3/97
Final FS/PRAP	28ed	11/3/97	12/1/97
Public Comment Period	30ed	12/1/97	12/31/97
Draft ROD	28ed	11/3/97	12/1/97
Comment Period	201ed	7/15/97	2/1/98
Final ROD	30ed	2/1/98	3/3/98
RA Design (Sitewide GW)	254ed	2/2/98	10/14/98
Prepare RA Project Plans	188ed	10/14/98	4/20/99
RA Construction	150ed	4/20/99	9/17/99
Post RA Report	60ed	9/17/99	11/16/99

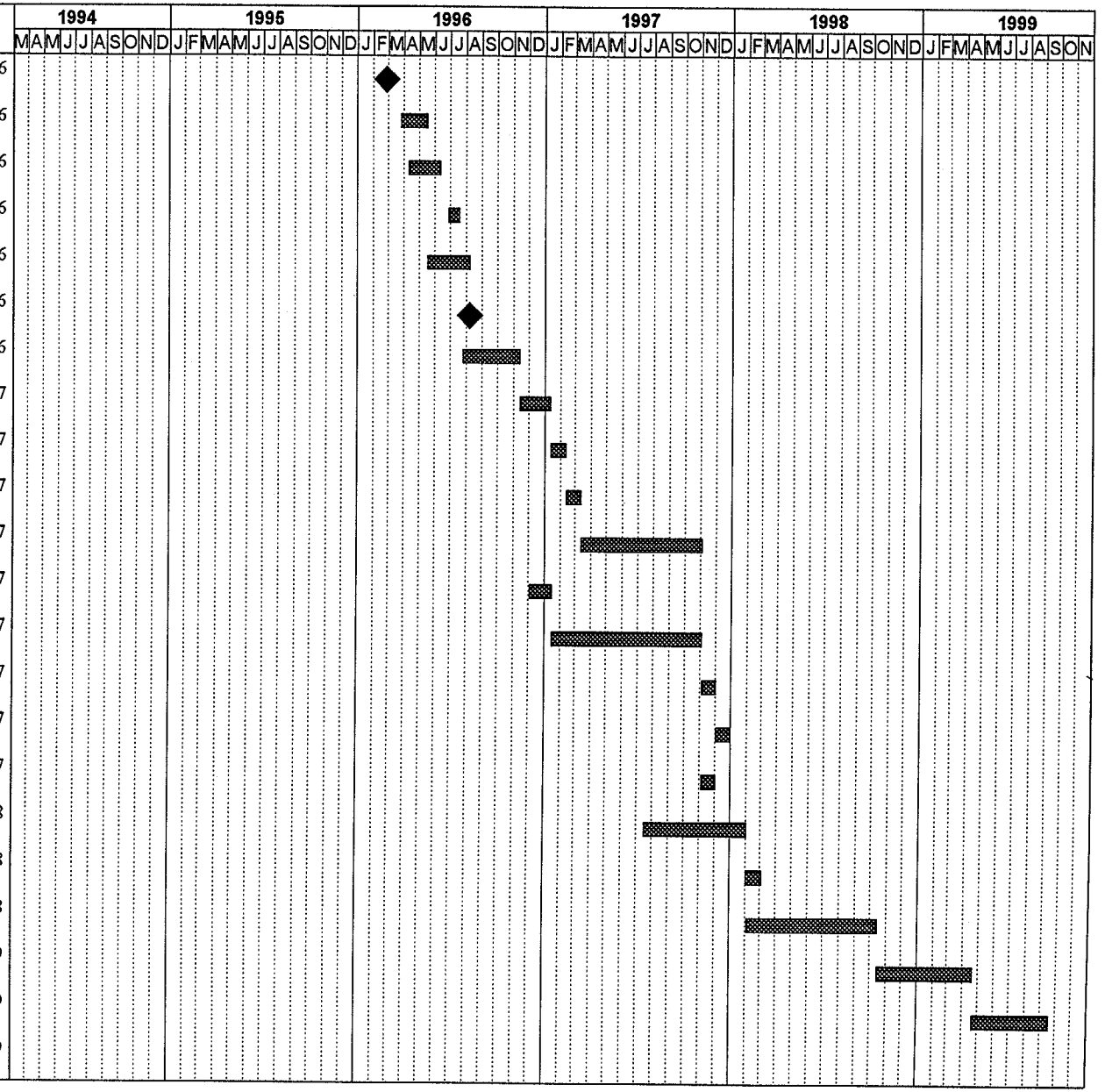


Table 4 -8
Remedial Investigation/Feasibility Study Site Management Schedule
Operable Unit No. 10 (Site 35), MCB, Camp Lejeune, North Carolina

Task Name	Days	Start	Finish
Notice to Proceed (Int. Design /Shal.GW)	0ed	1/25/97	1/25/97
Prepare Treat. Study Project Plans	183ed	12/1/95	6/1/96
Field Treat. Study	457ed	7/1/96	10/1/97
Draft Treat. Study Report	79ed	8/28/96	11/15/96
Comment Period	363ed	11/16/96	11/14/97
Final Treat. Study Report	161ed	1/16/97	6/26/97
Final 100% Interim Design (Shal. GW)	28ed	2/17/97	3/17/97
Comment Period	121ed	3/18/97	7/17/97
Revised Final 100% Interim Design (Shal. GW)	28ed	7/17/97	8/14/97
Interim RA Construction (Shal. GW)	90ed	10/4/97	1/2/98

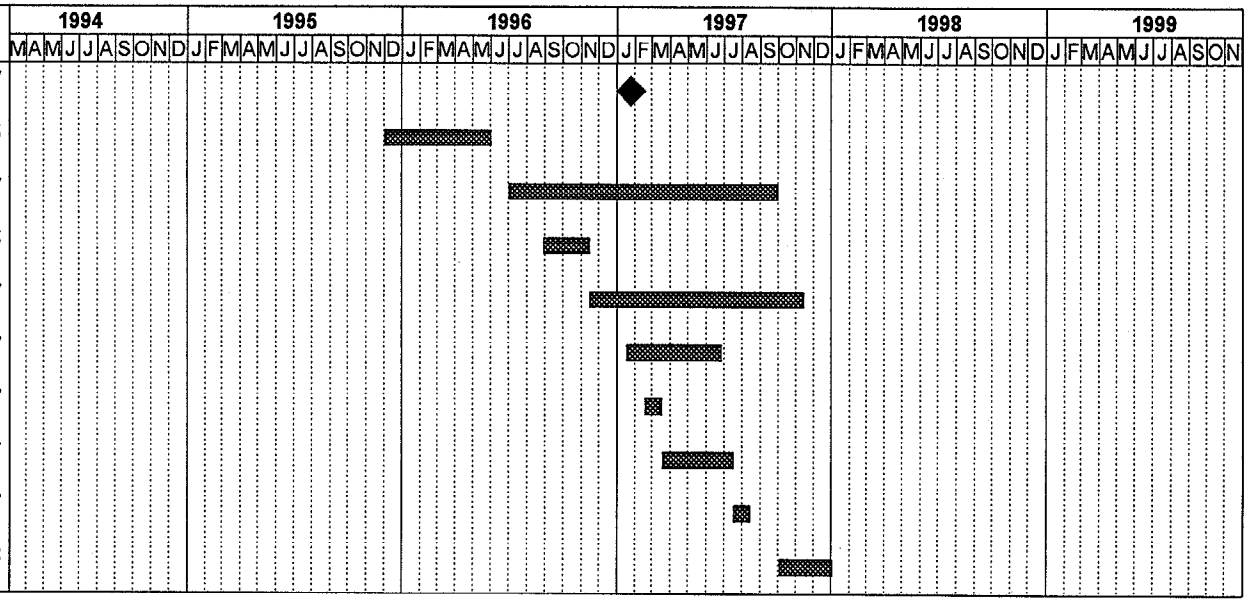
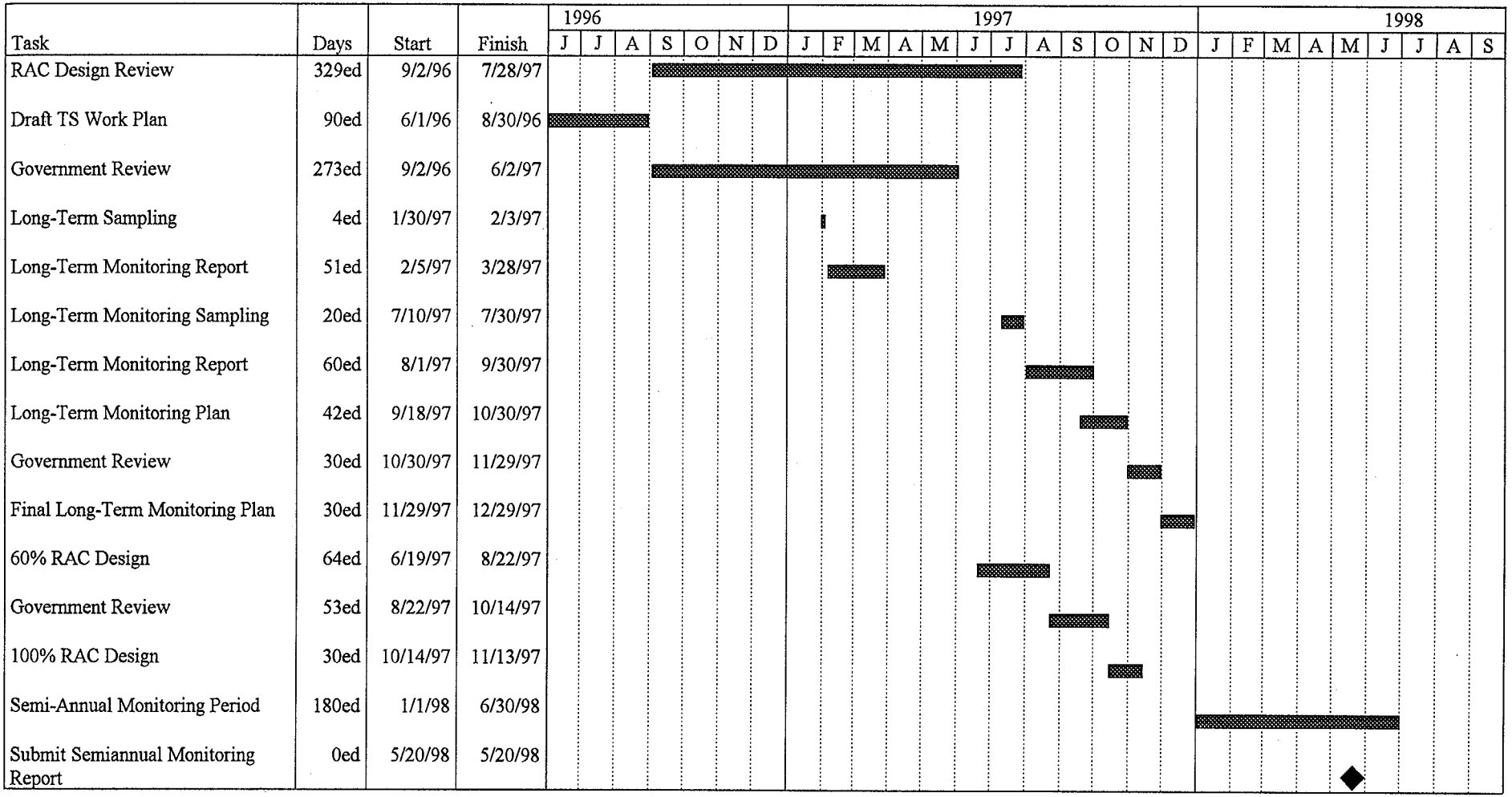


Table 9

Remedial Action Site Management Schedule
Operable Unit No. 12 (Site 3), MCB Camp Lejeune, North Carolina



Task	Days	Start	Finish
RAC Design Review	329ed	9/2/96	7/28/97
Draft TS Work Plan	90ed	6/1/96	8/30/96
Government Review	273ed	9/2/96	6/2/97
Long-Term Sampling	4ed	1/30/97	2/3/97
Long-Term Monitoring Report	51ed	2/5/97	3/28/97
Long-Term Monitoring Sampling	20ed	7/10/97	7/30/97
Long-Term Monitoring Report	60ed	8/1/97	9/30/97
Long-Term Monitoring Plan	42ed	9/18/97	10/30/97
Government Review	30ed	10/30/97	11/29/97
Final Long-Term Monitoring Plan	30ed	11/29/97	12/29/97
60% RAC Design	64ed	6/19/97	8/22/97
Government Review	53ed	8/22/97	10/14/97
100% RAC Design	30ed	10/14/97	11/13/97
Semi-Annual Monitoring Period	180ed	1/1/98	6/30/98
Submit Semiannual Monitoring Report	0ed	5/20/98	5/20/98

Table 4 - 10
Remedial Action Site Management Schedule
Operable Unit No. 14 (Site 69), MCB Camp Lejeune, North Carolina

Task	Days	Start	Finish
SITE 69 TREATABILITY STUDY	**453ed**	**2/20/95**	**5/18/96**
Draft Work Plan	46ed	2/20/95	4/7/95
Final Work Plan	33ed	8/11/95	9/13/95
Treatability Study (Phase I)	245ed	3/22/95	11/22/95
Treatability Study (Phase II)	702ed	11/22/95	10/24/97
Draft Report (Phase I)	61ed	11/22/95	1/22/96
Government Review	30ed	1/22/97	2/21/97
Final Report (Phase II)	39ed	10/27/97	12/5/97
SITE 69 RI/FS	**746ed**	**5/6/95**	**5/21/97**
Draft Final RI	48ed	5/6/95	6/23/95
Final RI	205ed	5/14/96	12/5/96
Draft Final FS	26ed	11/21/97	12/17/97
Government Review	32ed	12/18/97	1/19/98
Final FS	30ed	1/20/98	2/19/98
Draft PRAP/ROD	21ed	12/17/97	1/7/98
Government Review	30ed	1/8/98	2/7/98
Final PRAP	14ed	2/9/98	2/23/98
Public Comment Period	30ed	3/2/98	4/1/98
Final ROD	30ed	4/1/98	5/1/98
SITE 69 DESIGN	159ed	3/30/98	9/5/98

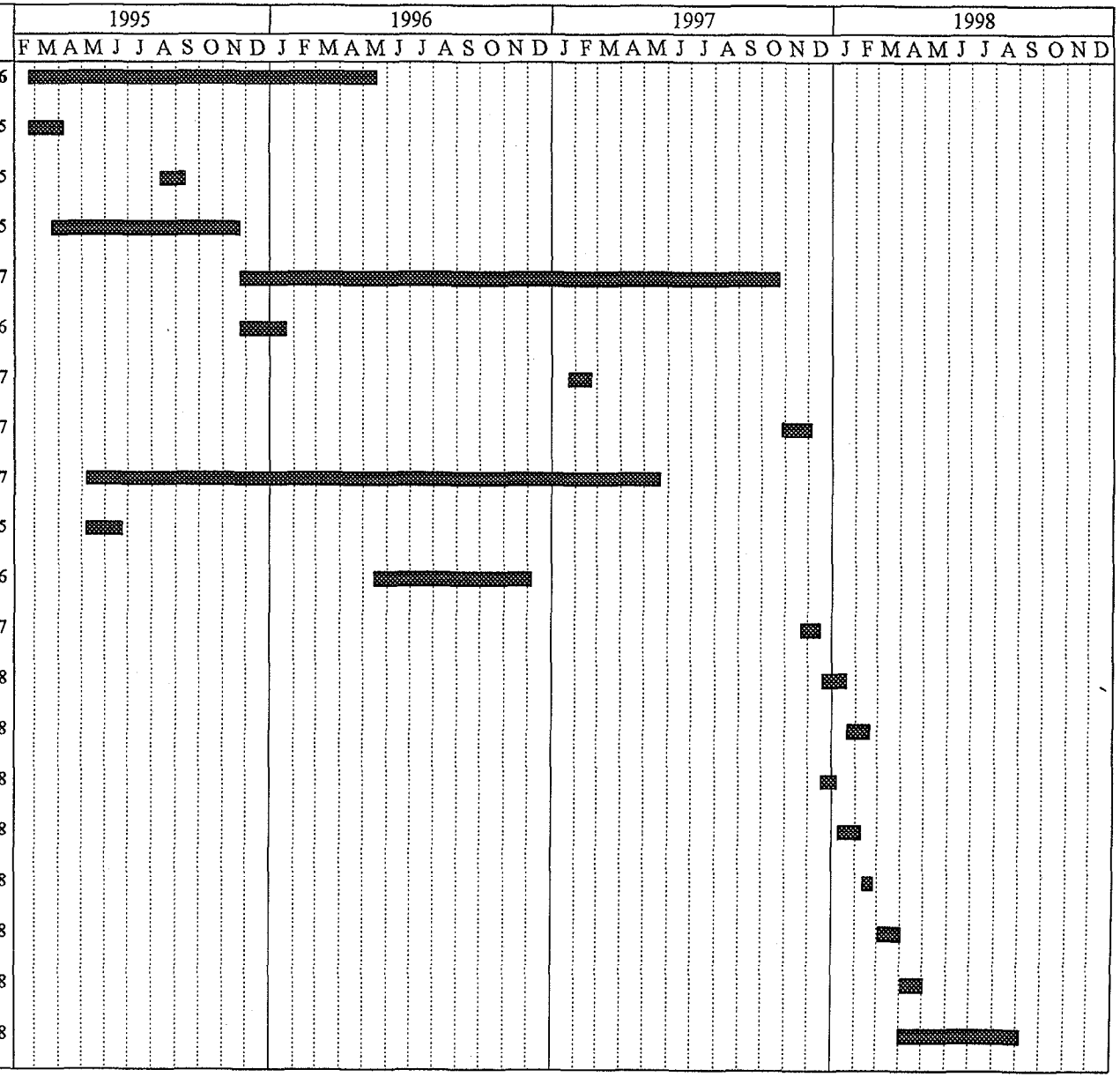


Table 4 - 10
Remedial Action Site Management Schedule
Operable Unit No. 14 (Site 69), MCB Camp Lejeune, North Carolina

Task	Days	Start	Finish
Draft Long-Term Monitoring Plan	79ed	3/30/98	6/17/98
Government Review	60ed	6/16/98	8/15/98
Final Long-Term Monitoring Plan	20ed	8/17/98	9/6/98
Draft RAC Design (100%)	79ed	3/30/98	6/17/98
Government Review	60ed	6/15/98	8/14/98
Final RAC Design	20ed	8/14/98	9/3/98
Procure Remediation Contractor	70ed	9/3/98	11/12/98
Begin Construction (Mobilization)	0ed	11/12/98	11/12/98

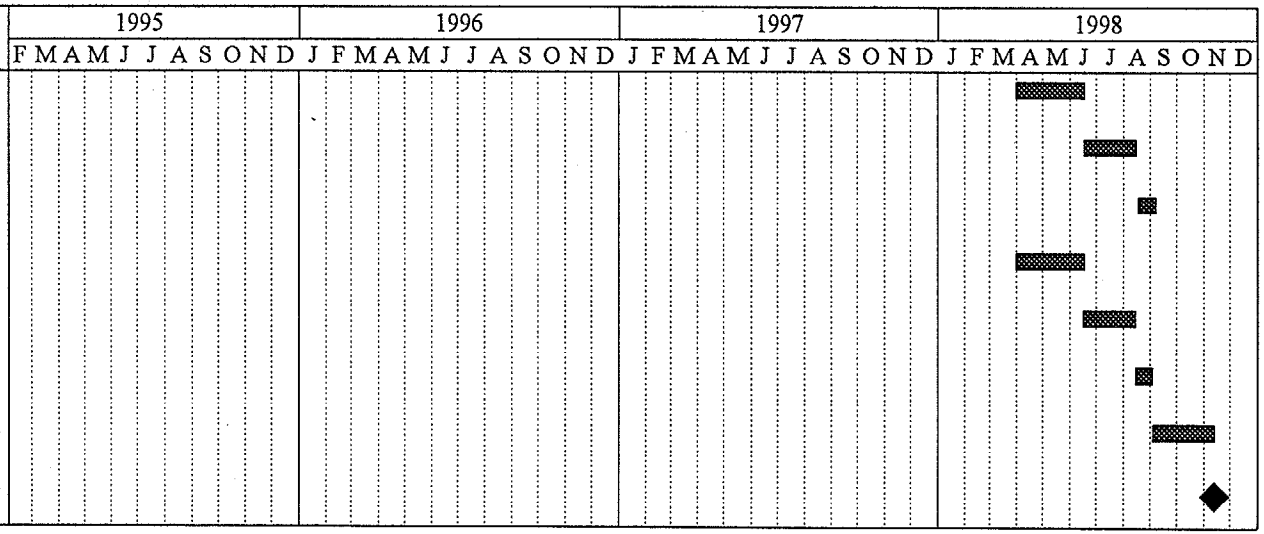


Table 11
Site Evaluation Site Management Schedule
Operable Unit No. 15 (Site 88), MCB Camp Lejeune, North Carolina

Task	Duration	Start	Finish
RI/FS Project Plans	244ed	2/27/96	10/28/96
Site Visit	0ed	3/4/96	3/4/96
Prepare Sample Stragtegy Plan	20ed	3/5/96	3/25/96
Scoping Conference Call	0ed	4/1/96	4/1/96
Prepare Draft RI/FS Project Plans	58ed	4/2/96	5/30/96
Submit Draft RI/FS Project Plans	0ed	5/30/96	5/30/96
Agency Review	60ed	5/30/96	7/29/96
Phase I Investigation	32ed	7/29/96	8/30/96
Phase I Report	88ed	9/3/96	11/30/96
Prepare Final Project Plans	40d	12/2/96	2/21/97
Submit Final Project Plans	0ed	2/21/97	2/21/97
Phase II Field Investigation	51ed	4/14/97	6/4/97
Sample Analysis/Validation	102ed	4/14/97	7/25/97
Data Evaluation	53ed	6/9/97	8/1/97
Risk Assessment	52ed	6/30/97	8/21/97
NFESC Surfactant Test	110ed	7/28/97	11/15/97
Draft EE/CA OU No. 15	45ed	10/4/97	11/18/97
Comment Period	60ed	11/18/97	1/17/98
Public Meeting	1ed	2/27/98	2/28/98
Final EE/CA	30ed	3/14/98	4/13/98
Draft NTCRA OU No. 15	45ed	1/13/98	2/27/98

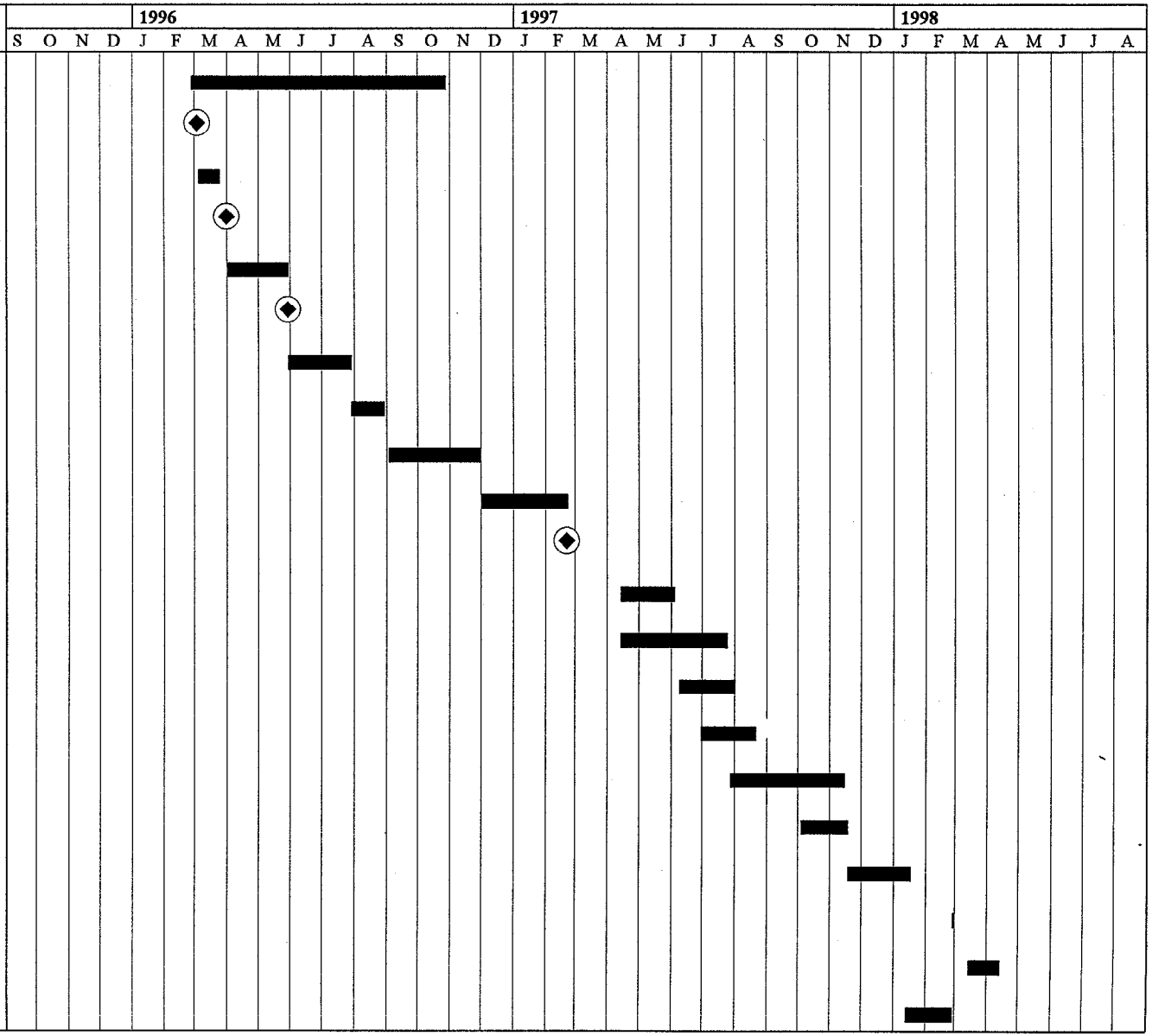


Table 11
Site Evaluation Site Management Schedule
Operable Unit No. 15 (Site 88), MCB Camp Lejeune, North Carolina

Task	Duration	Start	Finish
Comment Period	60ed	2/27/98	4/28/98
Final NTCRA OU No. 15	30ed	4/28/98	5/28/98

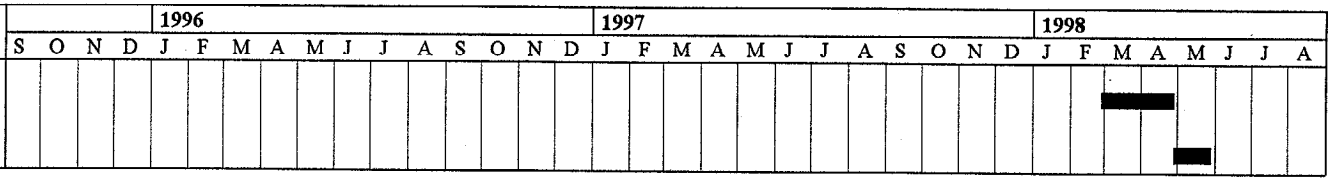


Table 12

Remedial Investigation/Feasibility Study Site Management Schedule
Operable Unit No. 16 (Sites 89 and 93), MCB Camp Lejeune, North Carolina

Task	Duration	Start	Finish
RI/FS Project Plans	299ed	9/1/95	6/26/96
Site Visit	2ed	9/6/95	9/8/95
Prepare Draft Sample Stragtegy Plan	35ed	9/11/95	10/16/95
LANTDIV Scoping Meeting	0ed	10/30/95	10/30/95
Prepare Final Strategy Plan	32ed	10/30/95	12/1/95
EPA Scoping Meeting	0ed	12/18/95	12/18/95
Prepare Draft RI/FS Project Plans	108ed	10/31/95	2/16/96
Submit Draft RI/FS Project Plans	0ed	2/16/96	2/16/96
Agency Review	60ed	2/16/96	4/16/96
Prepare Draft Final RI/FS Project Plans	45ed	4/16/96	5/31/96
Submit Draft Final RI/FS Project Plans	0ed	5/31/96	5/31/96
Phase I Field Investigation	32ed	7/29/96	8/30/96
Phase I Report	88ed	9/3/96	11/30/96
Final RI/FS Project Plans	40d	12/2/96	2/21/97
Submit Final RI/FS Project Plans	0ed	2/21/97	2/21/97
Phase II Field Investigation	51ed	4/14/97	6/4/97
Sample Analysis/Validation	102ed	4/14/97	7/25/97
Data Evaluation	53ed	6/9/97	8/1/97
Risk Assessment	52ed	6/30/97	8/21/97
Draft RI Report OU No. 16	70ed	7/28/97	10/6/97
Comment Period	60ed	10/6/97	12/5/97

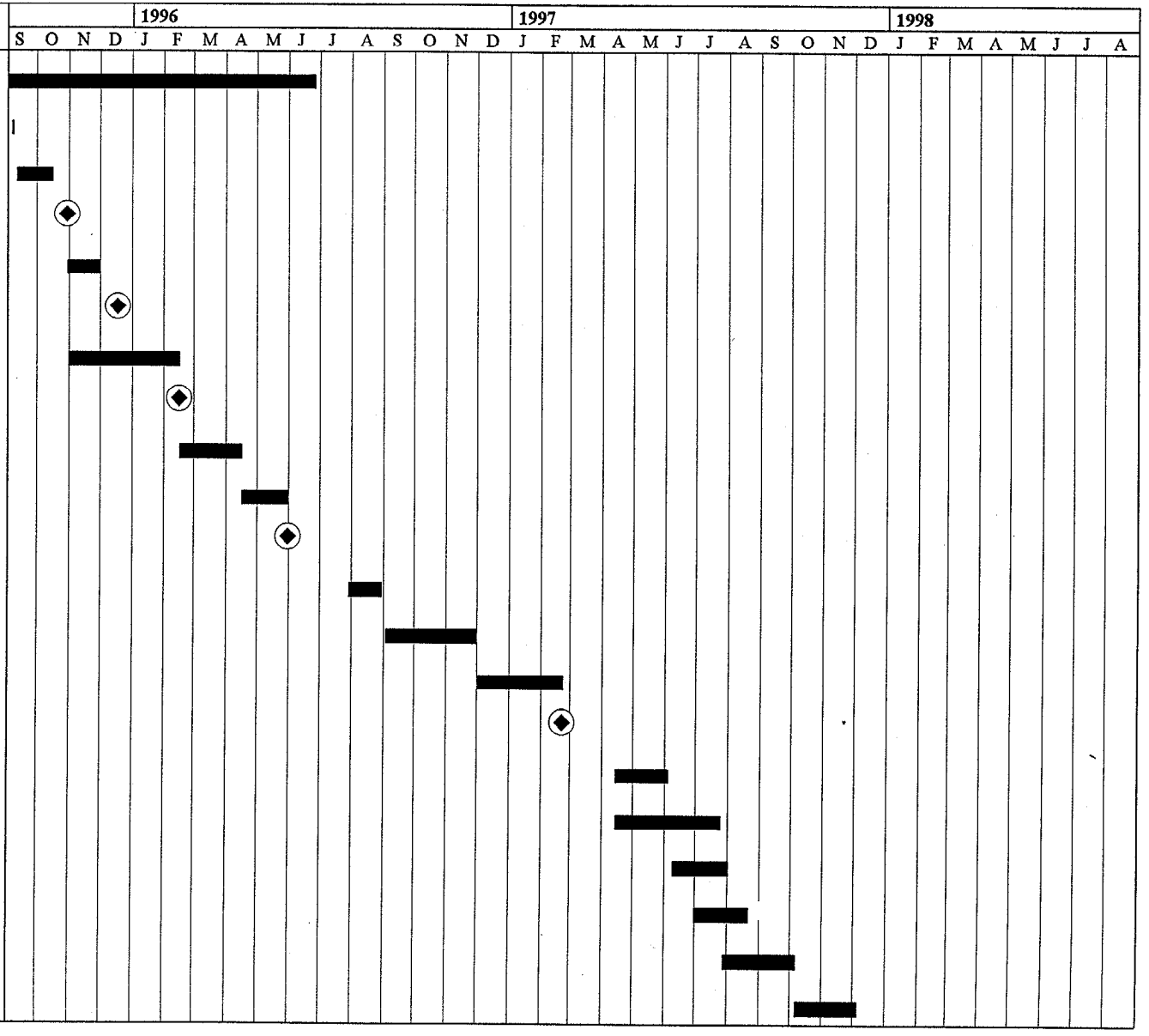


Table 12

Remedial Investigation/Feasibility Study Site Management Schedule
Operable Unit No. 16 (Sites 89 and 93), MCB Camp Lejeune, North Carolina

Task	Duration	Start	Finish
Final RI Report OU No. 16	30ed	12/5/97	1/4/98
Draft FS/PRAP OU No. 16	45ed	10/7/97	11/21/97
Comment Period	60ed	11/21/97	1/20/98
Final FS/PRAP OU No. 16	30ed	1/20/98	2/19/98
Draft ROD OU No. 16	30ed	11/22/97	12/22/97
Comment Period	60ed	12/22/97	2/20/98
Public Meeting	1ed	2/27/98	2/28/98
Final ROD OU No. 16	30ed	3/28/98	4/27/98

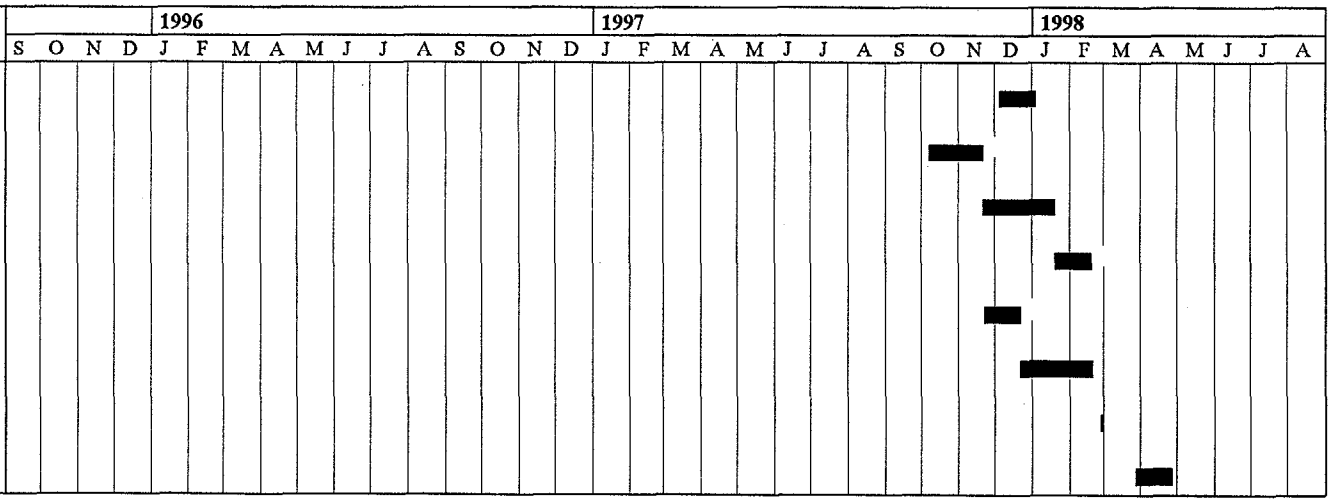


Table 4 - 13
Remedial Investigation Feasibility Study Site Management Schedule
Operable Unit No. 17 (Sites 90, 91, and 92), MCB Camp Lejeune, North Carolina

Task	Days	Start	Finish
Phase I Investigation	23ed	4/7/97	4/30/97
Sample Analysis/Validation	22ed	4/21/97	5/13/97
Data Evaluation	31ed	5/1/97	6/1/97
Prepare Focused RI Report	60ed	6/16/97	8/15/97
Submit Draft Focused RI Report	0ed	8/15/97	8/15/97
Government Review	60ed	8/15/97	10/14/97
Prepare Final Focused RI Report	30ed	10/14/97	11/13/97
Submit Final Focused RI Report	30ed	11/13/97	12/13/97
Draft PRAP/ROD	60ed	8/15/97	10/14/97
Government Review	60ed	10/14/97	12/13/97
Final PRAP/ROD	30ed	12/15/97	1/14/98

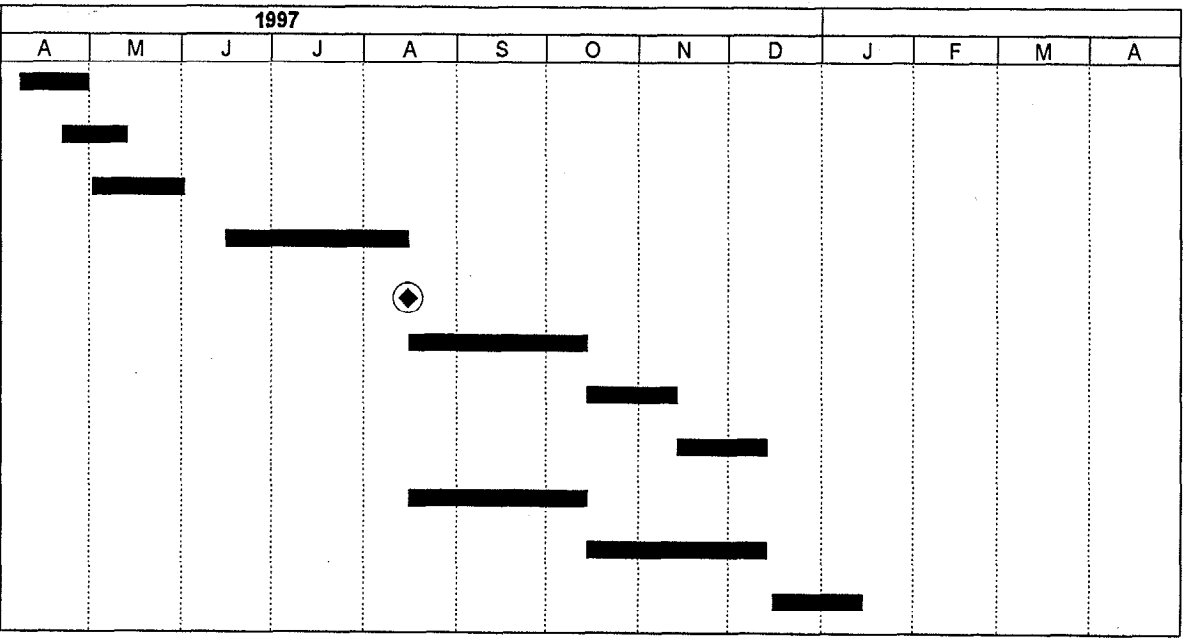


TABLE 4-14

PRIMARY AND SECONDARY DOCUMENT SUBMITTALS PER OPERABLE UNIT
FOR FISCAL YEAR 1998
MCB, CAMP LEJEUNE, NORTH CAROLINA

Operable Unit	Sites	Activity	Primary Document Submittal	Anticipated Submittal Date
1	78	Remedial Action	Semi Annual Monitoring Report	March 5, 1998
		Remedial Action	Semi Annual Monitoring Report	August 5, 1998
2	6 and 82	Remedial Action	Quarterly Monitoring Report	December 3, 1997
		Remedial Action	Quarterly Monitoring Report	March 5, 1998
		Remedial Action	Quarterly Monitoring Report	June 3, 1998
		Remedial Action	Quarterly Monitoring Report	September 2, 1998
4	41 and 74	Remedial Action	Semiannual Monitoring Report	November 20, 1997
		Remedial Action	Semiannual Monitoring Report	May 20, 1998
5	2	Remedial Action	Semiannual Monitoring Report	February 20, 1998
		Remedial Action	Semiannual Monitoring Report	August 20, 1998
6	36, 54, 86	Remedial Investigation/Feasibility Study	Final FS/PRAP	November 27, 1997
		Remedial Investigation/Feasibility Study	Final ROD	January 18, 1998
		Remedial Action	Quarterly Monitoring Report	August 20, 1998
7	1 and 28	Remedial Action	Semiannual Monitoring Report	November 20, 1997
		Remedial Action	Semiannual Monitoring Report	May 20, 1998
9	65 and 73	Remedial Investigation/Feasibility Study	Final RI	November 1, 1997
		Remedial Investigation/Feasibility Study	Final FS/PRAP	October 31, 1997
		Remedial Investigation/Feasibility Study	Final Rod	April 2, 1998
10	35	Remedial Investigation/Feasibility Study	Final FS/PRAP	December 1, 1997
		Remedial Investigation/Feasibility Study	Final ROD	March 3, 1998

TABLE 4-14 (Continued)

PRIMARY AND SECONDARY DOCUMENT SUBMITTALS PER OPERABLE UNIT
FOR FISCAL YEAR 1998
MCB, CAMP LEJEUNE, NORTH CAROLINA

Operable Unit	Sites	Activity	Primary Document Submittal	Anticipated Submittal Date
12	3	Remedial Action	Long-Term Monitoring Plan	October 30, 1997
		Remedial Action	Final Long-Term Monitoring Plan	December 29, 1997
		Remedial Action	100% RAC Design	November 13, 1997
		Remedial Action	Semiannual Monitoring Report	May 20, 1998
14	69	Remedial Investigation/Feasibility Study	Draft Final FS	December 17, 1997
		Remedial Investigation/Feasibility Study	Final FS	February 19, 1998
		Remedial Investigation/Feasibility Study	Draft PRAP/ROD	January 7, 1998
		Remedial Investigation/Feasibility Study	Final PRAP	February 23, 1998
		Remedial Investigation/Feasibility Study	Final ROD	May 1, 1998
14	69	Remedial Action	Draft Long-Term Monitoring Plan	June 16, 1998
		Remedial Action	Final Long-Term Monitoring Plan	September 4, 1998
		Remedial Action	Draft RAC Design	June 15, 1998
		Remedial Action	Final RAC Design	September 3, 1998
15	88	Site Evaluation	Draft EE/CA	November 18, 1997
		Site Evaluation	Final EE/CA	May 13, 1998
		Site Evaluation	Draft NTCRA	February 27, 1998
		Site Evaluation	Final NTCRA	May 28, 1998
16	89 and 93	Remedial Investigation/Feasibility Study	Draft RI Report	October 6, 1997
		Remedial Investigation/Feasibility Study	Final RI Report	January 4, 1998
		Remedial Investigation/Feasibility Study	Draft FS/PRAP	November 21, 1997
		Remedial Investigation/Feasibility Study	Final FS/PRAP	February 19, 1998
		Remedial Investigation/Feasibility Study	Draft ROD	December 22, 1997
		Remedial Investigation/Feasibility Study	Final ROD	June 30, 1998

TABLE 4-15

PRIMARY AND SECONDARY DOCUMENT SUBMITTALS BY MONTH
FOR FISCAL YEAR 1998
MCB, CAMP LEJEUNE, NORTH CAROLINA

Anticipated Submittal Date	Operable Unit	Sites	Primary Document Submittal
October 6, 1997	16	89 and 93	Draft RI Report
October 30, 1997	12	3	Draft Long-Term Monitoring Plan
October 31, 1997	9	65 and 73	Final FS/PRAP
November 1, 1997	9	65 and 73	Final RI
November 13, 1997	12	3	100% RAC Design
November 18, 1997	15	88	Draft EE/CA
November 20, 1997	4	41 and 74	Semiannual Monitoring Report
November 20, 1997	7	1 and 28	Semiannual Monitoring Report
November 21, 1997	16	89 and 93	Draft FS/PRAP
November 27, 1997	6	36, 54, 86	Final FS/PRAP
December 1, 1997	10	35	Final FS/PRAP
December 3, 1997	2	6 and 82	Quarterly Monitoring Report
December 17, 1997	14	69	Draft Final FS
December 22, 1997	16	89 and 93	Draft ROD
December 29, 1997	12	3	Final Long-Term Monitoring Plan
January 4, 1998	16	89 and 93	Final RI Report
January 7, 1998	14	69	Draft PRAP/ROD
January 18, 1998	9	65 and 73	Final ROD
February 19, 1998	16	89 and 93	Final FS/PRAP
February 19, 1998	14	69	Final FS
February 20, 1998	5	2	Semiannual Monitoring Report
February 23, 1998	14	69	Final PRAP
February 27, 1998	15	88	Draft NTCRA
March 3, 1998	10	35	Final ROD
March 5, 1998	1	78	Semiannual Monitoring Report
March 5, 1998	2	6 and 82	Quarterly Monitoring Report

TABLE 4-15 (Continued)

PRIMARY AND SECONDARY DOCUMENT SUBMITTALS BY MONTH
FOR FISCAL YEAR 1998
MCB, CAMP LEJEUNE, NORTH CAROLINA

Anticipated Submittal Date	Operable Unit	Sites	Primary Document Submittal
April 2, 1998	9	65 and 73	Final ROD
May 1, 1998	14	69	Final ROD
May 13, 1998	15	88	Final EE/CA
May 20, 1998	4	41 and 74	Semiannual Monitoring Report
May 20, 1998	7	1 and 28	Semiannual Monitoring Report
May 20, 1998	12	3	Semiannual Monitoring Report
May 28, 1998	15	88	Final NTCRA
June 3, 1998	2	6 and 82	Quarterly Monitoring Report
June 15, 1998	14	69	Draft RAC Design
June 16, 1998	14	69	Draft Long-Term Monitoring Plan
June 30, 1998	16	89 and 93	Final ROD
August 5, 1998	1	78	Semiannual Monitoring Report
August 20, 1998	5	2	Semiannual Monitoring Report
August 20, 1998	6	36, 54, 86	Semiannual Monitoring Report
September 2, 1998	2	6 and 82	Quarterly Monitoring Report
September 3, 1998	14	69	Final Long-Term Monitoring Plan
September 4, 1998	14	69	Final RAC Design

5.0 PRE-REMEDIAL INVESTIGATIONS

5.1 Introduction

This section identifies Fiscal Years 1997 through 2001 IRP activities for sites scheduled for Pre-Remedial Investigations (Pre-RIs). It is important to note that these Pre-RI sites are not required to adhere to the same reporting requirements as defined in the Camp Lejeune Federal Facilities Agreement for RI/FS sites. If these sites warrant further investigation based on the Pre-RI results, the sites will be added to the FFA list of RI/FS sites (e.g., Sites 3, 7, 43, 44, 54, 63, 65, 80, and 82 were added to this SMP as RI/FS sites in Fiscal Year 1994).

5.2 Sites

The list of sites at MCB Camp Lejeune that require Pre-RIs to determine whether additional RI/FS activities are needed is shown in Table 5-1.

Following are brief descriptions of the sites where Pre-RIs are being conducted or are scheduled to be performed.

5.2.1 Site 10 - Original Base Dump

Site 10 covers approximately 5 to 10 acres. It was operated prior to 1950 and was mainly used for disposal of construction debris and as a burn dump. It is located to the west of Open Storage Lot 203 along Holcomb Boulevard. This site was recently added to the IR Program when it was reported that two marines obtained skin rashes by contacting a heavy oily material which may have been at the site. Project plan development for this site was completed in September 1997. This site is expected to be investigated during 1998.

5.2.2 Site 12 - Explosive Ordnance Disposal (EOD-1 formerly known as G-4A)

Site 12 covers approximately 8 to 10 acres. During the early 1960s, ordnance was disposed of by burning or exploding when it was found to be inert, unserviceable, or defective. Materials disposed of included ordnance, colored smokes, and white phosphorous. Any undestroyed residues were typically less than 1 pound. Baker conducted soil and groundwater sampling activities in January and February 1996. Results indicate that neither soil nor groundwater have been significantly impacted by site activities. Accordingly, this site is likely to be considered for No Further Actions.

5.2.3 Site 68 - Rifle Range Dump

The Rifle Range Dump is located west of Range Road approximately 2,000 feet west of the Rifle Range water treatment plant and 800 feet east of Stone Creek. This 3- to 4-acre area was used as a disposal site for various types of wastes, including garbage, building debris, waste treatment sludge, and solvents. The fill lies within a 30- to 40-acre area that showed, in aerial photographs, signs of previous disturbance. However, this disturbance may be related to logging activities. The depth of the fill area is approximately 10 feet, and the amount of material deposited has been estimated to be 100,000 cubic yards. An estimated 2,000 gallons of waste solvents were reportedly deposited.

This currently inactive landfill was utilized as a disposal facility for a period of 30 years from 1942 to 1972. The major concern is the potential for waste solvents to affect the groundwater quality beneath the site. Organic compounds were identified in the potable supply wells RR-45 and RR-97. Even though these wells are located upgradient from the site, it was suspected that continuous pumping of the wells may have drawn contaminants to the wells. Baker conducted soil, groundwater, surface water, and sediment sampling activities in January and February, 1996. Results indicated that none of the media sampled have been significantly impacted by site activities. Accordingly, this site is likely to be considered for No Further Actions.

5.2.4 Site 75 - MCAS Basketball Court Site

The MCAS Basketball Court Site is located along the north side of Curtis Road. This AOC was reportedly a drum burial area that was used on at least one occasion in the early 1950s. The excavation as seen in an aerial photograph was an oval shaped pit approximately 90 feet long by 70 feet wide and was sufficiently deep to have encountered the water table. An estimated seventy-five to one hundred 55-gallon drums were placed in this pit. The drums reportedly contained a chloroacetophenone tear gas solution used for training. Additional organic chemicals, such as chloroform, carbon tetrachloride, benzene, and chloropicrin, may have been present in the solution. Degradation of the drums could have resulted in the release of the suspected materials into the groundwater. This was of particular concern due to the proximity of several water supply wells in the area, two of them being within 500 feet of the alleged disposal site. Baker conducted soil and groundwater sampling activities in January and February 1996. In addition, a comprehensive geophysical survey was also significantly impacted. The geophysical survey did not indicate that neither soil nor groundwater have been significantly impacted. The geophysical survey did not indicate any major subsurface anomalies which could be the suspected drums. Accordingly, this site is likely to be considered for No Further Actions.

5.2.5 Site 76 - MCAS Curtis Road Site

The MCAS Curtis Road Site is located in the vicinity of and along the north side of Curtis Road. The precise location of the site is unknown, and two possible locations have been identified based on interviews and aerial photography. This alleged dump site was reportedly used as a drum disposal area on two occasions in 1949. The estimated area of the disposal unit is 1/4 acre and approximately 25 to 75 55-gallon drums were allegedly involved. It is believed that the drums contained a chloroacetophenone tear gas agent similar to that allegedly buried in the MCAS Basketball Court Site (Site 75). Potential contaminants are chloroform, carbon tetrachloride, benzene, and chloropicrin. Baker conducted soil and groundwater sampling activities in January and February 1996. In addition, a comprehensive geophysical survey was also significantly impacted. The geophysical survey did not indicate that neither soil nor groundwater have been significantly impacted. The geophysical survey did not indicate any major subsurface anomalies which could be the suspected drums. Accordingly, this site is likely to be considered for No Further Actions.

5.2.6 Site 84 - Building 45 Area

Site 84 is located approximately 200 yards south of Highway 24 on the main side of MCB Camp Lejeune, one mile west of the main gate entrance. The study area is bordered by Building 45, electrical substation, to the east and Northeast Creek to the west. The area is wooded and vegetated with a pond, possibly manmade, within the study area. There are no direct access roads, however, access to the site is unrestricted.

This site is in proximity of a former electric substation. Transformers reportedly containing polychlorinated biphenyls (PCBs) were known to be used and possibly stored at the substation. A transformer was discovered in the wooded area, east of the substation, during an Underground Storage Tank (UST) Investigation. Additional transformers (approximately 20) potentially containing PCB transformer oil were discovered and removed from the lagoon.

Baker conducted soil, groundwater, surface water, and sediment sampling activities in October, 1995 as part of a site investigation (SI). PCBs were found at levels above 500 ppb in soil collected from around the lagoon, and in surface water and sediment (above 1,000 ppb) collected from within the lagoon. Remediation of PCBs in the lagoon and nearby soils recommended as a Time Critical Removal Action (TCRA).

5.2.7 Site 85 - Camp Johnson Battery Dump

The Camp Johnson Battery Dump was recently discovered off Wilson Drive in the Montford Point Area during road repairs. Decomposed batteries, which were used in military communication equipment during the Korean era, were unearthed as a roadway was being widened. Military personnel utilizing this area also discovered discarded charcoal canisters from old air purifying respirators. The discarded battery packs and charcoal canisters were observed in piles, randomly located throughout a 2 to 3 acre area.

Baker conducted soil and groundwater sampling activities in August, 1995. Results indicated that soil in the vicinity of the battery disposal piles have been impacted by metals leaching form the batteries. Removal of the soil and battery packs was recommended as part of a TCRA.

5.2.8 Site 87 - MCAS Officer's Housing Area

The MCAS Officers' Housing Area site (formerly Site A) is located on the west bank of the New River. This area was identified during the second round of sampling conducted in 1986. Waste was identified eroding out of a cut bank along the New River in the vicinity of an officers' housing area. The materials were tentatively identified as hospital wastes. Various hospital waste materials were noted, including hypodermic needles and vials of white powder that were believed to contain a chlorine-based substance. No information was available regarding the volume of the waste or the mode of disposal. Baker conducted soil, groundwater, surface water, sediment, and test pit sampling activities in October (groundwater, soil, surface water, and sediment) and February (test pits), 1996. Results indicate that none of the media sampled have been significantly impacted by site activities. Accordingly, the site is likely to be considered for No Further Action.

5.3 Scope of Work

During Fiscal Year 1992 and Fiscal Year 1993, Pre-Remedial Investigations were initiated by preparing Project Plans (Work Plan, Sampling and Analysis Plan, and Health and Safety Plan) and conducting the field investigations for Sites 3, 7, 43, 44, 54, 63, 65, 80, and 82. The Final Reports were submitted in Fiscal Year 1994 for Sites 43, 44, 63, and 65. The other Reports were never finalized due to funding. It should be noted that finalization of these reports is not problematic since all Pre-RI sites are being investigated as part of an RI/FS. Based on the results, all nine sites were added to the list of RI/FS sites due to either soil or groundwater contamination.

Pre-Remedial Investigations at Sites 12, 68, 75, 76, 84, 85, and 87 began in Fiscal Year 1994 with the preparation of Project Plans. In Fiscal Year 1996, the field investigation was initiated. The final report documenting the findings of the investigation is scheduled for submittal in 1997. Project Plans were initiated in 1997.

Most of the sites have been previously investigated in various stages of the NACIP Program, and there have been no sites identified that pose immediate threats to human health and the environment.

SECTION 5 TABLES

TABLE 5-1

PRE-REMEDIAL INVESTIGATION SITES
MCB CAMP LEJEUNE, NORTH CAROLINA

Site No.	Site Description	Dates Used	Material Deposited
10	Original Base Dump	Pre-1950	Construction debris
12	Explosive Ordnance Disposal EOD-1 (formerly known as G-4A)	Early 1960s	Ordnance burned or exploded, colored smokes, white phosphorus
68	Rifle Range Dump	1942-1972	Solvents, WTP sludge, construction materials
75	MCAS Basketball Court Site	Early 1950s	Training agents (CN, CNC, CNB, and/or CNS)
76	MCAS Curtis Road Site	1949	Training agents (CN, CNC, CNB, and/or CNS)
84	Building 45 Area	1940s - Unknown	Capacitors, transformers, and construction debris
85	Camp Johnson Battery Dump	1950s	Batteries, charcoal canisters
87	MCAS Officer's Housing Area	Unknown	Potential hospital wastes

6.0 REMOVAL/INTERIM REMEDIAL ACTIONS

Removal actions are taken to prevent immediate and substantial harm to human health. Examples are fencing, removal of aboveground drums, and removal of buried drums, if identified during geophysical surveys. Interim remedial actions are conducted to prevent a potential release of contaminants and/or further migration of contaminants.

A time-critical removal action (TCRA) was conducted at Site 2 to remove approximately 1,500 cubic yards of soil contaminated with pesticides. The contaminated soils were adjacent to the former pesticide mixing area. The mixing area is located behind an administrative building along Holcomb Boulevard. Another TCRA was initiated at Site 6 during Fiscal Year 1994 to remove surface drums and buried drums at two areas of concern.

An Interim Remedial Action (IRA) design for the remediation of the shallow aquifer at Site 78 (Hadnot Point Industrial Area) was completed in Fiscal Year 1993 (August 1993). Construction of the remediation system, which will pump and treat groundwater on site, then discharge the effluent to the Hadnot Point Industrial Area Sewage Treatment Plant (STP), was completed in December 1994.

An IRA design for the remediation of contaminated soil at Site 35 was initiated in July 1994. The design was completed in December 1994, and the construction phase was initiated in May 1995. Construction activities, which will involve excavation and treatment of TPH-contaminated soil, are scheduled to be completed in July 1995.

Access restriction measures were installed at Site 82 during Fiscal Year 1994. Access restrictions were completed for Sites 41, 43, and 44 during Fiscal Year 1995.

A debris removal action for Operable Unit No. 6 (Site 43) was performed June 1995.

Access restriction measures were installed at Sites 74 and 44 during Fiscal Year 1995. Additional access restrictions at Site 41 were installed in Fiscal Year 96.

A TCRA was conducted at Site 80 to remove pesticide contaminated soil. These pesticide soils were in the wooded area at the intersection of the access road and the road leading to the burn area. Additionally, pesticide contaminated soils were removed from the lawn area near the oil water separator.

During Fiscal Year 1998 a TCRA is planned to remove PCB contaminated soil at Site 36.

During Fiscal Year 1998 a TCRA is planned to remove PCB-contaminated sediment and battery piles from Sites 84 and 85, respectively.

Construction of a biocell to treat creosote contaminated soil from Site 3 is planned for Fiscal Year 1998.

The Navy will continue to identify possible removal/interim remedial actions as site investigations proceed.

7.0 REFERENCES

Baker, 1992. Draft Operable Unit Prioritization Report for MCB Camp Lejeune, North Carolina. April 24, 1992.

Camp Lejeune Federal Facility Agreement. February 1991.

ESE, 1990. Final Site Summary Report, MCB Camp Lejeune, North Carolina. September 1990.