

11/1/07 - 0443

FINAL

# Site Management Plan Fiscal Year 2008

Marine Corps Base Camp Lejeune  
Jacksonville, North Carolina



Prepared for

**Department of the Navy**  
Naval Facilities Engineering Command  
Mid-Atlantic Division  
Norfolk, Virginia

Contract No.  
N62470-02-D-3052  
CTO-0171  
Navy Clean III

**November 2007**

Prepared by

**CH2MHILL**

Final

**Site Management Plan  
Fiscal Year 2008**

**Marine Corps Base  
Camp Lejeune, North Carolina**

**Contract Task Order 171**

**November 2007**

Prepared for

**Department of the Navy  
Naval Facilities Engineering Command  
Mid-Atlantic Division**

Under the

**LANTDIV CLEAN III Program  
Contract N62470-02-D-3052**

Prepared by



**Charlotte, North Carolina**

# Contents

---

<b>ACRONYMS AND ABBREVIATIONS.....</b>	<b>IX</b>
<b>1. INTRODUCTION .....</b>	<b>1-1</b>
1.1 SMP PURPOSE .....	1-1
1.2 SMP REPORT ORGANIZATION.....	1-1
<b>2. MCB CAMP LEJEUNE DESCRIPTION AND ENVIRONMENTAL HISTORY .....</b>	<b>2-1</b>
2.1 BASE DESCRIPTION .....	2-1
2.2 FACILITY-WIDE DEMOGRAPHY AND LAND USE .....	2-1
2.3 REGIONAL AND FACILITY-WIDE PHYSIOGRAPHY, CLIMATE, AND SURFACE WATER HYDROLOGY .....	2-2
2.4 GEOLOGY AND HYDROGEOLOGY .....	2-2
2.4.1 <i>General Regional Geologic and Hydrogeologic Framework</i> .....	2-2
2.4.2 <i>Regional Water Usage</i> .....	2-3
2.5 ENVIRONMENTAL HISTORY .....	2-3
2.5.1 <i>IR Program History</i> .....	2-3
2.5.2 <i>MRP History</i> .....	2-4
2.6 CERCLA PROCESS .....	2-5
2.6.1 <i>Preliminary Assessment/Site Investigation</i> .....	2-5
2.6.1.1 Preliminary Assessment.....	2-5
2.6.1.2 Site Investigation .....	2-5
2.6.2 <i>Remedial Investigation/Feasibility Study</i> .....	2-6
2.6.2.1 Remedial Investigation .....	2-6
2.6.2.2 Feasibility Study .....	2-6
2.6.2.3 Removal Action .....	2-6
2.6.2.4 Treatability Study.....	2-7
2.6.3 <i>Proposed Remedial Action Plan and Record of Decision</i> .....	2-7
2.6.3.1 Proposed Remedial Action Plan.....	2-7
2.6.3.2 Record of Decision .....	2-8
2.6.4 <i>Remedial Design and Remedial Action</i> .....	2-8
2.6.4.1 Remedial Design .....	2-8
2.6.4.2 Remedial Action .....	2-8
2.6.5 <i>Remedy-in-Place and Response Complete</i> .....	2-8
2.6.5.1 Remedy-in-Place.....	2-8
2.6.5.2 Response Complete.....	2-9
2.6.5.3 Five-Year Reviews.....	2-9
<b>3. SITE DESCRIPTIONS .....</b>	<b>3-1</b>
3.1 PRELIMINARY ASSESSMENT/SITE INVESTIGATION SITES .....	3-1
3.1.1 <i>IR Sites</i> .....	3-1
3.1.1.1 MCAS New River (Buildings SAS113, AS116, and AS119).....	3-1
3.1.1.2 Montford Point (Buildings M119 and M315) .....	3-2
3.1.1.3 IR Site 4 – Sawmill Road Construction Debris Dump.....	3-3
3.1.1.4 IR Site 13 – Golf Course Construction Dump Site .....	3-3
3.1.1.5 IR Site 18 – Watkins Village (E) Site .....	3-4
3.1.1.6 IR Site 19 – Naval Research Lab Dump .....	3-4
3.1.1.7 IR Site 20 – Naval Research Lab Incinerator.....	3-4
3.1.1.8 IR Site 23 – Roads and Grounds Building 1105 .....	3-5
3.1.1.9 IR Site 25 – Base Incinerator .....	3-5
3.1.1.10 IR Site 37 – Camp Geiger Area Surface Dump .....	3-5
3.1.1.11 IR Site 38 – Camp Geiger Construction Dump.....	3-6
3.1.1.12 IR Site 40 – Camp Geiger Area Borrow Pit .....	3-6
3.1.1.13 IR Site 42 – Building 705 BOQ Dump .....	3-6

3.1.1.14	IR Site 46 – MCAS Main Gate Dump .....	3-7
3.1.1.15	IR Site 49 – MCAS Suspected Minor Dump .....	3-7
3.1.1.16	IR Site 51 – MCAS Football Field.....	3-7
3.1.1.17	IR Site 53 – MCAS Warehouse Building 3525 Area.....	3-7
3.1.1.18	IR Site 55 – Air Station East Perimeter Dump.....	3-8
3.1.1.19	IR Site 61 – Rhodes Point Road Dump.....	3-8
3.1.1.20	IR Site 62 – Race Course Area Dump.....	3-8
3.1.1.21	IR Site 66 – AMTRAC Landing Site and Storage Area.....	3-9
3.1.1.22	IR Site 67 – Engineer’s TNT Burn Site .....	3-9
3.1.1.23	IR Site 95 (OU 22) – Dipping Vat Sites.....	3-9
3.1.2	<b>MRP Sites .....</b>	<b>3-10</b>
3.1.2.1	MRP Site UXO-01 – Former Live Hand Grenade Range .....	3-10
3.1.2.2	MRP Site UXO-02 – Unnamed Explosive Range.....	3-10
3.1.2.3	MRP Site UXO-03 – Practice Hand Grenade Course .....	3-11
3.1.2.4	MRP Site UXO-04 – Knox Trailer Park .....	3-11
3.1.2.5	MRP Site UXO-05 – Miniature Anti-Tank Range and Former B-3 Gas Chamber .....	3-12
3.1.2.6	MRP Site UXO-06 – Fortified Beach Assault Area.....	3-12
3.1.2.7	MRP Site UXO-07 – Practice Hand Grenade Course .....	3-13
3.1.2.8	MRP Site UXO-08 – Bazooka Range and Gas Chambers .....	3-13
3.1.2.9	MRP Site UXO-09 – Triangulation Range .....	3-14
3.1.2.10	MRP Site UXO-10 – Flame Tank and Flame Thrower Range.....	3-14
3.1.2.11	MRP Site UXO-11 – Practice Hand Grenade Course .....	3-14
3.1.2.12	MRP Site UXO-12 – New River 1,000-Inch Range .....	3-14
3.1.2.13	MRP Site UXO-14 – Indoor Pistol Range and Gas Chamber .....	3-15
3.2	<b>REMEDIAL INVESTIGATION/FEASIBILITY STUDY SITES.....</b>	<b>3-15</b>
3.2.1	<i>IR Site 35 (OU 10) – Camp Geiger Area Fuel Farm.....</i>	<i>3-15</i>
3.2.2	<i>IR Site 69 (OU 14) – Rifle Range Chemical Dump.....</i>	<i>3-18</i>
3.2.3	<i>IR Site 73 (OU 21) – Courthouse Bay .....</i>	<i>3-19</i>
3.2.4	<i>IR Site 86 (OU 20) – Tank Area AS419-AS421 at MCAS.....</i>	<i>3-21</i>
3.2.5	<i>IR Site 88 (OU 15) – Base Dry Cleaners.....</i>	<i>3-23</i>
3.2.6	<i>IR Site 89 (OU 16) – Former DRMO.....</i>	<i>3-25</i>
3.3	<b>PROPOSED REMEDIAL ACTION PLAN AND RECORD OF DECISION SITES.....</b>	<b>3-27</b>
3.3.1	<i>IR Site 84 (OU 19) – Building 45.....</i>	<i>3-27</i>
3.4	<b>REMEDIAL DESIGN AND REMEDIAL ACTION SITES .....</b>	<b>3-29</b>
3.5	<b>REMEDY-IN-PLACE AND RESPONSE COMPLETE SITES .....</b>	<b>3-29</b>
3.5.1	<b>IR Sites.....</b>	<b>3-29</b>
3.5.1.1	PA Site – Hadnot Point Industrial Area (Buildings 1120, 1409, and 1512).....	3-29
3.5.1.2	IR Site 1 (OU 7) – French Creek Liquids Disposal Area.....	3-30
3.5.1.3	IR Site 2 (OU 5) – Former Nursery/Day Care Center.....	3-31
3.5.1.4	IR Site 3 (OU 12) – Old Creosote Plant.....	3-32
3.5.1.5	IR Site 6 (OU 2) – Lots 201 and 203 .....	3-34
3.5.1.6	IR Site 7 (OU 11) – Tarawa Terrace Dump .....	3-35
3.5.1.7	IR Site 9 (OU 2) – Fire Fighting Training Pit at Piney Green Road .....	3-36
3.5.1.8	IR Site 10 (Pre-RI) - Original Base Dump.....	3-37
3.5.1.9	IR Site 12 (Pre-RI) - Explosive Ordnance Disposal Detonation Area.....	3-37
3.5.1.10	IR Site 16 (OU 8) – Former Montford Point Burn Dump .....	3-38
3.5.1.11	IR Site 21 (OU 1) – Transformer Storage Lot 140.....	3-39
3.5.1.12	IR Site 24 (OU 1) – Industrial Area Fly Ash Dump.....	3-40
3.5.1.13	IR Site 28 (OU 7) – Hadnot Point Burn Dump .....	3-41
3.5.1.14	IR Site 30 (OU 7) – Sneads Ferry Road Fuel Tank Sludge Area .....	3-42
3.5.1.15	IR Site 36 (OU 6) – Camp Geiger Dump Area Near Sewage Treatment Plant.....	3-43
3.5.1.16	IR Site 41 (OU 4) – Camp Geiger Dump near Former Trailer Park.....	3-45
3.5.1.17	IR Site 43 (OU 6) – Agan Street Dump .....	3-46
3.5.1.18	IR Site 44 (OU 6) – Jones Street Dump.....	3-47
3.5.1.19	IR Site 48 (OU 3) – MCAS Mercury Dump .....	3-48
3.5.1.20	IR Site 54 (OU 6) – Crash Crew Fire Training Burn Pit.....	3-49
3.5.1.21	IR Site 63 (OU 13) – Verona Loop Dump .....	3-51
3.5.1.22	IR Site 65 (OU 9) – Engineer Area Dump .....	3-52
3.5.1.23	IR Site 68 (Pre-RI) - Rifle Range Dump.....	3-53
3.5.1.24	IR Site 74 (OU 4) – Mess Hall Grease Dump Area .....	3-53
3.5.1.25	IR Site 75 (Pre-RI) - MCAS Basketball Court Site.....	3-54

3.5.1.26	IR Site 76 (Pre-RI) - MCAS Curtis Road Site .....	3-55
3.5.1.27	IR Site 78 (OU 1) – Hadnot Point Industrial Area .....	3-56
3.5.1.28	IR Site 80 (OU 11) – Paradise Point Golf Course Maintenance Area.....	3-58
3.5.1.29	IR Site 82 (OU 2) – Piney Green VOC Area .....	3-59
3.5.1.30	IR Site 85 (Pre-RI) - Camp Johnson Battery Dump.....	3-61
3.5.1.31	IR Site 87 (Pre-RI) - MCAS Officers’ Housing Area .....	3-61
3.5.1.32	IR Site 90 (OU 17) – Building BB-9.....	3-62
3.5.1.33	IR Site 91 (OU 17) – Building BB-51.....	3-62
3.5.1.34	IR Site 92 (OU 17) – Building BB-46.....	3-63
3.5.1.35	IR Site 93 (OU 16) – Building TC-942.....	3-64
3.5.1.36	IR Site 94 (OU 18) – PCX Service Station .....	3-65
3.5.2	<i>MRP Sites</i> .....	3-66
3.5.2.1	MRP Site UXO-13 – Naval Regional Medical Center.....	3-66
<b>4.</b>	<b>REFERENCES.....</b>	<b>4-1</b>

**TABLES**

- 3-1 Summary of Sites by Operable Unit
- 3-2 Summary of Environmental Studies, Investigations, and Actions Completed to Date
- 3-3 Installation Restoration Program Sites and Status for FY 2008, FY 2009, and FY 2010
- 3-4 Summary of the Long-Term Monitoring Program
- 3-5 Summary of Land Use Controls
- 3-6 Schedule for IR Site 2 (OU 5), FY 2008
- 3-7 Schedule for IR Site 3 (OU 12), FY 2008
- 3-8 Schedule for IR Site 6 (OU 2), FY 2008
- 3-9 Schedule for IR Site 35 (OU 10), FY 2008
- 3-10 Schedule for IR Site 36 (OU 6), FY 2008
- 3-11 Schedule for IR Site 69 (OU 14), FY 2008
- 3-12 Schedule for IR Site 73 (OU 21), FY 2008
- 3-13 Schedule for IR Site 78 (OU 1), FY 2008
- 3-14 Schedule for IR Site 82 (OU 2), FY 2008
- 3-15 Schedule for IR Site 84 (OU 19), FY 2008
- 3-16 Schedule for IR Site 86 (OU 20), FY 2008
- 3-17 Schedule for IR Site 88 (OU 15), FY 2008
- 3-18 Schedule for IR Site 89 (OU 16), FY 2008
- 3-19 Schedule for IR Site 93 (OU 16), FY 2008
- 3-20 Schedule for IR Site 95 (OU 22), FY 2008
- 3-21 Schedule for MRP Site UXO-01, FY 2008
- 3-22 Schedule for MRP Site UXO-03, FY 2008
- 3-23 Schedule for MRP Site UXO-04, FY 2008
- 3-24 Schedule for MRP Site UXO-05, FY 2008
- 3-25 Schedule for MRP Site UXO-06, FY 2008
- 3-26 Schedule for MRP Site UXO-08, FY 2008
- 3-27 Schedule for MRP Site UXO-09, FY 2008

**FIGURES**

- 2-1 Base Location Map
- 3-1 Installation Restoration Sites
- 3-2 IR Sites Requiring Re-Evaluation
- 3-3 Munitions Response Program Sites
- 3-4 PA Site - MCAS New River Buildings SAS113, AS116, and AS119
- 3-5 PA Site - Montford Point Buildings M119 and M315
- 3-6 PA Site - Hadnot Point Industrial Area Buildings 1120, 1409, and 1512
- 3-7 IR Site 4
- 3-8 IR Site 10 (Pre-RI)
- 3-9 IR Site 12 (Pre-RI)
- 3-10 IR Site 13
- 3-11 IR Site 18
- 3-12 IR Site 19
- 3-13 IR Site 20
- 3-14 IR Site 23
- 3-15 IR Site 25
- 3-16 IR Site 37
- 3-17 IR Site 38
- 3-18 IR Site 40
- 3-19 IR Site 42
- 3-20 IR Site 46
- 3-21 IR Site 49
- 3-22 IR Site 51
- 3-23 IR Site 53
- 3-24 IR Site 55
- 3-25 IR Site 61
- 3-26 IR Site 62
- 3-27 IR Site 66
- 3-28 IR Site 67
- 3-29 IR Site 68 (Pre-RI)
- 3-30 IR Site 75 (Pre-RI)
- 3-31 IR Site 76 (Pre-RI)
- 3-32 IR Site 85 (Pre-RI)
- 3-33 IR Site 87 (Pre-RI)
- 3-34 IR Sites 21, 24, and 78 (OU1)
- 3-35 IR Sites 6, 9, & 82 (OU 2)
- 3-36 IR Site 48 (OU 3)
- 3-37 IR Sites 41 and 74 (OU 4)
- 3-38 IR Site 2 (OU 5)
- 3-39 IR Sites 36, 43, 44, and 54 (OU 6)
- 3-40 IR Sites 1, 28, and 30 (OU 7)
- 3-41 IR Site 16 (OU 8)
- 3-42 IR Site 65 (OU 9)
- 3-43 IR Site 35 (OU 10)
- 3-44 IR Sites 7 and 80 (OU 11)

- 3-45 IR Site 3 (OU 12)
- 3-46 IR Site 63 (OU 13)
- 3-47 IR Site 69 (OU 14)
- 3-48 IR Site 88 (OU 15)
- 3-49 IR Sites 89 and 93 (OU 16)
- 3-50 IR Sites 90, 91, and 92 (OU 17)
- 3-51 IR Site 94 (OU 18)
- 3-52 IR Site 84 (OU 19)
- 3-53 IR Site 86 (OU 20)
- 3-54 IR Site 73 (OU 21)
- 3-55 IR Site 95 (OU 22)
- 3-56 MRP Site UXO-01
- 3-57 MRP Site UXO-02
- 3-58 MRP Site UXO-03
- 3-59 MRP Site UXO-04
- 3-60 MRP Site UXO-05
- 3-61 MRP Site UXO-06
- 3-62 MRP Site UXO-07
- 3-63 MRP Site UXO-08
- 3-64 MRP Site UXO-09
- 3-65 MRP Site UXO-10
- 3-66 MRP Site UXO-11
- 3-67 MRP Site UXO-12
- 3-68 MRP Site UXO-13
- 3-69 MRP Site UXO-14

# Acronyms and Abbreviations

---

µg/L	micrograms per liter
AFVR	Aggressive Fluid Vapor Recovery
AM	Action Memorandum
AMTRAC	Amphibious Tractors
AOC	Area of Concern
AST	Aboveground Storage Tank
bgs	below ground surface
BOQ	Bachelor Officers Quarters
BRA	Baseline Risk Assessment
BTEX	Benzene, Toluene, Ethylbenzene, and Total Xylenes
CAIS	Chemical Agent Identification Sets
CAP	Corrective Action Plan
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	Contaminant of Concern
COPC	Contaminant of Potential Concern
CS	Chemical Smoke
CSM	Conceptual Site Model
CSS	Chemical Safety Submission
CWM	Chemical Warfare Material
DCE	Dichloroethene
DD	Decision Document
DDD	Dichlorodiphenyldichloroethane
DDE	Dichlorodiphenyldichloroethylene
DDT	Dichlorodiphenyltrichloroethane
DLA	Defense Logistics Agency
DNAPL	Dense Non-Aqueous Phase Liquid
DoD	Department of Defense
DoN	Department of the Navy
DRMO	Defense Reutilization Marketing Office
EE/CA	Engineering Evaluation/Cost Analysis
EOD	Explosive Ordnance Disposal
ERA	Ecological Risk Assessment
ERD	Enhanced Reductive Dechlorination
ERH	Electrical Resistance Heating
ERS	Ecological Risk Screening
ESD	Explanation of Significant Differences
ESI	Expanded Site Investigation
EVO	Emulsified Vegetable Oil

°F	Fahrenheit
FFA	Federal Facilities Agreement
FS	Feasibility Study
FY	Fiscal Year
HDD	Horizontal Directionally Drilled
HHRA	Human Health Risk Assessment
HHRS	Human Health Risk Screening
HPIA	Hadnot Point Industrial Area
HQMC	Headquarters Marine Corps
HRC®	Hydrogen Release Compounds®
IAS	Initial Assessment Study
IR	Installation Restoration
IRA	Interim Removal/Remedial Action
IRACR	Interim Remedial Action Completion Report
IROD	Interim Record of Decision
ISCO	In-situ Chemical Oxidation
JP	Jet Propulsion
LNAPL	Light Non-Aqueous Phase Liquid
LTM	Long-Term Monitoring
LTTD	Low Temperature Thermal Desorption
LUC	Land Use Control
LUCIP	Land Use Control Implementation Plan
MCAS	Marine Corps Air Station
MCB	Marine Corps Base
MEC	Munitions of Explosive Concern
MEK	Methyl ethyl ketone
MILCON	Military Construction
MIP	Membrane Interface Probe
MMRP	Military Munitions Response Program
MNA	Monitored Natural Attenuation
MRP	Munitions Response Program
msl	mean sea level
MTBE	Methyl Tert-Butyl Ethylene
NACIP	Navy Assessment and Control of Installation Pollutants
NAE	Natural Attenuation Evaluation
NAVFAC MIDLANT	Naval Facilities Engineering Command, Mid-Atlantic Division
NBC	Nuclear, Biological, and Chemical
NCDENR	North Carolina Department of Environment and Natural Resources
NCGWQS	North Carolina Groundwater Quality Standards
NCP	National Oil and Hazardous Substances Pollution Control Contingency Plan
NFA	No Further Action
NOAA	National Oceanic and Atmospheric Administration
NTCRA	Non-Time Critical Removal Action

NPL	National Priorities List
O&G	Oil and Grease
ORC®	Oxygen Release Compounds®
OU	Operable Unit
OWS	Oil Water Separator
PA	Preliminary Assessment
PAH	Polynuclear Aromatic Hydrocarbon
PCA	Tetrachloroethane
PCB	Polychlorinated Biphenyls
PCE	Tetrachloroethene
PCP	Pentachlorophenol
POL	Petroleum, Oil, Lubricant
ppb	parts per billion
ppm	parts per million
PPV	Public Private Venture
Pre-RI	Pre-Remedial Investigation
PRAP	Proposed Remedial Action Plan
PRB	Permeable Reactive Barrier
PSI	Preliminary Site Investigation
RA	Remedial Action
RAB	Restoration Advisory Board
RABITT	Reductive Anaerobic Bioremediation In-Situ Treatment Technology
RAC	Remedial Action Contractor
RAO	Remedial Action Objective
RACR	Remedial Action Closeout Report
RBC	Risk-Based Concentration
RC	Response Complete
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
RI	Remedial Investigation
RIP	Remedy-in-Place
ROD	Record of Decision
SARA	Superfund Amendments and Reauthorization Act
SEAR	Surfactant Enhanced Aquifer Remediation
SGI	Supplemental Groundwater Investigation
SI	Site Investigation/Site Inspection
SMP	Site Management Plan
STP	Sewage Treatment Plant
SVE	Soil Vapor Extraction
SWMU	Solid Waste Management Unit
SVOC	Semivolatile Organic Compound
TCE	Trichloroethene
TCRA	Time-Critical Removal Action

TEU	Technical Escort Unit
TNT	Trinitrotoluene
TPH	Total Petroleum Hydrocarbon
USEPA	United States Environmental Protection Agency
UST	Underground Storage Tank
UXO	Unexploded Ordnance
VOC	Volatile Organic Compound
WAR	Water and Air Research
WWII	World War II
ZVI	Zero Valent Iron

# 1. Introduction

---

This document presents the Draft Fiscal Year (FY) 2008 Site Management Plan (SMP) for Marine Corps Base (MCB) Camp Lejeune, North Carolina. This SMP presents planned activities to be conducted at MCB Camp Lejeune during FY 2008 and provides projections for long-term progress in accordance with the Department of the Navy (DoN) Installation Restoration (IR) Program. This document has been prepared by CH2M HILL, Inc. for the Naval Facilities Engineering Command Mid-Atlantic Division (NAVFAC MIDLANT) and the MCB Camp Lejeune IR Program. This document is submitted to representatives of the North Carolina Department of Environment and Natural Resources (NCDENR), the U.S. Environmental Protection Agency (USEPA) Region 4, and members of the Camp Lejeune IR Restoration Advisory Board (RAB).

## 1.1 SMP Purpose

The FY 2008 SMP is a forward-looking management tool and one of the primary documents identified in the Federal Facilities Agreement (FFA) (MCB Camp Lejeune, 1991). The SMP includes proposed deadlines for completion of deliverables, as specified in the FFA, to be submitted during FY 2008. The SMP is a working document that is updated yearly to maintain current documentation and summaries of environmental actions at MCB Camp Lejeune. This SMP updates and supersedes the FY 2007 SMP (CH2M HILL, 2007).

In addition to the SMP, the second update to the Camp Lejeune Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) 5-Year Review Plan, that provides the schedule for 5-year reviews at MCB Camp Lejeune, was completed in FY 2004 (initial version FY 1999). The third update to the Community Involvement Plan, that provides information on community participation, was completed in FY 2006 (initial versions in FY 1990 and FY 1994).

## 1.2 SMP Report Organization

The FY 2008 SMP for MCB Camp Lejeune consists of four sections, organized as follows:

- Section 1 - SMP purpose and report organization
- Section 2 - Description and environmental history of MCB Camp Lejeune
- Section 3 - Descriptions of IR sites, munitions response program (MRP) sites, and sites requiring re-evaluation; schedule for conducting activities; and specific target submittal dates for FY 2008, FY 2009, and FY 2010 documents
- Section 4 - References

## 2. MCB Camp Lejeune Description and Environmental History

---

### 2.1 Base Description

MCB Camp Lejeune was commissioned in 1942 as a training area to prepare Marines for combat. The MCB Camp Lejeune complex consists of six geographical locations under the jurisdiction of the Base command. These areas include Camp Geiger, Montford Point, Courthouse Bay, Mainside, the Greater Sandy Run Area, and the Rifle Range Area. MCB Camp Lejeune is host to five Marine Corps commands and two Navy commands. All of the real estate and infrastructure are owned, operated, and maintained by the host command. MCB Camp Lejeune also provides support and training for the following tenant commands: Headquarters Nucleus, Second Marine Expeditionary Force; Second Marine Division; Second Marine Force Service Support Group; Second Marine Surveillance, Reconnaissance, and Intelligence Group; Sixth Marine Expeditionary Brigade; the Naval Hospital; and the Naval Dental Clinic.

MCB Camp Lejeune is located on 236 square miles of land in Onslow County, North Carolina, adjacent to the southern side of the City of Jacksonville (**Figure 2-1**). Jacksonville is the largest city near MCB Camp Lejeune and contains approximately half of the county's total population. Since 1990, much of the MCB Camp Lejeune complex has been part of Jacksonville. The Base is bisected by the New River, which flows into the Atlantic Ocean in a southeasterly direction. The Base is bordered by the Atlantic Ocean to the east, U.S. Route 17 to the west, and State Route 24 to the north.

### 2.2 Facility-wide Demography and Land Use

MCB Camp Lejeune is home to an active duty, dependent, retiree, and civilian population of approximately 150,000. Approximately 47,000 military personnel are stationed at MCB Camp Lejeune, including 39,000 Marines for resident formal school training, and 8,000 Marines and Department of Defense (DoD) employees for job enhancement training. MCB Camp Lejeune provides housing, training facilities, logistical support, and administrative supplies for Fleet Marine Force units and other assigned units.

Training facilities at the Base include Camp Geiger, Camp Johnson, Stone Bay, Greater Sandy Run Training Area, and Marine Corps Air Station (MCAS) New River. Military training operations also include 78 live-fire ranges, 98 maneuver areas, 34 gun positions, 50 tactical landing zones, and a military operation in an urban terrain training facility. In addition, the 11 miles of beach frontage at the Base is capable of supporting amphibious operations.

Located within Onslow County, along the coastal plain of North Carolina, the Base covers more than 153,000 acres that consist of approximately 26,000 acres of water and 127,000 acres of terrestrial features. Elevation at the Base ranges from sea level to 70 feet above mean sea level (msl), with much of the site topography traversed by swales, wetlands, streams, and creeks that

drain into the New River. The Base encompasses a 92-mile perimeter, including approximately 14 miles along the Atlantic Ocean. The ocean frontage of the Base is composed of a fragile barrier island system that is separated from the mainland by salt marshes, small bays, and an intercoastal waterway.

The City of Jacksonville, North Carolina is located immediately northwest of MCB Camp Lejeune. Most of the land surrounding the facility is used for agriculture. Estuaries along the coast support commercial fishing and residential resort areas are located adjacent to the Base along the Atlantic Ocean.

## 2.3 Regional and Facility-Wide Physiography, Climate, and Surface Water Hydrology

MCB Camp Lejeune lies within the outer part of the Atlantic Coastal Plain Physiographic Province in North Carolina. This physiographic province stretches from Georgia to Long Island, New York. The physiography of the area is typical of the Atlantic Coastal Plain, with stepped terraces consisting of wide, gently eastward-sloping plains separated by linear, steeper, northward and eastward-facing scarps. Low elevations and relatively low relief characterize topography across MCB Camp Lejeune. The surface elevations range from sea level to approximately 70 feet above msl, with most of MCB Camp Lejeune's elevation ranging from 20 to 40 feet above msl.

Mild winters and hot, humid summers generally characterize climatic conditions within southeastern North Carolina and at MCB Camp Lejeune. Winters are usually short and mild with occasional short, cold periods. Summers are long, hot, and humid, with an average humidity of 75 percent. Average annual net precipitation is approximately 54 inches. Ambient air temperatures generally range from 37 to 60 degrees Fahrenheit (°F) in the winter months and 71°F to 88°F during the summer months. Winds are generally south-southwesterly in the summer, and north-northwesterly in the winter (National Oceanic and Atmospheric Administration [NOAA], 2002).

The land at MCB Camp Lejeune generally slopes toward the New River with a grade of about 0.5 percent. The relief between stream and interstream areas typically ranges from 20 to 30 feet.

## 2.4 Geology and Hydrogeology

### 2.4.1 General Regional Geologic and Hydrogeologic Framework

Southeastern North Carolina and MCB Camp Lejeune are within the Tidewater region of the Atlantic Coastal Plain Physiographic Province. The Tidewater region is of low relief, with elevations averaging about 20 feet above msl and is generally swampy. The MCB Camp Lejeune area is underlain by an eastward-thickening wedge of marine and non-marine sediments ranging in age from early Cretaceous to Holocene. The eastward-thickening wedge of sediment begins at the fall line (western boundary of Atlantic Coastal Plain physiographic province) and dips southeastward towards the coast. Along the coastline, several thousand feet of interlayered, unconsolidated sediment is present, consisting of gravel, sand, silt, clay deposits, calcareous clays, shell beds, sandstone, and limestone, that was deposited over pre-Cretaceous

crystalline basement rock. Minor amounts of detrital carbonate shells and secondary minerals, such as glauconite, siderite, and chlorite, often distinguish these sedimentary units.

Historical Coastal Plain sedimentation and deposition was controlled by fluctuations in sea level on a subsiding continental margin in marine and near-shore environments (Winner and Coble, 1989). Confining units associated with specific aquifers within the Coastal Plain region are composed of less permeable beds of clay and silt. Within the MCB Camp Lejeune area, approximately 1,500 feet of a sedimentary sequence that overlies the basement rock is composed of seven aquifers (the Surficial, Castle Hayne, Beaufort, Peedee, Black Creek, and Upper and Lower Cape Fear aquifers) and their associated confining units (Cardinell, et al., 1993).

Recharge of aquifers within the Coastal Plain region generally occurs within interstream areas. Annual recharge to the aquifers has been estimated in the range of 5 to 21 inches of rainfall (Heath, 1989). Natural discharge of groundwater from the Coastal Plain aquifer system is generally into streams, swamps, and lakes. Evapotranspiration from the soil zone and upward leakage through confining units into streams, estuaries, swamps, and even the ocean also contribute to groundwater discharge. The New River estuary serves as the principal discharge area for groundwater from the Castle Hayne aquifer within the vicinity of MCB Camp Lejeune (Harned, et al., 1989).

## 2.4.2 Regional Water Usage

Potable water to MCB Camp Lejeune and the surrounding residential area is provided by water supply wells that pump groundwater from the Castle Hayne aquifer. Although fresh water is present within the Surficial, Castle Hayne, Beaufort, and Peedee aquifers, all of which are located below MCB Camp Lejeune, only the Castle Hayne aquifer is used by the Base as a water supply source (Cardinell, et al., 1993). Regionally in southeastern North Carolina, the Castle Hayne aquifer may be used as a potable source of domestic water supply and for watering lawns or filling swimming pools.

Based on the information provided in the Wellhead Protection Plan (AH Environmental Consultants, 2002), there are 67 active water supply wells on Base, which rely entirely on groundwater as the supply source. The supply wells are included in the Base's annual wellhead monitoring program to ensure compliance with drinking water standards.

## 2.5 Environmental History

### 2.5.1 IR Program History

MCB Camp Lejeune has been actively engaged in environmental investigations and remediation programs since 1983, beginning with the Navy Assessment and Control of Installation Pollutants (NACIP) Program. An Initial Assessment Study (IAS) was the first investigation of potentially hazardous sites at the Base conducted under NACIP. The IAS, which was conducted in 1983 (Water and Air Research [WAR], 1983) identified areas of concern (AOCs) that might cause threats to human health and the environment as a result of past storage, handling, and disposal of hazardous materials. Based on a review of historical records, field inspections, and personal interviews, 76 AOCs were identified. The IAS conclusions stated

that while none of the posed an immediate threat to human health or the environment, further investigations to assess the potential long-term impacts were warranted at 23 of these sites.

The DoN's IR Program was initiated in 1986 following enactment of the Superfund Amendments and Reauthorization Act (SARA) legislation. The IR Program, which was implemented to follow the requirements of SARA, replaced the NACIP. MCB Camp Lejeune was placed on the CERCLA National Priorities List (NPL) on October 4, 1989 (54 *Federal Register* 41015, October 4, 1989). Following that listing, a FFA between USEPA Region 4, North Carolina Department of Environment, Health, and Natural Resources (now NCDENR), and the DoN was signed in February 1991. The FFA was created under CERCLA Section 120 and was prepared to fulfill the following objectives:

- To ensure that potential 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 public health, welfare, and the environment.
- To establish a procedural framework and a schedule for developing, implementing, and monitoring appropriate response actions at MCB Camp Lejeune in accordance with CERCLA, the National Oil and Hazardous Substances Pollution Control Contingency Plan (NCP), and relevant USEPA remediation policy.
- To encourage public participation and to facilitate cooperation and exchange of information among parties associated with the investigation and remediation process.

The original FFA pertained to 23 of the initial sites identified at MCB Camp Lejeune. The 23 sites have been investigated in accordance with the NCP, CERCLA, and SARA, under the terms and conditions of the FFA. Based upon the conclusions and recommendations identified by subsequent site inspections, 23 newly identified sites throughout MCB Camp Lejeune have been added to the original list of 23, bringing the total to 46 IR sites. At present, there are no specific requirements to amend the FFA. If, however, amendments to the FFA are necessary, a summary of the changes will be outlined in this section of the SMP.

As part of the requirements established under CERCLA, an administrative record file has been established for the IR Program at MCB Camp Lejeune. The administrative record is a compilation of all documents that the DoN used to select a remedial action or removal action for a site. Regardless of the nature of the site, an administrative record must be maintained. The administrative record will also serve as the basis for any future legal review of decisions made by the DoN concerning remedial action taken at a site. A copy of the MCB Camp Lejeune administrative record file is available for review at NAVFAC Mid-Atlantic in Norfolk, Virginia. The files can also be viewed online at: <http://lejeune.lantops-ir.org/>. Access to the website is available at the Onslow County Library.

## 2.5.2 MRP History

The DoD has established the Military Munitions Response Program (MMRP), shortened to the Munitions Response Program (MRP) by the DoN. The MRP was established under the Defense Environmental Restoration Program to address munitions and explosives of concern and munitions constituents at other than operational ranges. The DoD and the Navy are establishing policy and guidance for munitions and response actions under the MRP; however, the key

program drivers developed to date conclude that munitions response action will be conducted under the process outlined in the NCP, as authorized by CERCLA.

## 2.6 CERCLA Process

The objectives of the CERCLA process are to evaluate the nature and extent of contamination at a site, and to identify, develop, and implement appropriate remedial actions to protect human health and the environment. The major elements of the CERCLA process are:

- Preliminary Assessment/Site Investigation or Site Inspection (PA/SI)
- Remedial Investigation/Feasibility Study (RI/FS)
- Proposed Remedial Action Plan (PRAP) and Record of Decision (ROD)
- Remedial Design (RD) and Remedial Action (RA)
- Remedy-In-Place (RIP) and Response Complete (RC)

These elements are discussed in further detail in the subsections below. The documents prepared for the IR program are maintained in information repositories for public review. MCB Camp Lejeune has developed a Community Involvement Plan and established a RAB comprised of members of the community, local environment group members, and state and federal officials, who meet quarterly to maintain community involvement on IR issues at the Base.

### 2.6.1 Preliminary Assessment/Site Investigation

The PA/SI phase of the CERCLA process evaluates potential sites to determine if the site should be eliminated from further consideration (i.e., no further action [NFA]), identified for a removal action to address actual or imminent threats to human health or the environment, or further evaluated through the performance of a RI/FS.

#### 2.6.1.1 Preliminary Assessment

Environmental samples are rarely collected during a PA; rather, a PA is intended to be a relatively quick, low-cost compilation of existing information about a site. The PA may result in a determination of NFA; completion of an SI if there is insufficient information to reach a NFA decision; a removal action if significant threat to human health or the environment exists; or an RI/FS if remediation is deemed necessary.

#### 2.6.1.2 Site Investigation

The SI is the most common step after a PA is completed. The SI involves an on-site investigation intended to gather more information needed in determining whether there is a release or potential release, and to characterize the nature of the release and associated threats or potential threats to human health and the environment. SIs typically include the collection of environmental and waste samples to identify what hazardous substances are present at a site and to determine if these substances have been released to the environment. Additionally, a screening risk assessment is completed as part of the SI.

The investigations and data evaluation conducted during the PA and SI may determine that a site does not pose an unacceptable risk to human health and the environment. These sites do not require further investigation or response and are designated as NFA sites, and achieve Site

Closeout at this stage of the process. Technical reports prepared for the PA/SI should provide sufficient information to support the NFA conclusion for these sites.

## **2.6.2 Remedial Investigation/Feasibility Study**

The purpose of the RI/FS is to determine the nature and extent of the threat presented by a release of a hazardous substance and, if sufficient need is documented by site sampling and a risk assessment, to evaluate proposed remedies. The RI and FS can be conducted concurrently; data collected in the RI influences the development of remedial alternatives in the FS, which in turn affect the data needs and scope of treatability studies and additional field investigations. This phased approach encourages the continual scoping of the site characterization, thereby minimizing the collection of unnecessary data and maximizing data quality.

### **2.6.2.1 Remedial Investigation**

The RI is the investigative phase of the response action designed to characterize site conditions, determine the nature and extent of contamination, assess the risk to human health and the environment posed by site contamination; and provide a basis for decisions on further response actions or NFA. The RI provides information to refine the conceptual site model (CSM) and forms the basis for the development of RA objectives and remedial strategies that will comprise the FS.

### **2.6.2.2 Feasibility Study**

The FS is the mechanism for the development, screening, and detailed evaluation of alternative remedial actions. The overall objectives of an FS are to develop and evaluate potential remedies that permanently and significantly reduce the threat to public health, welfare, and the environment; select a cost-effective remedial action alternative that mitigates the threat(s); and achieve consensus regarding the selected response action.

### **2.6.2.3 Removal Action**

A removal action is a response implemented in an expedited manner to address releases or threatened releases in order to mitigate the spread of contamination. Removal actions may be implemented at any time during the CERCLA process. Removal actions include Time-Critical Removal Actions (TCRAs) and non-time-critical removal actions (NTCRAs).

Actions taken immediately to mitigate an imminent threat to human health or the environment, such as the removal of corroded or leaking drums, are classified as TCRAs. The planning period for a TCRA is six months or less before field work is initiated. An Engineering Evaluation/Cost Assessment (EE/CA) is not required for a TCRA, although an appropriate work plan must be completed.

Removal actions that may be delayed for six months or more without significant additional harm to human health or the environment are classified as NTCRAs. For a NTCRA, an EE/CA is prepared rather than the more extensive FS. An EE/CA focuses only on the substances to be removed rather than on all contaminated substances at the site. A removal action can become the final remedial action if the risk assessment results indicate that no further action is required to protect human health and the environment.

A removal action can be either the final remedy or an interim action followed by a remedial action as the final remedy, based on the extent to which the threats are mitigated by the action. A removal action, when implemented as the final remedy, can be used for fast and significant reductions in risk and to mitigate long-term threats. In cases where the removal action is the final remedy, the removal action may lead to either Response Complete (RC) or Site Closeout (SC). If the removal action was accomplished during the RI/FS phase, any final determination of RC and/or SC must be documented in the ROD. If the NCP nine criteria were not addressed as part of the EE/CA or Action Memorandum (AM), a focused FS would be needed, followed by a ROD.

#### 2.6.2.4 Treatability Study

Treatability studies involve testing and evaluation of a treatment technology to determine the effectiveness of that technology at a particular site or to establish site-specific design parameters. The primary objectives of treatability testing are to provide sufficient data to allow treatment alternatives to be fully developed and evaluated during the FS, and to support the remedial design of a selected alternative. Treatability studies may be conducted at any time during the CERCLA process.

The need for a treatability study generally is identified during the FS. Treatability studies may be classified as either bench-scale (laboratory study) or pilot-scale (field studies). For technologies that are well-developed and tested, bench-scale studies are often sufficient to evaluate performance. For innovative technologies, pilot tests may be required to obtain the desired information. Pilot tests simulate the physical and chemical parameters of the full-scale process, and are designed to bridge the gap between bench-scale and full-scale operations.

Treatability studies may also be needed during the RD/RA phase to obtain more detailed information about the unit operations, performance, and cost for designing a full-scale treatment system. Generally, a pilot-scale system is deployed on-site to collect the required information.

### 2.6.3 Proposed Remedial Action Plan and Record of Decision

The remedy selection process involves identifying a preferred response action strategy from those alternatives evaluated in the FS. Remedial alternatives may include NFA, land use controls (LUCs), containment, in situ treatment/mass removal, and ex situ treatment/mass removal. The preferred alternative is based first on each alternative's ability to satisfy the threshold criteria, and then on trade-offs among alternatives considering the primary balancing criteria. Further, results of the risk assessment need to be factored into the selection of the remedy. The remedy selection process includes a PRAP and ROD.

#### 2.6.3.1 Proposed Remedial Action Plan

A PRAP presents the remedial alternatives developed in the FS and recommends a preferred remedial method. The public has an opportunity to comment on the PRAP during an announced formal public comment period. Site information is compiled in an administrative record and placed in the general IR program information repositories established at local libraries for public review. The public comments are reviewed and the responses are recorded in a document called a Responsiveness Summary.

### 2.6.3.2 Record of Decision

At the end of the public comment period, an appropriate remedial alternative is chosen to protect human health and the environment. The ROD document is then issued, which describes the remedy selection process and the remedy selected. Public comments received during the public comment period for the PRAP are considered as part of the Responsiveness Summary in the ROD. Once the ROD has been signed, the RD/RA process is initiated.

## 2.6.4 Remedial Design and Remedial Action

Following signature of the ROD, the RD and RA phases are implemented. The technical specifications for cleanup remedies and technologies are designed in the RD phase. The RA is the actual construction or implementation phase of the cleanup process.

### 2.6.4.1 Remedial Design

The purpose of the RD phase is to convert the conceptual design for the selected remedy from the FS into a full-scale detailed design for implementation. RD includes preparation of technical RD work plans, drawings, specifications, and RA Work Plans.

### 2.6.4.2 Remedial Action

Upon completion of the RD, implementation of the RA (the remedy selected in the ROD) begins. The

RA start date is defined as the date the contractor has mobilized and begun substantial and continuous physical on-site remedial action. The start date is important because it triggers the beginning of the Five-Year Review cycle if one is required. The RA phase involves two main components, remedial action construction and remedial action operation.

Interim RAs are implemented to provide temporary mitigation of human health risks or to mitigate the spread of contamination in the environment. Similar to removal actions, RAs may be implemented at any time during the process. Examples of interim RAs include installing a pump-and-treat system for product recovery from groundwater or installing a fence to prevent direct contact with hazardous materials. For interim RAs, a focused FS is prepared rather than the more-extensive FS. As with the removal action, an interim action may become the final RA if the results of the risk assessment indicate that no further action is required to protect human health and the environment.

## 2.6.5 Remedy-in-Place and Response Complete

### 2.6.5.1 Remedy-in-Place

For long-term remedies where it is anticipated that RAOs will be achieved over a long period, the RIP milestone signifies the completion of the RA construction phase, and that the remedy has been implemented and has been demonstrated to be functioning as designed (i.e., all testing has been accomplished and the remedy will function properly). Once RIP is completed for a site, an Interim Remedial Action Completion Report (IRACR) is prepared to document that the remedy is constructed and operating successfully.

### 2.6.5.2 Response Complete

The RC milestone signifies completion of the RA operation phase, and that cleanup goals have been met as specified in a ROD. Once RC is completed for a site, a RA Completion Report (RACR) is prepared to demonstrate that the remedy is complete and the RAOs are met. RC is followed by individual site closeout.

Once all RIPs and RCs have been documented for every site at the facility and the terms of the FFA have been met, site closeout and NPL deletion is requested.

### 2.6.5.3 Five-Year Reviews

Five-year reviews generally are required by CERCLA or program policy when hazardous substances remain on a site above levels that permit unlimited use and unrestricted exposure. Five-year reviews provide an opportunity to evaluate the implementation and performance of a remedy and whether it still protects human health and the environment. Generally, reviews are performed five years after the initiation of a CERCLA response action, and are repeated every five years as long as future uses remain restricted. USEPA or the lead agency for a site can perform these reviews, but USEPA is responsible for assessing the protectiveness of the remedy.

## 3. Site Descriptions

---

There are currently 66 sites in the IR Program and 14 sites in the MRP at MCB Camp Lejeune. The IR Program includes 23 sites identified in the original FFA, 23 sites that were identified at a later date, and 20 sites which have been added to this SMP for re-evaluation in FY 2008. The 46 IR sites that have been previously investigated are shown on **Figure 3-1**, the 20 additional IR sites to be re-evaluated are shown on **Figure 3-2**, and the MRP sites are shown on **Figure 3-3**. The extent of each IR site and MRP site are shown on **Figures 3-4** through **3-69**.

The majority of the IR sites are grouped into Operable Units (OUs) based on geographic location of sites or specific site problems, as shown in **Table 3-1**. For figures illustrated in this SMP for which OU boundaries were developed prior to investigation completion, the site boundaries were developed based on suspected contamination and the LUC boundaries were set based on final investigative data. **Table 3-2** summarizes the previous investigations completed at each site. **Table 3-3** lists the current status of each site, and provides a list of primary documents and anticipated submittal dates for FY 2008, FY 2009, and FY 2010.

The following subsections provide a brief site description and history, summary of previous investigations, and planned CERCLA activities for FY 2008. The subsections are organized according to the site's current phase in the CERCLA process. Site-specific schedules are provided for active sites in **Tables 3-6** through **3-27**. These schedules are adjusted annually within the SMP or periodically throughout the FY.

For ease of reference to tables and figures, **Tables 3-6** through **3-27** and **Figures 3-4** through **3-69** have been organized numerically by site or OU, as appropriate, and not according to the order they are discussed in the text.

### 3.1 Preliminary Assessment/Site Investigation Sites

The following sections discuss the site history for the 23 IR sites and 14 MRP sites which are in the PA/SI phase of the CERCLA process. PA/SI reports have been completed for three of these IR sites and future investigations are planned. PA/SIs will be implemented in the future at the remaining 34 sites.

#### 3.1.1 IR Sites

##### 3.1.1.1 MCAS New River (Buildings SAS113, AS116, and AS119)

The MCAS New River PA site includes Buildings SAS113, AS116, and AS119, located in the northwest portion of the Base (**Figure 3-4**).

Building SAS113 was constructed in 1986 when surrounding buildings were converted into automotive hobby shops. Currently, Building SAS113 primarily serves as an outside work and storage area for the automobile hobby shops. The chemicals used or stored in Building SAS113 are unknown; however, it is suspected that any number of automobile repair wastes are used or stored here and may include paints, paint thinners, waste oil, antifreeze, parts cleaning wastes

(solvents and parts washers), automotive batteries, and shop cleaning wastes (floor cleaning wastes, absorbents used for spills or leaks and shop rags). The waste disposal practices are also unknown.

Building AS116 was constructed in 1954 to provide the Air Station with vehicle maintenance facilities. From 1979 to 1981, Building AS116 served as a hazardous and flammables storage area; and in the early 1980s, Building AS116 was converted into an automotive hobby shop. The chemicals used or stored in Building AS116 are unknown; however, it is suspected that any number of automobile repair wastes are used or stored here and may include waste oil, antifreeze, parts cleaning wastes (solvents and parts washers), automotive batteries, and shop cleaning wastes (floor cleaning wastes, absorbents used for spills or leaks and shop rags). Building AS116 is also listed as a paint shop and may include the following wastes associated with painting: paint thinners (mineral spirits, toluene, methyl ethyl ketone [MEK] or acetone) and waste paint.

Building AS119 was constructed in 1963 as an Automotive Vehicle Maintenance Facility, and in 1988, a fuel oil storage tank with a capacity of 250 gallons was installed on a concrete pad. The chemicals used or stored in Building AS119 are unknown; however, it is suspected that any number of automobile repair wastes are used or stored in this building and may include paint, paint thinners, waste oil, antifreeze, parts cleaning wastes (solvents and parts washers), automotive batteries, and shop cleaning wastes (floor cleaning wastes, absorbents used for spills or leaks and shop rags).

#### PA/SI (2001-2006)

A PA was conducted for Buildings SAS113, AS116, and AS119 in 2001, which included a literature review and field reconnaissance. A qualitative evaluation of the potential impact of the sites on human health and the environment was also performed. Because information was not known about the possible types and or extent of contamination at these sites, field investigation activities were recommended. As a result, an SI was completed in June 2004. Field activities included soil and groundwater investigations. Based on the analytical results, the Final PA/SI report (issued in February 2006) recommended further investigation of groundwater at Buildings SAS113, AS116, and AS119 due to the presence of metals and recommended further investigation of soils at Building AS119 due to the presence of semivolatile organic compounds (SVOCs), pesticides, and metals.

#### Future Activities

Based on the findings of the PA/SI, future investigations are planned for Buildings SAS113, AS116, and AS119.

#### 3.1.1.2 Montford Point (Buildings M119 and M315)

The Montford Point PA site includes Buildings M119 and M315, located in the Montford Point portion of the Base (**Figure 3-5**). Building M119 was constructed in 1943 as a Gun Shed; most likely storing Howitzers. Over the years the building has been renovated, and has been used as a classroom and vehicle repair shop. There are a number of fuel oil tanks that are used for heating this building. Known chemicals/compounds that were used or stored in Building M119 include solvents, waste oils, gasoline, and vehicle repair related materials. Potential vehicle repair related materials used or stored at this building may include paint and paint thinners, parts cleaning wastes (solvents and parts washers), automotive batteries, automotive oils, and shop cleaning wastes (floor cleaning wastes, absorbents used for spills or leaks and shop rags).

Building M315 was reportedly used as a laundry pick up facility until the 1980s; however, no records were found to indicate dry cleaner operations.

#### PA/SI (2001-2006)

A PA was conducted for Building M119 in 2001, which included a literature review and field reconnaissance. A qualitative evaluation of the potential impact of the site on human health and the environment was also performed. Based on the amount of potential contaminants that were used at Building M119, the PA recommended that this building be investigated further to determine if contamination exists from past operations. As a result, an SI was completed in June 2004. Building M315 was also included in the SI since it was thought that the facility operated as a dry cleaner. Field activities included soil and groundwater investigations. Based on the analytical results, the Final PA/SI report (issued in February 2006) recommended further investigation of groundwater at Buildings M119 and M315 due to the presence of metals and recommended further investigation of soil at Building M315 due to the presence of metals. Subsequent investigations regarding historic use of Building M315 revealed it was not utilized as a dry cleaning facility; so it has obtained NFA status.

#### Future Activities

Based on the findings of the PA/SI, future investigations are planned for Building M119.

#### 3.1.1.3 IR Site 4 – Sawmill Road Construction Debris Dump

Site 4, the Sawmill Road Construction Debris Dump, encompasses approximately 0.3 acres located on the Mainside of the Base (**Figure 3-7**). The dates of operation are unknown, but Site 4 was reportedly used for surface disposal of construction debris including asphalt, old bricks, and cement.

#### Initial Assessment Study (1983)

The IAS (WAR, 1983) reported that no hazardous wastes were disposed at Site 4, and concluded that no further assessment was necessary since any wastes present at the site would be inert.

#### Future Activities

Future investigations are planned at Site 4 to verify the presence or absence of hazardous wastes due to the site's history as a dump.

#### 3.1.1.4 IR Site 13 – Golf Course Construction Dump Site

Site 13, the Golf Course Construction Dump Site, encompasses approximately 13 acres in the Paradise Point area of the Base (**Figure 3-10**). In 1944, Site 13 was reportedly used for surface disposal of construction debris including clippings, branches, and asphalt.

#### Initial Assessment Study (1983)

The IAS (WAR, 1983) reported that no hazardous wastes were disposed at Site 13, and concluded that no further assessment was necessary since any wastes present at the site would be inert.

#### Future Activities

Future investigations are planned at Site 13 to verify the presence or absence of hazardous wastes due to the site's history as a dump.

#### 3.1.1.5 IR Site 18 – Watkins Village (E) Site

Site 18, Watkins Village (E) Site, includes approximately 0.5 to one acre in the Paradise Point area of the Base (**Figure 3-11**). From 1976 to 1978, construction materials and debris were reportedly buried at Site 18.

##### Initial Assessment Study (1983)

The IAS (WAR, 1983) reported that no hazardous wastes were disposed at Site 18, and concluded that no further assessment was necessary since any wastes present at the site would be inert.

##### Future Activities

Future investigations are planned at Site 18 to verify the presence or absence of hazardous wastes due to the site's history as a dump.

#### 3.1.1.6 IR Site 19 – Naval Research Lab Dump

Site 19, the Naval Research Lab Dump, is approximately two to three acres located on the Mainside of the Base (**Figure 3-12**). From 1947 to 1976, the Naval Research Laboratory was located in the area of the Pest Control Shop (Building PT-37). Activities at the laboratory included using radionuclides (Iodine 131) for metabolic studies on small animals. From 1956 to 1960, approximately 100 dogs were disposed of in a small area near Building PT-37. Because Iodine 131 has a half-life of only eight days, potential for residual radiological contamination was considered to be negligible. In November 1980, Strontium-90 beta buttons were found while grading a parking lot near Building PT-37. The area was surveyed, and contaminated items were recovered. Soil samples were obtained and the site was cleaned of radioactive substances. Five 55-gallon drums of soil and animal residues were collected along with 499 beta buttons and appropriately disposed off-site.

##### Initial Assessment Study

The IAS (WAR, 1983) concluded that the quantity of any waste disposed at Site 19 was insignificant and did not warrant further investigation.

##### Future Activities

An archives search was conducted in 2007 in support of a potential MILCON project at Sites 19 and 20. Based on potential radiological concerns identified during the search, the Radiological Affairs Service Office (RASO) is assessing the sites. As part of the assessment, RASO completed a radiological survey and collected concrete and soil samples in 2007.

#### 3.1.1.7 IR Site 20 – Naval Research Lab Incinerator

Site 20, the Naval Research Lab Dump, encompasses less than 0.5 acres located on the Mainside of the Base (**Figure 3-13**). From 1947 to 1976, the Naval Research Laboratory was located in the area of the Pest Control Shop (Building PT-37). Activities at the laboratory included using radionuclides (Iodine 131) for metabolic studies on small animals. From 1956 to 1960, Site 20 was used for the incineration of burnable wastes.

##### Initial Assessment Study

The IAS (WAR, 1983) reported that no hazardous wastes were disposed at Site 20, and concluded that no further assessment was necessary since any wastes present at the site would be inert.

### Future Activities

An archives search was conducted in 2007 in support of a potential MILCON project at Sites 19 and 20. Based on potential radiological concerns identified during the search, RASO is assessing the sites. As part of the assessment, RASO completed a radiological survey and collected concrete and soil samples in 2007.

#### 3.1.1.8 IR Site 23 – Roads and Grounds Building 1105

Site 23, the Roads and Grounds Building 1105, is located in the Hadnot Point Industrial Area (HPIA), within the boundaries of IR Site 78 (**Figure 3-14**). In 1958, the Pest Control Shop, moved its activities from Building 712 (IR Site 2) to Building 1105 at Site 23. From 1958 until 1977, Building 1105 was used for storage of insecticides and herbicides, while mixing of the chemicals was performed at Lot 140 (IR Site 21). Storage and handling procedures at Building 1105 were reportedly adequate to prevent any large spills and to ensure a current safe working environment. Chemicals reportedly stored in Building 1105 included chlorinated hydrocarbons such as dichlordiphenyltrichloroethane (DDT) and chlordane as well as diazinon, malathion, lindane, mirex, 2,4-D, dalapon, and dursban. Building 1105 currently houses the Roads and Grounds Department.

### Initial Assessment Study (1983)

The IAS (WAR, 1983) reported that although the site had been listed as a potential hazardous waste sites, no spills or disposal of materials had occurred at Site 23 and concluded that no further assessment was necessary.

### Future Activities

Future investigations are planned at Site 23 to verify the presence or absence of hazardous wastes due to the site's history as a storage facility for insecticides and herbicides.

#### 3.1.1.9 IR Site 25 – Base Incinerator

Site 25, the Base Incinerator, encompasses less than 0.5 acres on the Mainside of the Base (**Figure 3-15**). From 1940 to 1960, Site 25 operated as the Base Incinerator, burning trash and classified materials. Potential materials present at the site include burned trash and melted glass.

### Initial Assessment Study (1983)

The IAS (WAR, 1983) reported that no hazardous wastes were disposed at Site 25, and concluded that no further assessment was necessary since any wastes present at the site would be inert.

### Future Activities

Future investigations are planned at Site 25 to verify the presence or absence of hazardous wastes due to the site's history as an incinerator.

#### 3.1.1.10 IR Site 37 – Camp Geiger Area Surface Dump

Site 37, the Camp Geiger Area Surface Dump, encompasses approximately four acres in the Camp Geiger area of the Base (**Figure 3-16**). Between 1950 and 1951, Site 37 was used for the surface disposal of wastes including motor parts, garbage and wood.

**Initial Assessment Study (1983)**

The IAS (WAR, 1983) reported that no hazardous wastes were disposed at Site 37, and concluded that no further assessment was necessary since any wastes present at the site would be inert.

**Future Activities**

Future investigations are planned at Site 37 to verify the presence or absence of hazardous wastes due to the site's history as a dump.

**3.1.1.11 IR Site 38 – Camp Geiger Construction Dump**

Site 38, the Camp Geiger Area Surface Dump, encompasses approximately four acres in the Camp Geiger area of the Base (**Figure 3-17**). The dates of operation are unknown, but Site 38 was reportedly used for surface disposal of construction debris and branches. During the IAS, dumping activities were observed.

**Initial Assessment Study (1983)**

The IAS (WAR, 1983) reported that no hazardous wastes were disposed at Site 38, and concluded that no further assessment was necessary since any wastes present at the site would be inert.

**Future Activities**

Future investigations are planned at Site 38 to verify the presence or absence of hazardous wastes due to the site's history as a dump.

**3.1.1.12 IR Site 40 – Camp Geiger Area Borrow Pit**

Site 40, the Camp Geiger Area Borrow Pit, encompasses approximately four to five acres in the Camp Geiger area of the Base (**Figure 3-18**). Starting in 1969, Site 40 was reportedly used for disposal of auto parts and metal. The date that disposal activities ceased is unknown.

**Initial Assessment Study (1983)**

The IAS (WAR, 1983) reported that no hazardous wastes were disposed at Site 40, and concluded that no further assessment was necessary since any wastes present at the site would be inert.

**Future Activities**

Future investigations are planned at Site 40 to verify the presence or absence of hazardous wastes due to the site's history as a dump.

**3.1.1.13 IR Site 42 – Building 705 BOQ Dump**

Site 42, the Building 705 Bachelor Officers Quarters (BOQ) Dump, encompasses several acres located in the MCAS New River portion of the Base (**Figure 3-19**). From 1950 to 1960, Site 42 was reportedly used for surface disposal of debris including trees, tree stumps, and boards.

**Initial Assessment Study (1983)**

The IAS (WAR, 1983) reported that no hazardous wastes were disposed at Site 42, and concluded that no further assessment was necessary since any wastes present at the site would be inert.

### Future Activities

Future investigations are planned at Site 42 to verify the presence or absence of hazardous wastes due to the site's history as a dump.

#### 3.1.1.14 IR Site 46 – MCAS Main Gate Dump

Site 46, the MCAS Main Gate Dump, encompasses less than one acre in MCAS New River, in the northwest portion of the Base (**Figure 3-20**). From 1958 to 1962, Site 46 was reportedly used for disposal of construction and demolition debris.

### Initial Assessment Study (1983)

The IAS (WAR, 1983) reported that there was no current evidence of a dump site and no hazardous wastes were disposed at Site 46, so it concluded that no further assessment was necessary since any wastes present at the site would be inert.

### Future Activities

Future investigations are planned at Site 46 to verify the presence or absence of hazardous wastes due to the site's history as a dump.

#### 3.1.1.15 IR Site 49 – MCAS Suspected Minor Dump

Site 49, the MCAS Suspected Minor Dump, is located within MCAS New River, in the northwest portion of the Base (**Figure 3-21**). The dates of operation are unknown, but Site 49 is suspected of having been used for the disposal of paint cans.

### Initial Assessment Study (1983)

The IAS (WAR, 1983) concluded that the quantity of any waste disposed at Site 49 was insignificant and did not warrant further investigation.

### Future Activities

Future investigations are planned at Site 49 to verify the presence or absence of hazardous wastes due to the site's potential history as a dump.

#### 3.1.1.16 IR Site 51 – MCAS Football Field

Site 51, the MCAS Football Field, encompasses approximately 20 to 30 acres in MCAS New River, in the northwest portion of the Base (**Figure 3-22**). Site 51 was reportedly the site of empty container disposal between approximately 1967 and 1968. Paint cans and hydraulic fluid cans were reportedly disposed.

### Initial Assessment Study (1983)

The IAS (WAR, 1983) concluded that the quantity of any waste disposed at Site 51 was insignificant and did not warrant further investigation.

### Future Activities

Future investigations are planned at Site 51 to verify the presence or absence of hazardous wastes due to the site's potential history as a dump.

#### 3.1.1.17 IR Site 53 – MCAS Warehouse Building 3525 Area

Site 53, the MCAS Warehouse Building 3525 Area, encompasses approximately three miles of roadway in MCAS New River, in the northwest portion of the Base (**Figure 3-23**). From 1970 to 1975, liquid wastes were sprayed on the unimproved dirt roads in the vicinity of Site 53 to

control dust. The liquid waste mixture reportedly contained crankcase waste oil, Jet Propulsion (JP) fuels, and paint thinners.

#### Initial Assessment Study (1983)

The IAS (WAR, 1983) concluded that the quantity of any waste disposed at Site 53 was insignificant and did not warrant further investigation.

#### Future Activities

Future investigations are planned at Site 53 to verify the presence or absence of hazardous wastes due to the site's potential history.

### 3.1.1.18 IR Site 55 – Air Station East Perimeter Dump

Site 55, the Air Station East Perimeter Dump, encompasses several acres in MCAS New River, in the northwest portion of the Base (**Figure 3-24**). From the 1950s to the 1960s, Site 55 was reportedly used as a disposal area for barrels, tires, trash, metal planking, and telephone poles. The area is currently used as a marina and recreation area by the Air Station.

#### Initial Assessment Study (1983)

The IAS (WAR, 1983) reported that no hazardous wastes were disposed at Site 55, and concluded that no further assessment was necessary since any wastes present at the site would be inert.

#### Future Activities

Future investigations are planned at Site 55 to verify the presence or absence of hazardous wastes due to the site's history as a dump.

### 3.1.1.19 IR Site 61 – Rhodes Point Road Dump

Site 61, the Rhodes Point Road Dump, encompasses approximately eight to 10 acres, located nearly five miles south of the MCAS New River operations area (**Figure 3-25**). The exact dates of operation are unknown; however, it was reported that Site 61 has been used as a disposal area for wastes generated during bivouac exercises. The site is currently used for war games, so site access/use is restricted.

#### Initial Assessment Study (1983)

The IAS (WAR, 1983) reported that no hazardous wastes were disposed at Site 61, and concluded that no further assessment was necessary since any wastes present at the site would be inert.

#### Future Activities

Future investigations are planned at Site 61 to verify the presence or absence of hazardous wastes due to the site's history as a dump.

### 3.1.1.20 IR Site 62 – Race Course Area Dump

Site 62, the Race Course Area Dump, encompasses approximately one to two acres, nearly two miles south of the MCAS New River operations area (**Figure 3-26**). The exact dates of operation are unknown; however, it was reported that Site 62 has been used as a disposal area for wastes generated during bivouac exercises. The site is currently used for war games, so site access/use is restricted.

### Initial Assessment Study (1983)

The IAS (WAR, 1983) reported that no hazardous wastes were disposed at Site 62, and concluded that no further assessment was necessary since any wastes present at the site would be inert.

### Future Activities

Future investigations are planned at Site 62 to verify the presence or absence of hazardous wastes due to the site's history as a dump.

#### 3.1.1.21 IR Site 66 – AMTRAC Landing Site and Storage Area

Site 66, the Amphibious Tractors (AMTRAC) Landing Site and Storage area, encompasses approximately one square mile in the Courthouse Bay area of the Base (**Figure 3-27**). Beginning in the 1950s, Site 66 was utilized for vehicle maintenance during training activities. Exact operations are unknown; however, it is likely that vehicle maintenance operations resulted in release of oil, petroleum, oil, lubricant (POL), and battery acid.

### Initial Assessment Study

The IAS (WAR, 1983) concluded that although spills of POL had likely occurred at Site 66, the quantity was insignificant and did not warrant further investigation.

### Future Activities

Future investigations are planned at Site 66 to verify the presence or absence of hazardous wastes due to the site's history.

#### 3.1.1.22 IR Site 67 – Engineer's TNT Burn Site

Site 67, Engineer's Trinitrotoluene (TNT) Burn Site, is located in the Courthouse Bay area of the Base (**Figure 3-28**). In 1951, Site 67 was reportedly used for TNT disposal. Two-foot to three-foot deep pits were dug and unwanted TNT was opened and burned. Complete consumption of all TNT was reported during these procedures.

### Initial Assessment Study (1983)

The IAS (WAR, 1983) concluded that the quantity of any waste disposed at Site 67 was insignificant and did not warrant further investigation.

### Future Activities

Future investigations are planned at Site 67 to verify the presence or absence of hazardous wastes due to the site's history.

#### 3.1.1.23 IR Site 95 (OU 22) – Dipping Vat Sites

Site 95, the Dipping Vat sites, consists of three separate areas, which are identified by their locations (Jaybird Road, Magnolia Road, and Lyman Road), shown on **Figure 3-55**. The Site 95 dipping vats were in operation from approximately 1906 through 1961 and were used to submerge livestock in a pesticide solution consisting of arsenic and synthetic pesticides, such as DDT and toxaphene. Various petroleum products were used as carriers for the pesticides. The dipping vats were approximately 25 to 30 feet long, 4 to 5 feet deep, and 2.5 to 3.5 feet wide, each able to hold approximately 1,500 to 2,000 gallons of dipping solution. A drip pad, approximately 12-feet by 15-feet, was constructed at the exit of each vat. Holding pens, approximately 50-feet by 50-feet, were also associated with the dipping vats.

### Initial Assessment

The vats were initially identified during an archaeological investigation of the Base. Following their discovery, an initial assessment was performed in 2004 on two of the three dipping vat sites (Jaybird Road and Magnolia Road), which included soil and groundwater sampling. At the Jaybird Road site, soil samples exceeded screening criteria for arsenic, chromium, and mercury. At the Magnolia Road site, soil samples exceeded screening criteria for 4,4'-dichlorodiphenyldichloroethane (4,4'-DDD), 4,4'-dichlorodiphenyldichloroethylene (4,4'-DDE), 4,4'-DDT, arsenic, and mercury. As a result, additional assessment was recommended. The third site (Lyman Road) was identified after the initial investigation.

### SI (2006-2007)

In 2006, an SI field investigation was completed for all three sites. Field activities included soil and groundwater sampling. A human health risk screening (HHRS) was completed as part of the SI to determine if site-related compounds are present at levels that could pose a risk to exposed human receptors. The Final SI report, submitted in June 2007, did not identify unacceptable risks to humans exposed to constituents in groundwater, surface soil, or subsurface soil at the Jaybird Road and Lyman Road Sites; therefore, NFA was recommended at these two locations. The Final SI report also concluded that arsenic concentrations in surface and subsurface soil at Magnolia Road present an unacceptable risk to human health; therefore, a removal action was recommended.

### Future Activities

Based on the findings of the SI, the estimated volume of soil to be excavated at Magnolia Road and disposed is 10,000 cubic feet, or 370 cubic yards. **Table 3-20** provides a proposed schedule of activities at Site 95.

## 3.1.2 MRP Sites

### 3.1.2.1 MRP Site UXO-01 – Former Live Hand Grenade Range

Site Unexploded Ordnance (UXO)-01, the Former Live Hand Grenade Range, encompasses approximately 10 acres on the Mainside of the Base (**Figure 3-56**). The Live Hand Grenade Course was established under Camp Training Order Number 7-1945, dated March 19, 1945, and was disestablished in March 1946 and no longer used for the firing of live ammunition. During operation of the site, munitions used included fragmentation, offensive, and practice grenades. Based on a review of historical aerial photographs and site reconnaissance, the site has never been developed.

### Future Activities

A PA/SI is scheduled at UXO-01 in 2008. **Table 3-21** provides a schedule of activities proposed for UXO-01.

### 3.1.2.2 MRP Site UXO-02 – Unnamed Explosive Range

Site UXO-02, the Unnamed Explosive Range, encompasses approximately 127 acres along the west bank of the New River in the Rifle Range Area of the Base (**Figure 3-57**). UXO-02 encompasses IR Site 69 (Section 3.2.2). UXO-02 was used as an explosive range from 1973 to 2002; however, the type of munitions employed at this range is unknown.

Based on the reported history that Site 69 (a portion of UXO-02) was a suspected radioactive waste disposal site, a radiation survey and soil sampling were conducted from 1980 to 1981.

Radioactivity was not detected at higher than average natural concentrations and soil sample results indicated naturally-occurring radioactivity. In 2007, RASO conducted a radiation survey which confirmed the 1980 to 1981 findings.

#### Future Activities

Future investigations are planned at UXO-02 in order to properly close the range in accordance with DoD and Headquarters Marine Corps (HQMC) guidance.

#### 3.1.2.3 MRP Site UXO-03 – Practice Hand Grenade Course

Site UXO-03, the Practice Hand Grenade Course, encompasses approximately four acres on the Mainside of the Base (**Figure 3-58**). UXO-03 was used as a practice hand grenade course from 1953 to approximately 1959. Based on an archives review, no structure was built on the site until recent construction of the Hobby Shop Complex.

#### Future Activities

A PA/SI is scheduled at UXO-03 in 2008. **Table 3-22** provides a schedule of activities proposed for UXO-03.

#### 3.1.2.4 MRP Site UXO-04 – Knox Trailer Park

Site UXO-04, Knox Trailer Park, encompasses approximately 134 acres in the northern portion of the Base (**Figure 3-59**). The Knox Trailer Park area began as a Civilian Conservation Corps Camp in 1941, responsible for eliminating the source of endemic malaria by draining all surrounding wetlands. This was accomplished by ditching, using dynamite, and spraying diesel oil on water surfaces as a larvicide. Additionally, a dog-training school was located in the southernmost area of the site from 1942 to 1946. The dogs were subjected to overhead rifle and machine gun fire and explosions of charges of dynamite and TNT to simulate battlefield conditions. It has also been reported that the research facilities at Camp Knox conducted testing on body armor during World War II (WWII) through the early 1950s. The research was likely performed indoors, and the amount of ammunition expended for testing purposes is expected to be minimal. From the early 1950s until 2006, the area has been used for residential housing. Sometime between 1974 and 1976, an explosive ordnance disposal (EOD) technician responded to the discovery of UXO in the Knox Trailer Park area. A bulldozer operator uncovered a live WWII MK-II high-explosive hand grenade while conducting excavation activities. A visual inspection of the Knox Trailer Park was conducted in November 2002 by the Base's EOD team, and no UXO was discovered.

#### Future Activities

The Navy and MCB Camp Lejeune are currently assessing a public-private venture (PPV) development on approximately 38 acres of UXO-04. As a result in 2006, an Expanded SI (ESI) was conducted at UXO-04 to evaluate the nature, number, and density of anomalies that could potentially represent subsurface munitions of explosive concern (MEC) and to identify the presence and nature of any hazardous or toxic waste contamination that may exist. Field activities included a geophysical survey, intrusive investigation, soil sampling, groundwater sampling, and sediment and surface water sampling. The intrusive investigation identified one munitions-related item; a discarded military munition identified as "Signal, Illumination, Ground: Red Star Parachute M131" in its original shipping container. Based on the results of the intrusive investigation and historical information, it was concluded that the Knox Trailer Park area was not the site of a former hand grenade range. The hand grenade that was reportedly

found in the area was likely a randomly discarded item or likely found outside of the trailer park. As part of the ESI, a HHRS and ecological risk screening (ERS) were conducted to evaluate potential risks to human health and the environment. The HHRS and ERS concluded that a more comprehensive surface soil sampling program would need to be completed in order to define discrete areas of surface soil contamination.

Based on these findings, a second phase of sampling in support of the ESI will be conducted in September 2007. Field activities included soil, groundwater, surface water, and sediment sampling. The results of this sampling will be presented in the final ESI report. **Table 3-23** provides a schedule of activities proposed for UXO-04.

#### 3.1.2.5 MRP Site UXO-05 – Miniature Anti-Tank Range and Former B-3 Gas Chamber

Site UXO-05 is approximately 74 acres in size and is identified in the Range Identification and Preliminary Assessment (USACE, 2001) as being composed of the Former Miniature Anti-Tank Range and Former B-3 Gas Chamber. There are five separate former range areas associated with UXO-05. These ranges are generally located east of US Route 17 and west-southwest of Camp Geiger (**Figure 3-60**).

Between 1941 and 1942, the area to the northeast of UXO-05 was known as the Tent Camps. By the end of WWII, corrugated steel Quonset huts replaced most of the tents. All tents and huts were removed by the early 1950s. The Miniature Anti-Tank Range was used between 1942 and 1944. During operation, .22 caliber small arms were used to fire at a moving target. The explosive hazards for this range exist with complete rounds, which would be found at or near the firing line. Complete rounds would be located at the surface, but over the years, construction and other ground movement may have caused the rounds to become buried to an unknown depth. The area was also used extensively during WWII for blank fire and non-firing events.

The B-3 Gas Chamber Facility was used between 1953 and 1958. During operation, chemical warfare training agents, such as tear gas, would have been used at this training facility. There is no evidence that CWM munitions would have been used during training activities; however, the area surrounding gas chambers is often used for other chemical training. Therefore, war gas identification sets and riot control hand grenades may have been used in this area.

#### Future Activities

A PA/SI is scheduled for UXO-05 in 2008. **Table 3-24** provides a schedule of activities proposed for UXO-05.

#### 3.1.2.6 MRP Site UXO-06 – Fortified Beach Assault Area

Site UXO-06, the Fortified Beach Assault Area, encompasses approximately 177 acres in the HPIA (**Figure 3-61**). The Range Identification and Preliminary Assessment (USACE, 2001) reported that this range was in use from 1953 until approximately 1977, and listed the following types of munitions as having been employed at this site: small arms, 3.5-inch practice rockets, practice rifle grenades, smoke and white phosphorus hand grenades. In addition, cleaning solvents/solutions were used at the site to clean equipment. Currently, the eastern side of Site UXO-06 is being used as a borrow pit. Soil from the borrow pit is used for other construction projects across the base.

### Future Activities

In 2006, a SI was conducted within the 4.4-acre military construction (MILCON) area of UXO-06, which consisted of soil and groundwater sampling. A HHRS and ecological screening were conducted as part of the SI. One pesticide and iron were detected in soil samples at concentrations exceeding screening levels. One PAH, iron, and manganese were detected in groundwater samples at concentrations exceeding regulatory standards.

A PA/SI is scheduled for the entire UXO-06 site in 2008. Data from the MILCON area as well as the remainder of UXO-06 will be incorporated into the Final PA/SI report. **Table 3-25** provides a schedule of activities proposed for UXO-06.

#### 3.1.2.7 MRP Site UXO-07 – Practice Hand Grenade Course

Site UXO-07, the Practice Hand Grenade Course, encompasses approximately two acres in the HPIA (**Figure 3-62**). UXO-07 was reportedly used as a range in 1953. The types of munitions employed at the site are unknown; however, it is assumed that practice hand grenades were used.

### Future Activities

Future investigations are planned at UXO-07 in order to properly close the range in accordance with DoD and HQMC guidance.

#### 3.1.2.8 MRP Site UXO-08 – Bazooka Range and Gas Chambers

Site UXO-08, the Bazooka Range and Gas Chambers, encompasses approximately 144 acres in the HPIA. UXO-08 is located within the boundaries of IR Site 78 (**Figure 3-63**). Areas of interest within UXO-08 include the D-7 Gas Chamber, the alternate location of the Base Chemical Smoke (CS) Chamber, the Base CS Chamber and Nuclear, Biological, and Chemical (NBC) Training Trail, and a suspected 2.36-inch Bazooka Range. The Range Identification and Preliminary Assessment Report (USACE, 2001) identified the D-7 Gas Chamber as being located at Building 756. The gas chamber is estimated to have been used from 1953 to 1961 and is thought to have primarily used tear gas. Base maps and the Range Identification and Preliminary Assessment Report indicate the operation of the alternate Base CS chamber and NBC Training trail from 1985 to 1987. The amount of chemical stimulants used during the facilities operation is unknown. Reports have indicated the presence of a suspected firing range, designated as the Lejeune Cantonment 2.36 Bazooka Range. Retired Base EOD personnel have reported the findings of bazooka rounds on several occasions at various locations within Parade Grounds during the 1970s and 1990s.

### Future Activities

Previous investigations at UXO-08 have been conducted under the IR program for Site 78 since 1983 (Section 3.5.27). In 2006, a Limited SI was conducted on a 15-acre portion of UXO-08, designated for a MILCON project. Field activities included a geophysical investigation, soil sampling, and groundwater sampling. Soil and groundwater results revealed that munitions constituents were not detected within the UXO-08 MILCON area. However, explosives residues were detected in six surface soil samples located outside of the UXO-08 MILCON area footprint. In addition, metals were detected in two subsurface soil samples collected near the former gas chambers.

A PA/SI is scheduled for the remainder of UXO-08 in 2008. Data collected as part of the Limited SI will be incorporated into the Final PA/SI report of UXO-08. **Table 3-26** provides a schedule of activities proposed for UXO-08.

### 3.1.2.9 MRP Site UXO-09 – Triangulation Range

Site UXO-09, the Triangulation Range, encompasses approximately three acres in the HPIA (**Figure 3-64**). The Triangulation Range (Range F-9) area was established in or prior to 1953. The types of weapons used on the range were service munitions and automatic rifles. The Range Identification and Preliminary Range Assessment (USACE, 2001) lists the time frame of use as 1953; however, the 1966 regulations for training areas indicates the range was still in use as a “Battle Site” range in the 1960s.

#### Future Activities

A PA/SI is scheduled at UXO-09 in 2008. **Table 3-27** provides a schedule of activities proposed for UXO-09.

### 3.1.2.10 MRP Site UXO-10 – Flame Tank and Flame Thrower Range

Site UXO-10, the Flame Tank and Flame Thrower Range, encompasses approximately three acres on the Mainside of the Base (**Figure 3-65**). UXO-10 was reportedly used as a range from 1970 to 1977. The types of munitions used at the range include flame throwers and small arms blank ammunition, which was reportedly used on tanks for demonstration purposes.

#### Future Activities

Future investigations are planned at UXO-10 in order to properly close the range in accordance with DoD and HQMC guidance.

### 3.1.2.11 MRP Site UXO-11 – Practice Hand Grenade Course

Site UXO-11, the Practice Hand Grenade Course, encompasses approximately one acre located in Camp Geiger in the northwest portion of the Base (**Figure 3-66**). UXO-11 was reportedly used as a range in 1953. The types of munitions employed at the site are unknown; however, it is assumed that practice hand grenades were used.

#### Future Activities

Future investigations are planned at UXO-11 in order to properly close the range in accordance with DoD and HQMC guidance.

### 3.1.2.12 MRP Site UXO-12 – New River 1,000-Inch Range

Site UXO-12, the New River 1,000-inch Range, encompasses approximately 30 acres generally located west of Camp Geiger, in the northwest portion of the Base (**Figure 3-67**). The 1,000-inch range was established under Camp Training Order Number 7-1945, dated March 19, 1945, and was disestablished in March 1946 and no longer used for the firing of live ammunition. During operation of the site, munitions used included small caliber munitions (.30 caliber weapons firing).

#### Future Activities

Future investigations are planned at UXO-12 in order to properly close the range in accordance with DoD and HQMC guidance.

### 3.1.2.13 MRP Site UXO-14 – Indoor Pistol Range and Gas Chamber

Site UXO-14, the Indoor Pistol Range and Gas Chamber, encompasses approximately two acres within the Rifle Range area of the Base (**Figure 3-69**). The Indoor Pistol Range (Building RR-53) was reportedly in use from 1950 to 1996. During operation of the range, small arms were used to fire at a fixed target. The Gas Chamber (Building RR-63) was reportedly in use from 1950 through 1954 and is thought to have primarily used tear gas.

#### Future Activities

Future investigations are planned at UXO-12 in order to properly close the range in accordance with DoD and HQMC guidance.

## 3.2 Remedial Investigation/Feasibility Study Sites

The following sections discuss the site history for the six IR sites (Sites 35, 69, 73, 86, 88, and 89) for which a RI and/or a FS will be conducted in FY 2008. Additionally, a pilot study or NTCRA is planned for several of these sites during FY 2008.

### 3.2.1 IR Site 35 (OU 10) – Camp Geiger Area Fuel Farm

Site 35, formerly the Camp Geiger Area Fuel Farm, is located within Camp Geiger, in the northwest portion of the Base (**Figure 3-43**). Site 35 primarily refers to five 15,000-gallon above ground storage tanks (ASTs), underground fuel transmission lines, a pump house, a fuel unloading pad, an oil water separator, and a distribution island. The ASTs were installed in 1945 as part of the original Camp Geiger construction. The fuel farm was active until it was decommissioned in the spring of 1995 to make way for the construction of the US Highway 17 Bypass. During the active life of the fuel farm, several releases of fuel occurred. During 1957 and 1958 approximately 1,000-gallons of fuel were released. To control the release, interceptor trenches were dug and the fuel was ignited. There is also evidence of a fuel release from an abandoned underground distribution line that supplied No. 6 fuel oil to a underground storage tank (UST) that fueled a boiler at the Mess Hall Heating Plant, located adjacent to “D” Street between Third and Fourth Streets.

#### Initial Assessment Study (1983)

The IAS (WAR, 1983) concluded that historical releases of fuel in significant quantities created a potential for migration into the aquifer and recommended a confirmation study be completed.

#### Confirmation Study (1984-1987)

From 1984 to 1987, a Confirmation Study was conducted, which included collecting soil, groundwater, surface water, and sediment samples. Soil analytical results indicated that soils northeast of the Fuel Farm were potentially impacted by Site activities. Groundwater analytical results identified widespread contamination of the shallow aquifer with fuel-derived contaminants (lead, oil and grease [O&G]) and VOCs, including benzene, trans-1,2-dichloroethene (trans-1,2-DCE), and trichloroethene (TCE). The source of the fuel-related compounds was thought to be the recorded historical fuel spills from the ASTs, while the source of the solvent-related compounds was thought to be an automobile maintenance shop (former Building TC-474) located 200 feet southeast of the fuel farm. Surface water and sediment analytical results suggested that contaminants from Site 35 were probably discharging into Brinson Creek during periods when the shallow groundwater level was high.

### Interim Remedial Action RI/FS (1993-1994)

From 1993 to 1994, an Interim Remedial Action (IRA) RI/FS was conducted to obtain additional data regarding petroleum hydrocarbon contamination in support of selection of an IRA to address soil contamination. IRA RI/FS activities included a soil investigation and excavation of a shallow trench along Brinson Creek. Analytical results identified three areas of petroleum hydrocarbon contamination in the soil, which corresponded to past unauthorized discharges of fuel products.

### Interim PRAP and Interim ROD for Soil Contamination (1994)

Based on the findings of the IRA RI/FS, an Interim PRAP to address soils was submitted for public review and comment in July 1994 and the Interim ROD (IROD) was signed on September 15, 1994 (Baker, 1994c). The IROD identified soil removal and disposal as the selected remedy for soils at Site 35. The removal action for hydrocarbon-contaminated soil was performed from September 1995 to May 1996, and approximately 15,700 tons of hydrocarbon-contaminated soil was shipped off-site.

### Comprehensive RI (1994-1995)

From 1994 to 1995, a Comprehensive RI was completed, which included a soil gas survey and groundwater screening investigation, soil investigation, groundwater investigation, and surface water and sediment investigation. Soil analytical results identified low levels of VOCs (primarily tetrachloroethene [PCE]) possibly attributable to groundwater contamination beneath the Site. Groundwater analytical results identified fuel-related (primarily benzene) and solvent-related (primarily TCE and cis-1,2-DCE) groundwater contamination in the surficial aquifer. The extent of groundwater contamination was not delineated during the RI. The Human Health Risk Assessment (HHRA) concluded that the overall site risk is above the acceptable risk range for the future potential exposure to groundwater and current potential exposure to fish. The Ecological Risk Assessment (ERA) concluded that metals and pesticides have the potential to affect the integrity of aquatic and terrestrial receptors at Site 35.

### Interim FS (1995)

In June 1995, an Interim FS was completed to identify and evaluate remedial alternatives for contaminated groundwater in the vicinity of the Fuel Farm at Site 35. Although the extent of groundwater contamination was not adequately defined during the RI, an Interim FS was deemed necessary because groundwater contamination in the vicinity of the Fuel Farm was a known source of ongoing contamination to Brinson Creek.

### Interim PRAP and Interim ROD for Shallow Groundwater Contamination (1995)

An Interim PRAP to address shallow groundwater was submitted for public review and comment in June 1995 and the IROD was signed on September 22, 1995 (Baker, 1995b). The IROD identified in-situ air sparging as the preferred remedial alternative for shallow groundwater at Site 35. Because of unfavorable site conditions, lack of access, and a lack of benzene, toluene, ethylbenzene, and total xylenes (BTEX) contamination in groundwater east of the proposed highway, it was recommended that the in-situ air sparge trench (approximately 100 feet in length) be constructed along the western edge of the proposed right-of-way. It was further recommended that the system be tested before full-scale implementation. The in-situ air sparge trench was installed in 1998, based on the findings of a Limited Groundwater Investigation conducted in 1996 and 1997 to determine the optimal location. The pilot air sparging system is currently operating and is maintained by the Remedial Action Contractor (RAC).

### Supplemental Groundwater Investigation (1997)

A Supplemental Groundwater Investigation (SGI) was completed in 1997. Field activities included soil, groundwater, and sediment sampling. Soil analytical results did not identify fuel-related or solvent-related contamination. Fuel-related constituents were detected in sediment samples, suggesting these areas had impacted by previous operations at Site 35. Low-level fuel-related contamination was primarily identified in the upper portion of the surficial aquifer; while solvent-related contamination was primarily identified in the lower portion of the surficial aquifer. As part of the SGI, a HHRA was conducted. The supplemental HHRA concluded that the overall future site risk is above the acceptable risk range, due to ingestion of contaminated groundwater containing solvent-related VOCs, iron, and arsenic.

### Emergency Removal Action (2000)

In 2000, an emergency soil removal action was completed, associated with a release of POL from an existing pipeline that was severed during construction of the US Highway 17 Bypass.

### Hot Spot Characterization (2002)

In October 2002, a “hot spot” characterization was completed to delineate and characterize any continuing sources associated with the “hot spots”. Hot spots were defined as concentrations of TCE greater than 280 micrograms per liter ( $\mu\text{g/L}$ ). Field activities included soil and groundwater sampling. Based on the analytical results, two “hot spots” were identified. One shallow “hot spot” was identified near Building G480 containing fuel and solvent-related contamination. A second deeper (and larger) “hot spot” containing TCE was observed extending from the vicinity of Building TC470 underneath the US Highway 17 Bypass to the wetland area (just west of Brinson Creek).

### Natural Attenuation Evaluation (1998-2003)

In April 2003, the Final Natural Attenuation Evaluation (NAE) report was completed, compiling the results of data collected as part of the original NAE conducted in September 1998, long-term monitoring (LTM) data collected from January 1999 through October 2002, and data collected from the Focused NAE conducted in January, February, and April 2002. The purpose of the NAE study was to evaluate the site conditions to determine if monitored natural attenuation (MNA) could serve as a potential remedial alternative for groundwater. The Final NAE Report concluded that conditions were generally favorable to reduce the contaminant mass in groundwater; however, complete reduction may not be possible within a regulatory time frame due to the continued release of VOCs from the primary TCE “hot spot.”

### In Situ Chemical Reduction Pilot Study (2003-2005)

A Technology Evaluation Report was completed in 2003, recommending injections of modified Fenton’s Reagent and permanganate for a pilot study to be completed on the TCE “hot spot” identified during the 2002 Hot Spot Characterization. The pilot study was conducted from 2003 to 2005, and the Pilot Study Evaluation Report was submitted in March 2006. Within the pilot study area, TCE concentrations were reduced between 80% and 98% and total VOC concentrations were reduced between 72% and 85%. The Pilot Study report concluded that contaminant concentrations at the conclusion of the test were significantly lower; however, there are no clear, definitive lines of evidence that modified Fenton’s permanganate, natural attenuation, biodegradation, or other process was the primary cause of contaminant reduction. Overall reduction is most likely associated with all of these processes

### Engineering Evaluation/Cost Assessment for LNAPL (2004)

An EE/CA to address a POL light non-aqueous phase liquid (LNAPL) area near Building G480 was completed in 2004 for both soil and groundwater. During the fourth quarter of FY 2005, the POL site associated with Building G480 was transferred to the NAVFAC UST program.

### Future Activities

In 2006, a Draft Supplemental RI was conducted at Site 35 to further delineate the nature and extent of contamination. Field activities included groundwater sampling. An ERA Addendum was also completed as part of the Supplemental RI. The Final Supplemental RI is scheduled to be completed in 2008.

In January 2007, an EE/CA was completed and an NTCRA was approved to address the continuing presence of a dissolved-phase chlorinated VOC groundwater plume east of Building G533 at Site 35. An Action Memorandum was submitted in May 2007, documenting enhanced reductive dechlorination (ERD) via emulsified vegetable oil and lactate injection as the preferred remedial action. Injections associated with the NTCRA were completed in May and June 2007 and monitoring is on-going. The results of the pilot study will be presented in a Final Pilot Study Report, scheduled for 2008.

Following the Supplemental RI and the EE/CA, a FS, PRAP, and ROD will be completed. **Table 3-9** provides a schedule of activities proposed for Site 35.

## **3.2.2 IR Site 69 (OU 14) – Rifle Range Chemical Dump**

Site 69, the Rifle Range Chemical Dump, encompasses approximately 14 acres located approximately ¼ mile west of the New River in the Rifle Range area of MCB Camp Lejeune (**Figure 3-47**). From 1950 to 1976, Site 69 was reportedly used to dispose of chemical wastes including polychlorinated biphenyls (PCBs), solvents, pesticides, and drums of “gas” that possibly contained cyanide (i.e., tear gas) or other training agents, also known as CWM. Site 69 is located within a former explosive range, UXO-02 (Section 3.1.1.2), which was used as an explosive range from 1973 to 2002 and is currently being addressed under the MRP. Based upon background information, chemical agent identification sets (CAIS) containing calcium hypochlorite, high-test hypochlorite, and other chemical agents may be buried at this site.

Because the suspected CWM of concern at Site 69 are primarily CAIS and because of the remote location of Site 69, the Army CWM Team determined that Site 69 was a low priority site for CWM issues. The Army’s recommendation was to minimize disturbance of such sites until the time that the Army had developed adequate tools to use in the assessment and remediation of such sites and had sufficient personnel to support investigation and clean-up efforts. As a result, investigations conducted at Site 69 have focused on non-CWM contaminants based on historic disposal of chemical wastes (solvents, PCBs, pesticides, etc.) at the site. Monitoring for CWM was performed during the investigations with all intrusive activities for health and safety reasons, but no CWM was ever detected. However, the investigations were not intended to confirm or deny the presence of CWM.

Based on the reported history that Site 69 was a suspected radioactive waste disposal site, a radiation survey and soil sampling were conducted from 1980 to 1981. Radioactivity was not detected at higher than average natural concentrations and soil sample results indicated naturally-occurring radioactivity. In 2007, RASO conducted a radiation survey which confirmed the 1980 to 1981 findings.

#### Initial Assessment Study (1983)

The IAS (WAR, 1983) concluded that burial of hazardous or toxic wastes at Site 69 created a potential for migration into the aquifer and recommended a confirmation study be completed.

#### Confirmation Study (1984-1987)

From 1984 to 1987, a Confirmation Study was conducted, which included collecting groundwater, surface water, and sediment samples. Analytical results identified VOCs in groundwater and surface water and pentachlorophenol (PCP) in one sediment sample.

#### RI (1992-1995)

The RI at Site 69 commenced in 1992 and, after a number of supplemental investigations, concluded in 1995. Field activities included geophysical investigations, groundwater sampling, and surface water and sediment sampling. Intrusive investigations were not conducted due to the potential for encountering chemical agents. Geophysical investigations indicated buried metallic objects near the groundwater source area. It is likely that the buried material consists of drums or canisters that contain solvents. Results of the RI indicated that soil has not been affected by the former disposal activities; however, it is believed that the top two feet of soil may be cover material that was placed over debris. Analytical results identified solvent-based groundwater contamination centered in the south-central portion of the site; which had not appeared to migrate extensively from the disposal area. Surface water and sediment analytical results indicated that the New River, Everett Creek, and an unnamed tributary north of the site have not been impaired by the former disposal operations.

#### In-Well Aeration Pilot Study (1996-1998)

A pilot study was initiated in March 1996 to assess the effectiveness of an innovative groundwater treatment technology called in-well aeration. After two years of operation and testing, in-well aeration was ineffective at reducing the number and concentration of contaminants in the groundwater. Consequently, the pilot study was discontinued.

#### PRAP and IROD (1998-2000)

The PRAP for Site 69 was submitted for public review and comment in May 1998. The Final IROD for Site 69 was signed on June 29, 2000 (Baker, 2000b). The IROD stipulated MNA and institutional controls for remediating groundwater. LTM at Site 69 was implemented in 1998 and continued until 2005 when the LTM Optimization Report (CH2M HILL, 2005) recommended removal of Site 69 from the LTM program, as the site is a part of ongoing investigations and studies in which the LTM requirements are being fulfilled or exceeded by site specific monitoring programs. LUCs were implemented in 2001 and updated in 2002, as indicated on **Table 3-5**.

#### Future Activities

Because an IROD is in place for this site, the Partnering Team agreed to complete a Supplemental RI in order to further delineate the nature and extent of contamination in preparation for a Final ROD. Based on the presence of CWM, all activities will be conducted in accordance with a Chemical Safety Submission (CSS). **Table 3-11** provides a proposed schedule of activities at Site 69.

### 3.2.3 IR Site 73 (OU 21) – Courthouse Bay

Site 73 encompasses the Amphibious Vehicle Maintenance Facility located along the northwest shore of Courthouse Bay (**Figure 3-54**). Available information indicates that disposal activities

occurred within a 13-acre area of Site 73 from 1946 until 1977. An estimated 400,000 gallons of waste oil, generated during routine vehicle maintenance, was discharged directly onto the ground surface, primarily near Building A47. In addition, approximately 20,000 gallons of waste battery acid were reportedly disposed of in the area northwest of Building A47. Waste battery acid was poured into shallow, hand-shoveled holes that were backfilled after disposal.

#### **Initial Assessment Study (1983)**

The IAS (WAR, 1983) concluded that historical waste releases in significant quantities at Site 73 created a potential for migration into the aquifer and recommended a confirmation study be completed.

#### **Confirmation Study (1984-1987)**

From 1984 to 1987, a Confirmation Study was conducted, which included collecting groundwater, surface water, and sediment samples. Chlorinated VOCs, benzene, and lead were detected in groundwater at concentrations exceeding North Carolina Groundwater Quality Standards (NCGWQS).

#### **UST Investigations (1991-1993)**

Between 1991 and 1993, several UST investigations were completed, which included the collection of soil and groundwater samples in the vicinity of several USTs at Site 73. Analytical results identified total petroleum hydrocarbons (TPH) and BTEX compounds in soil and groundwater associated with USTs located in the vicinity of Building A47.

#### **Preliminary Investigation (1994)**

A Preliminary Investigation was completed in 1994, which included a soil gas survey and groundwater screening program. The analytical results identified nine areas of concern at Site 73, segregated by potential sources of contamination.

#### **RI (1995-1996)**

From 1995 to 1996, a RI was conducted at Site 73 to further investigate the nine areas of concern. Field activities included soil, groundwater, surface water, and sediment sampling. Findings from the RI identified VOCs in shallow and deep groundwater samples primarily located in the vehicle wash area in the center/southeast portion of the site. The HHRA identified a risk to future receptors due to ingestion of groundwater due to the presence of vinyl chloride. The ERA identified a potential risk to terrestrial receptors due to contaminants in soil and surface water.

#### **Supplemental Groundwater Investigation (1998)**

In 1998, a Supplemental Groundwater Investigation was conducted to further define the extent of groundwater contamination at the Site. The investigation included the collection of groundwater samples. The SGI concluded that natural attenuation was occurring and that additional delineation was necessary and recommended a natural attenuation evaluation. A Groundwater Modeling Report was also completed in 1998, to support the evaluation of remedial alternatives in a FS.

#### **LTM (2000-2005)**

LTM was implemented at Site 73 in July 2000 and included semi-annual sampling and reporting. Although no ROD was in place, the monitoring program was implemented to provide continued analytical data. The LTM Optimization Report (CH2M HILL, 2005) recommended removal of Site 73 from the LTM program, as the site is a part of ongoing

investigations and studies in which the LTM requirements are being fulfilled or exceeded by site specific monitoring programs.

#### Natural Attenuation Evaluation (2000-2002)

From 2000 to 2001, NAE field investigations were completed at Site 73 to provide additional data on plume characterization and natural attenuation conditions. The Final NAE Report was completed in 2002. Although natural attenuation of the VOCs in groundwater was demonstrated to be a viable treatment option, the time frame needed to reach the cleanup objectives was believed to be cost prohibitive.

#### Air Sparging Interim Measure (2002)

In 2002, air sparging points were employed as an interim measure to treat an area of concentrated vinyl chloride near the bulkhead. Air was injected into 29 well points for a four-month period. Data from the treatment area indicated that the air was not effectively moving through the shallow formation due to the low permeability of the soil. Accordingly, it was decided to discontinue the air injection.

#### Hydrogen Sparging Pilot Study (2003-2006)

A Technology Evaluation Report and Treatability Study Work Plan were completed in 2003, recommending a pilot study for the main TCE groundwater plume at the site. The pilot study was conducted from 2003 to 2006 and involved hydrogen sparging through a horizontal well. Results of the pilot study showed the average TCE concentration decreased approximately 35% over the 15 month study period and the average total VOC concentration decreased approximately 8%. Hydrogen was never detected in any of the wells above the background concentration. Long-term residual effects of hydrogen sparging were not expected to be significant.

#### Future Activities

In 2006, a Draft Supplemental RI was conducted at Site 73 to further delineate the nature and extent of groundwater and soil contamination. Field activities included groundwater sampling. An ERA Addendum was also completed as part of the Supplemental RI. The Final Supplemental RI is scheduled to be completed in 2008.

In 2007 a pilot study was implemented at Site 73 to evaluate the performance and effectiveness of ozone enhanced air sparging using a horizontal well for the purpose of groundwater remediation. Monitoring for the pilot study is on-going, and the results will be presented in a Final Pilot Study report, scheduled for completion in 2008.

Following the Supplemental RI, a FS, PRAP, and ROD will be completed. **Table 3-12** provides a schedule of activities proposed for Site 73.

### **3.2.4 IR Site 86 (OU 20) – Tank Area AS419-AS421 at MCAS**

Site 86, Tank Area AS419-AS421, is located within the operations area of MCAS New River (**Figure 3-53**). From 1954 to 1988 Site 86 served as a storage area for petroleum products. In 1954, three 25,000-gallon ASTs were installed within an earthen berm. The three tanks were reportedly used for No. 6 fuel oil storage until 1979. From 1979 to 1988, the tanks were used for temporary storage of waste oil. The three tanks were emptied in 1988 and were removed in 1992. Today, the former location of the tanks is grass-covered and only a slight depression remains.

### Preliminary Site Investigation (1990)

In November 1990, a Preliminary Site Investigation (PSI) was conducted, which included soil sampling. The results of the PSI revealed limited TPH contamination in two soil samples and low-level detections of VOCs likely attributable to localized surface spills.

### Site Assessment (1992)

In 1992, a Site Assessment was completed, which included soil and groundwater sampling. The results of the Site Assessment revealed TPH contamination in only one soil boring obtained within the former tank area and identified benzene, PCE, and TCE in groundwater.

### RI (1995-1996)

From 1995 to 1996 a RI field investigation was conducted, which included soil and groundwater sampling. Surface and subsurface soil analytical results indicated localized VOC and metals contamination in samples collected within and immediately adjacent to the former AST area and wide-spread low-level SVOC contamination (primarily polynuclear aromatic hydrocarbons [PAHs]). Groundwater analytical results indicated the presence of VOC contamination limited to the surficial aquifer in the central and southeastern portion of the Site. Although VOCs were not present in the Castle Hayne aquifer, the VOCs appeared to have migrated vertically to the lower portion of the surficial aquifer and were migrating horizontally in the general direction of groundwater flow.

### Post-RI Fieldwork (1997-2000)

Post-RI fieldwork was conducted in 1997 and 1998 to delineate the vertical and horizontal extent of the VOC contamination. This work identified a large plume extending east-northeast from Site 86, and a much smaller plume to the southwest, near a former wash rack area. In June 1998 a FS was completed to develop and evaluate remedial alternatives for addressing groundwater at Site 86.

In June 2000 it was recommended that Site 86 be further evaluated based on the increasing levels of TCE, as noted during monitoring, in a downgradient intermediate well. The data also suggested that the TCE plume may be migrating, as indicated by several downgradient wells. Subsequently, it was decided at the July 2000 IR Partnering Meeting that Site 86 would be permanently removed from OU 6 and a new operable unit, OU 20, would be created for this site.

### LTM (1998-2005)

Site 86 was added to the LTM program in July 1998. Although no ROD was in place, the monitoring program at Site 86 was implemented to provide continued analytical data to assess whether contamination remains present, has migrated, or has degraded through natural processes. In September 2005, Site 86 was removed from the LTM program based on the recommendation of the LTM Optimization Report (CH2M HILL, 2005), as Site 86 is a part of ongoing investigations and studies in which the LTM requirements are being fulfilled or exceeded.

### Amended RI (2001-2002)

Based on the findings from the post-RI monitoring, an Amended RI was conducted from 2001 to 2002 in order to further delineate the nature and extent of contamination. The findings from the Amended RI field investigation showed that the primary TCE plume is located at a depth of 40 to 45 feet below ground surface (bgs). The plume extends from the boundary of Site 86 to approximately 1,700 feet downgradient. The Final Amended RI Report was completed in 2003.

### Air/Ozone Sparging Pilot Study (2005-2006)

The Technology Evaluation Report and Pilot Study Work Plan were completed in 2004, which recommended injection of ozone through a horizontal well. The pilot study was conducted from 2005 to 2006 for the main TCE groundwater plume at the site. The Pilot Study Report was prepared following completion of the test in September 2006. The report concluded that TCE concentrations were reduced 99% in groundwater samples collected from monitoring wells with baseline concentrations exceeding 50 µg/L, and air sparging beneath a low permeability layer using a horizontal directionally drilled (HDD) well resulted in a zone of influence of at least 50 feet on either side of the well.

### Future Activities

In 2006, a Resource Conservation and Recovery Act (RCRA) Facility Investigation completed for Solid Waste Management Unit (SWMU) 303/318 (located south of Site 86) identified chlorinated VOCs in groundwater from an undetermined source. Based on these results, the Partnering Team agreed that Site 86 would need to be expanded to include the SWMU area and a Supplemental RI would need to be completed in order to fully define the nature and extent of contamination.

Following the Supplemental RI, a FS, PRAP, and ROD will be completed. **Table 3-16** provides a proposed schedule of activities for Site 86.

## 3.2.5 IR Site 88 (OU 15) – Base Dry Cleaners

Site 88, the former Base Dry Cleaning Facility (former Building 25), is located within the HPIA of MCB Camp Lejeune (**Figure 3-48**). Building 25 operated as a dry cleaning facility beginning in the 1940s. Five 750-gallon USTs were installed on the north side of the building to store dry cleaning fluids. Initially, Varsol™ was used in dry cleaning operations at Building 25. Because of flammability concerns, Varsol's use was discontinued in the 1970s and it was replaced with PCE. The PCE was stored in one 150-gallon AST adjacent to the north wall of Building 25, in the same vicinity as the USTs. PCE was reportedly stored in the AST from the 1970s until 1995. During this time, facility employees have reported that spent PCE was disposed of in floor drains. In December 1986 and March 1995, self-contained dry cleaning machines were installed in Building 25, eliminating the need for bulk storage of PCE. The USTs and AST were removed in November 1995. The dry cleaning operations ceased in January 2004, and the building was demolished to slab in August 2004.

### Focused RI (1996-1997)

During removal of the USTs and ASTs, chlorinated VOCs and metals were detected in the subsurface soil samples, and chlorinated VOCs, TPH, and naphthalene were detected in the groundwater samples. As a result of these findings, a two-phased Focused RI was completed for Site 88 from 1996 to 1997. Field activities included soil and groundwater sampling. The final Focused RI report, submitted on May 15, 1998, identified subsurface soil contamination under and near Building 25, and along a line of borings paralleling an underground sewer line (apparently due to the leakage of solvent-contaminated wastewater). Groundwater analytical results identified wide-spread chlorinated solvent contamination (PCE, TCE, and cis-1,2-DCE), which had impacted the surficial aquifer and the upper portion of the Castle Hayne aquifer. A distinct contaminant plume was identified, which suggested Building 25 was the source area. The results of the RI also suggested the presence of a dense non-aqueous phase liquid (DNAPL).

**DNAPL Recovery (1998-1999)**

To address DNAPL at Site 88, in 1998 a partial free-phase liquid recovery was completed in addition to a pre-surfactant remediation characterization and delineation study to establish the nature and extent of the residual-phase DNAPL. Surfactant-Enhanced Aquifer Remediation (SEAR) was conducted to remove the residual phase DNAPL and some free phase DNAPL. This pilot program was completed in August 1999. The Final SEAR Report was issued January 25, 2000, and post-SEAR monitoring was completed in 2001.

**Reductive Anaerobic Bioremediation In-Situ Treatment (2001-2002)**

In 2001, several other interim remedial actions were also initiated. The U.S. Air Force started operations of the Reductive Anaerobic Bioremediation In-Situ Treatment Technology (RABITT) pilot scale test within the dissolved portion of the plume near monitoring wells 88-MW05 and 88-MW05IW. This pilot test, completed in 2002, reported that PCE and TCE concentrations were reduced to below detectable levels in almost all wells after 14 weeks and remained depressed throughout the remainder of the demonstration. In addition, the RAC started aggressive fluid vapor recovery (AFVR) activities at Site 88 by pumping free phase product monthly from six existing extraction wells.

**LTM (1999-2002)**

LTM at Site 88 was implemented in April 1999 and discontinued in 2002 when an Amended RI was initiated.

**Supplemental SI (2002-2003)**

In July 2002, a Supplemental SI was conducted, which involved collection of groundwater samples in order to determine the "current" nature and extent of contamination and to provide recommendations for completing a comprehensive RI. Analytical results indicated that significant groundwater contamination still existed at Building 25. Notably, chlorinated hydrocarbons were detected in peripheral monitoring wells, indicating that the extent of groundwater contamination had not been delineated. As a result a second supplemental SI was conducted in 2003 in order to address the data gaps identified in the original SI. Activities included a sewer survey to identify potential DNAPL migration pathways, soil sampling and groundwater sampling. The sewer survey identified several areas of potential DNAPL migration pathways. The analytical results indicated a general northwest migration of contaminants. Further, the vertical distribution of VOCs suggested that the shallow silt layer was not impermeable, and dissolved-phase VOCs were potentially migrating vertically to the intermediate-depth aquifer zone.

**Membrane Interface Probe Investigation (2004)**

In April 2004, a membrane interface probe (MIP) investigation was conducted to refine previous source area characterization efforts and conduct vertical soil profiling in the vicinity of Building 25 and the nearby sewer systems. Information provided by the MIP investigation was used to evaluate the horizontal and vertical distribution of the DNAPL source area.

**NTCRA (2004-2005)**

An EE/CA for the soil source under Building 25 was completed in September 2004, which provided recommendations for the technology and approach to be completed as part of source removal action. The EE/CA was presented at a public meeting in June 2004. Shallow soil mixing with clay-zero valent iron (ZVI) and dual phase extraction were the recommended technology presented in the EE/CA. In 2005, the removal action was completed, treating approximately

7,050 cubic yards of impacted soil. Within the treatment area PCE concentrations in the soil were reduced by greater than 99%. Despite the significant source area reduction, residual dissolved phase groundwater contamination remains over a large portion of the surrounding and downgradient areas.

#### Future Activities

A Draft Amended RI Report was completed in 2006 to further delineate the nature and extent of chlorinated VOCs in groundwater and to assess whether there was a continuing source of chlorinated VOC contamination in groundwater at the site. The FS, PRAP, and ROD will be completed following the Final Amended RI Report. **Table 3-17** provides a proposed schedule of activities at Site 88.

### 3.2.6 IR Site 89 (OU 16) – Former DRMO

Site 89, the former Defense Reutilization and Marketing Office (DRMO), is located within OU 16, which is within Camp Geiger in the extreme northwest corner of the Base. OU 16 includes Sites 89 and 93 (**Figure 3-49**). Historical records for Site 89 indicate that the Base Motor Pool operated on site until approximately 1988, when it was relocated to its current location, an asphalt paved area immediately north of the DRMO facility. The Base Motor Pool, while located at Site 89, reportedly used solvents (acetone, TCE, and MEK) for parts cleaning. After 1988, the site was used as the DRMO by the Defense Logistics Agency (DLA) until 2000. The facility was used as a storage yard for items such as scrap and surplus metal, electronic equipment, vehicles, and rubber tires. In the early 1990s, fuel bladders were placed onsite. The bladders ranged in size from 600 to 20,000 gallons and were used in training exercises for helicopter refueling. Base personnel reported that the bladders were emptied on the ground, cleaned with solvents, re-emptied on the ground, and capped prior to storage at the DRMO. The bladders were stored for three to four years in a pile approximately 75 feet in diameter by 25 feet high. A shredder was then brought onsite and located immediately north of the bladder pile. The bladders were shredded into small cubes and placed into roll-off boxes. During shredding operations, liquids were observed escaping from the bladders. These liquids were not contained or removed. The site has not been used since the DRMO relocated in 2000.

Investigations at Site 89 have historically been focused on a small area within the DRMO that formerly contained a 550-gallon steel UST used to store waste oil. The UST was reportedly installed in 1983 and removed in 1993. The initial UST investigation detected chlorinated VOCs in the groundwater, which led to the inclusion of the site into the Camp Lejeune IR Program.

#### Focused RI (1996-1997)

From 1996 to 1997, a Focused RI was conducted to characterize the nature and extent of soil and groundwater contamination at OU 16 (Sites 89 and 93). Field activities at Site 89 included the collection of soil, groundwater, surface water, and sediment samples. The Focused RI identified chlorinated solvent contamination in soil and groundwater at Site 89. Most of the groundwater contamination is located in the area of the former DRMO. The contaminant plume extends to approximately 50 feet bgs and extends approximately 1,200 feet east of the DRMO. In addition, the Focused RI concluded that chlorinated VOCs in the groundwater affected Edwards Creek, which is located along the southern boundary of Site 89. The HHRA identified potential human health risks for future receptors due to exposure to chlorinated VOCs in groundwater. The ERA identified a potential risk to ecological receptors primarily due to the presence of chlorinated VOCs in sediment.

### LTM (1999-2005)

Based on the results of the RI, LTM was implemented at Site 89 in April 1999 in order to assess plume stability. LTM was discontinued in 2005 due to the ongoing FS (CH2M HILL, 2005).

### Post-RI Investigations (1999)

Additional investigation activities were conducted in June/July 1999 and in October 1999. Activities included soil, groundwater, surface water, and sediment sampling. These investigations verified that the extensive amounts of chlorinated VOCs had contaminated the immediate and surrounding areas of Site 89. A follow-up investigation was conducted in December 1999 to further delineate the extensive soil contamination in the southern portion of Site 89. Soil samples were collected both inside and outside the DRMO. This sampling confirmed that extremely high levels of chlorinated VOCs were affecting an extensive area within the southern portion of the site.

### Low Temperature Thermal Desorption TCRA (2000)

Based on the findings of the additional investigations, a TCRA was completed in October 2000 for the removal and treatment of vadose zone contaminants in the southern portion of the site. Low Temperature Thermal Desorption (LTTD) units were used to treat the contaminated soil and roughly, 32,000 tons were treated. In addition, an aeration system was installed in Edwards Creek to assist in the remediation of VOCs in the creek. This system is anticipated to be operational through FY 2008.

### Electrical Resistive Heating Pilot Study (2001-2004)

In 2001 and 2002, field investigations were completed in support of a NTCRA. However, based on the results of the investigations a pilot study was recommended to evaluate electrical resistance heating (ERH) prior to full-scale implementation. In 2004, the ERH pilot study was conducted as a remedial action for one of the DNAPL plumes identified in the Supplemental Investigation. The total area of treatment was approximately 15,900 square feet. The Final Pilot Study report, submitted in July 2005, concluded that an estimated 48,000 pounds of VOCs were removed from the subsurface during this remedial action.

### Future Activities

In November 2006, a treatability study was implemented at Site 89 to evaluate the performance and effectiveness of four remedial alternatives, including air sparging using a HDD well; permeable reactive barrier (PRB), using mulch/compost as backfill; chemical reduction via ZVI injection through pneumatic fractures; and ERD using a combination of sodium lactate and emulsified vegetable oil (EVO), with direct push emplacement. Groundwater monitoring in support of these treatability studies was conducted until July 2007; and results of the treatability study will be presented in a Final Treatability Study report to be submitted in FY 2008.

The Draft Final Comprehensive RI was completed in 2006 and will be finalized in November 2007. Additionally, an NTCRA to address the source area and an EE/CA to address potential ecological risk is planned for 2008/2009. The FS, PRAP, and ROD will be completed following acceptance of the Final RI and completion of the source area NTCRA and ecological EE/CA. **Table 3-18** provides a schedule of proposed activities at Site 89.

## 3.3 Proposed Remedial Action Plan and Record of Decision Sites

The following subsection discusses the site history for one IR site (Site 84) for which a PRAP and ROD will be completed during FY 2008.

### 3.3.1 IR Site 84 (OU 19) – Building 45

Site 84, Building 45, is located approximately 200 yards south of State Route 24, one mile west of the Main Gate (**Figure 3-52**). The property on which Site 84 is located was purchased by the federal government in 1941. Building 45, constructed by the U.S. Navy soon after purchasing the property, was leased to Tidewater Electric, who operated the building through 1965. Camp Lejeune converted Building 45 to a maintenance facility for large machinery in 1965. While no official operational history exists for the building and the surrounding property, former employees recalled that site activities included PCB transformer maintenance, recycling, and on-site disposal of spent transformer casings. A transformer was discovered near the wooded area, east of the powerhouse; and additional transformers (approximately 20), potentially containing PCB dielectric oil, were discovered near the woods, east of the powerhouse. Maintenance personnel at Building 45 have indicated that additional transformers may still be buried in areas near a former lagoon. Public Works Center personnel were reported to have performed minor excavations in the area and did not discover any waste materials.

#### UST Investigation (1992)

During a UST Investigation conducted in 1992, low levels of PCBs were detected in a soil sample collected from the area where a transformer was discovered.

#### Pre-Remedial Investigation Screening Study (1995)

A Pre-Remedial Investigation (Pre-RI) Screening study was conducted in October 1995, which included soil, groundwater, surface water, and sediment sampling. Additional groundwater sampling was performed in March 1998. Samples were analyzed for PCBs only. Based on the analytical results, the Pre-RI concluded that the site had been adversely affected by PCB contamination. PCBs were detected at levels above 500 parts per billion (ppb) in soil collected from around the lagoon, and in surface water and sediment (above 1,000 ppb) collected from within the lagoon. A Baseline Risk Assessment (BRA) was also completed as part of the Pre-RI, which did not identify any risks to human health or the environment.

Based on the results of the Pre-RI, a Draft EE/CA was prepared on January 15, 1999 to present removal action options for the NTCRA of PCB-contaminated sediments and soil in and near the lagoon at Site 84. This report, along with the Draft Action Memorandum was not finalized because the removal action was delayed to allow for more complete PCB delineation at the site.

#### UST Removal (1999)

In July 1999, a 500-gallon UST used for storing heating oil was removed in the vicinity of Building 45. Confirmatory soil samples identified petroleum hydrocarbons in the soil. The UST removal report concluded that the detected petroleum hydrocarbons might not be from the UST, rather it was suggested that the contamination might have come from other unidentified source(s), based on the long industrial operation history at Building 45.

#### Building 45 Removal (1999)

Concrete sampling and surface soil sampling was conducted at Building 45 in August 1999 in preparation for razing and off-site disposal of material from the aboveground portions of

Building 45. Analytical results identified PCBs in the concrete. As a result, the aboveground portion of Building 45 was removed between August and September 1999, with the foundation left in place.

#### RI/FS (2001-2002)

The RI/FS field investigation was completed in August 2001. RI field activities included a soil investigation, trenching to locate a drain line from former Building 45 to the former lagoon, and a shallow groundwater investigation. The findings from the RI indicated that soil around former Building 45 and limited areas west of the building were impacted by organic compounds (primarily PCBs, pesticides, and PAHs) and metals. The RI also identified limited groundwater contamination present in the surficial aquifer (primarily benzene, pesticides, and metals). Sediments in the lagoon are also contaminated, primarily from PCBs. The HHRA identified unacceptable risks to current receptors due to the presence of PCBs and PAHs in surface soil. The ERA identified potential unacceptable risks to terrestrial receptors primarily due to the presence of pesticides, PCBs, and metals in surface soils and potential unacceptable risks to ecological receptors primarily due to the presence of VOCs, SVOCs, and PCBs in lagoon sediments. The Final RI recommended completion of a NTCRA to remove surface soils surrounding Building 45, in the lagoon area, and in the midfield area as well as remove the Building 45 foundation materials. The Final FS was completed in June 2002, which developed and screened remedial alternatives for addressing soil contamination.

#### Phase I NTCRA (2002)

Based on the recommendations of the RI/FS, an NTCRA Work Plan was submitted in January 2002 to remove the remaining building foundation at Building 45 and some surrounding PCB-contaminated soil. The Phase I removal action was completed in the fall of 2002, and included removal of 4,857 tons of non-hazardous PCB-contaminated soil and 142 tons of contaminated soil.

#### PRAP (2002)

The PRAP for Site 84 was submitted for public review and comment in June 2002 for a 30-day period. The PRAP consisted of eight alternatives to address residual soil contamination and two alternatives to address groundwater contamination. Owing to the national debate between USEPA and DoD regarding enforcement issues of the LUCs, completion of the Final ROD was temporarily delayed. Accordingly a draft EE/CA was also presented at the public meeting for completing an IRA to address residual soil contamination.

#### Phase II NTCRA (2002-2004)

The EE/CA was finalized in October 2002 and the Action Memorandum was finalized in November 2002, identifying excavation and off-site disposal of contaminated soil and lagoon sediments as the selected response action. The Phase II NTCRA was conducted from December 2003 to August 2004, and included the removal of approximately 12,000 tons of contaminated soil/sediment. However, rather than meeting the PCB remediation goal and reaching site closure, the Phase II NTCRA uncovered additional areas of contamination. A steel pipe was unearthed in the northern portion of the site and concerns were raised about a possible second burial lagoon.

### Corrective Action Plan (2003)

In October 2003, a Final Corrective Action Plan (CAP) was submitted to NCDENR to address pesticide contamination in the groundwater at Site 84. The groundwater remediation program proposed in the CAP is being managed under the authority of NCDENR's UST program.

### Phase III NTCRA (2006)

A Final Recommendations Report was completed in September 2006 to re-evaluate the site and determine what additional actions were required to meet the established objectives. Based on its findings, a Phase III NTCRA was conducted from April to October 2006, which included the excavation of approximately 680 tons of PCB-contaminated soil. Total excavation to achieve the PCB remediation goal of 10 parts per million (ppm) was deemed impractical, so a two-foot thick vegetative soil cover was placed over the remaining PCB-contaminated soil.

### Future Activities

A Draft Final Construction Closeout Report was submitted in May 2007. A Focused FS, PRAP and ROD will be completed following the Final Construction Closeout Report. **Table 3-15** provides a proposed schedule of activities at Site 84.

## 3.4 Remedial Design and Remedial Action Sites

No sites are expected to be in the RD/RA phase during FY 2008.

## 3.5 Remedy-in-Place and Response Complete Sites

The following sections discuss the site history for 21 IR sites which are in the RIP stage as well as the 15 IR sites and one (1) MRP site which are NFA and in the RC stage of the CERCLA process. Of the 21 RIP sites, all have LUCs in place, as shown in **Table 3-5**. Six of the RIP sites (Sites 3, 6, 36, 78, 82, and 93) are also currently in the LTM program (**Table 3-4**), as required by the applicable signed ROD.

### 3.5.1 IR Sites

#### 3.5.1.1 PA Site – Hadnot Point Industrial Area (Buildings 1120, 1409, and 1512)

The HPIA PA site includes Buildings 1120, 1409, and 1512, located in the HPIA (**Figure 3-6**). Building 1120 has been used as an Automobile Hobby Shop since 1955. One 1,000-gallon AST storing waste oil was reportedly installed prior to 1972 in the vicinity of Building 1120. Operations conducted in this building include automotive repair and painting. Known wastes used or stored in this building include automotive grease, oil, waste oils, and paint.

Building 1409 was constructed in the 1940s and has been used as an upholstery and carpentry shop, a decontamination building, a storage building, and a furniture repair shop. Painting was also conducted at this building and a number of wastes including paint stripper, hydraulic fluid, penetrating fluid, and gear case oil have been used or stored here. The Furniture Repair Shop contained a 550-gallon vat of paint stripper, which was reportedly disposed of in 55-gallon drums, transported to the Fly Ash Dump (IR Site 24) where the contents was poured on the ground (WAR, 1983). Paint stripping chemicals can include any of the following products: mineral spirits, toluene, MEK, or acetone. Currently, the building houses a military Boat Shop.

Several ASTs are currently located adjacent to Building 1409; however, the contents and capacity of the ASTs are unknown.

The operational history for former Building 1512 is unknown. It is assumed that it was used as an automotive repair support structure for the series of vehicle maintenance buildings in this area. Currently the area is being used as open storage for drums and tires and as vehicle maintenance support. During a site visit in 2004, approximately 75 tires and 15 55-gallon drums were observed.

#### PA/SI (2001-2006)

A PA was conducted for Buildings 1120, 1409, and 1512 in 2001, which included a literature review and field reconnaissance. A qualitative evaluation of the potential impact of the sites on human health and the environment was also performed. Due to known historical site use or because information was not known about the possible types and or extent of contamination at the site, field investigation activities were recommended. As a result, an SI was completed in June 2002. Field activities included soil and groundwater investigations. Based on the analytical results, the Final PA/SI report (issued in February 2006) recommended NFA at Buildings 1120, 1409, and 1512.

#### 3.5.1.2 IR Site 1 (OU 7) – French Creek Liquids Disposal Area

Site 1, the French Creek Liquids Disposal Area, is located within OU 7 on the Mainside of the Base. OU 7 includes Sites 1, 28, and 30 (**Figure 3-40**). Site 1 has been used by several different mechanized, armored, and artillery units since the 1940s. Liquid wastes generated from vehicle maintenance were reportedly routinely poured onto the ground surface. At times, holes were reportedly excavated 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 estimated quantity of POL waste disposed at the areas is between 5,000 and 20,000 gallons; and the quantity of battery acid waste is between 1,000 and 10,000 gallons. Currently, Site 1 continues to serve as a vehicle and equipment maintenance/staging area.

#### Initial Assessment Study (1983)

The IAS (WAR, 1983) concluded that waste POL and used battery acid may threaten a potable water well (Building 636) and could potentially migrate off-site into Cogdels Creek; and thus recommended that a confirmation study be conducted to determine the boundaries of the disposal area.

#### Confirmation Study (1984-1987)

A Confirmation Study, conducted from 1984 to 1987, included groundwater, surface water, and sediment investigations. Groundwater samples collected from the surficial aquifer identified the presence of chlorinated VOCs (PCE and TCE), metals, and O&G.

#### Soil Assessment (1991)

In July 1991 a soil assessment was completed for an area in the southern portion of the site that was being considered for a MILCON project. Surface soil and subsurface soil samples identified inorganic constituents at levels generally consistent with background concentrations.

Groundwater Study (1993)

In April 1993, additional groundwater sampling was conducted to determine current site conditions during scoping of the RI/FS. Groundwater analytical results also identified inorganic constituents at concentrations generally consistent throughout the site.

RI (1994)

In 1994, a RI was conducted at OU 7 (Sites 1, 28, and 30). RI field activities at Site 1 consisted of a site survey, a soil investigation, and a groundwater investigation. Due to a lack of rainfall and the intermittent nature of surrounding drainages, a surface water and sediment investigation was not completed. VOCs were not found in surface soil, but were detected in limited number of subsurface soil samples. VOCs (primarily TCE and vinyl chloride) detected in groundwater above their respective NCGWQS were limited to the northern portion of the study area. The HHRA did not identify any unacceptable risks to human health or the environment. The ERA concluded that metals may have the potential to affect the integrity of terrestrial receptors at Site 1. Remedial alternatives for groundwater were evaluated during preparation of the FS, submitted in July 1995.

PRAP (1995) and ROD (1996)

The Final PRAP for OU 7 (Sites 1, 28, and 30) was issued July 13, 1995 and the Final ROD was signed on May 16, 1996 (Baker, 1996a). The ROD identified LTM and LUCs as the selected remedy for Site 1. LTM at Site 1 was implemented in 1996 and discontinued in January 2001 when site-wide groundwater concentrations fell below the remedial action goals.

Remedy-In-Place

LTM at Site 1 was implemented in 1996 and discontinued in January 2001 when site-wide groundwater concentrations fell below the remedial action goals. A Final OU 7 Closeout Report was completed in September 2002 to document the completion of the remedial action (monitoring). LUCs were implemented 2001 and updated in 2002, as shown in **Table 3-5**.

**3.5.1.3 IR Site 2 (OU 5) – Former Nursery/Day Care Center**

Site 2, the Former Nursery/Day Care Center, encompasses approximately five acres just inside the Main Gate in the northeast portion of the Base (**Figure 3-38**). From 1945 to 1958, an on-site building (Building 712) was used for storing, handling, and dispensing pesticides. Chemicals known to have been used at Site 2 include chlordane, 4,4'-DDT, diazinon, and 4,4'-DDD. Chemicals known to have been stored at Building 712 include dieldrin, lindane, malathion, and silvex. Historical aerial photos display evidence that a former storage area was primarily used to store bulk materials; however, there is no indication that this area actually had pesticides stored on it. Contamination at the site is believed to have occurred as a result of small spills, washout, and excess product disposal.

Initial Assessment Study (1983)

The IAS (WAR, 1983) indicated Building 712 had been used as a nursery/day care center for children; however, the day care center was relocated in April 1982 when a preliminary soil sampling investigation conducted in 1982 indicated the presence of pesticides. Building 712 is currently used as a personnel office for non-appropriated-funding personnel.

Confirmation Study (1984-1990)

From 1984 through 1990, a Confirmation Study was conducted to verify the presence of potential contaminants in groundwater, surface water, soil, and sediment. The results of the

Confirmation Study indicated the presence of pesticides and VOCs in environmental media throughout Site 2. The Confirmation Study recommended that further characterization of groundwater be conducted and suggested the completion of a supplemental surface water and sediment investigation.

#### Geophysical Investigation (1992)

In July 1992, a surface geophysical investigation was performed at Site 2 to establish the source of groundwater contamination. No anomalies that could serve as sources (i.e., tanks or drums) of groundwater contamination were identified during this investigation. However, an atypical subsurface feature was detected. The data from this anomaly was not conclusive to ascertain whether or not it was a tank, large diameter utility line or other buried structure.

#### RI/FS (1993-1994)

A RI/FS was initiated in April 1993 and completed in September 1994. RI field activities included a geophysical investigation; soil gas survey; and soil, groundwater, surface water, and sediment sampling. Analytical results identified elevated levels of pesticides detected in soil near the former mixing pads. In addition, a plume consisting of low levels of ethylbenzene and toluene was present in the shallow aquifer. Ethylbenzene and toluene are known constituents in petroleum-based pesticides similar to what was historically used at Site 2. The HHRA identified unacceptable risks to current receptors due to the presence of pesticides in the soil and identified unacceptable risks to future receptors due to the presence of VOCs in groundwater. The ERA identified potential risks to aquatic and terrestrial receptors due to the presence of pesticides in sediment and soil.

#### TCRA (1994)

Based on the findings of the RI, a TCRA was recommended for removal of pesticide-contaminated soil. The TCRA was initiated in January 1994 and included the excavation and offsite treatment of pesticide-contaminated soil and concrete. A total of 1,049 tons of pesticide-contaminated soil was excavated and sent for offsite disposal. Because site risks due to the presence of contaminated soil were reduced by the completion of the TCRA, the FS (completed in June 1994) focused on evaluating remedial alternatives for addressing groundwater contamination.

#### PRAP and ROD (1994)

The Final PRAP for OU 5 was issued June 23, 1994 and the Final ROD for OU 5 was signed on September 15, 1994 (Baker, 1994b). The ROD identified LTM of groundwater and LUCs as the preferred remedial alternative.

#### Remedy-In-Place

LTM at Site 2 was implemented in 1995 and was discontinued in May 2007 after groundwater concentrations fell below NCGWQS for four consecutive quarters. A RACR will be issued for Site 2 to document the response complete (monitoring). LUCs were implemented in 2001 and updated in 2002, as shown in **Table 3-5**. **Table 3-6** provides a proposed schedule of activities for Site 2.

#### 3.5.1.4 IR Site 3 (OU 12) – Old Creosote Plant

Site 3, the Old Creosote Plant, encompasses approximately five acres on the Mainside of the Base (**Figure 3-45**). The Creosote Plant reportedly operated from 1951 to 1952 to supply treated lumber during construction of the Camp Lejeune Railroad. An onsite sawmill, which supplied

cut timbers for the creosote treatment, was reportedly located in the northern portion of the Site. Remnants of the former creosote plant, including the chimney, concrete pads, and train rails, are present in the southern portion of Site 3.

#### Initial Assessment Study (1983)

The IAS (WAR, 1983) reported that no hazardous wastes were disposed at Site 3, and concluded that no further assessment was necessary since any wastes present at the site would be inert. However, the USEPA requested an additional investigation to determine whether hazardous waste contamination existed.

#### Site Inspection (1991)

In June 1991, a SI was conducted, which included soil, groundwater and sediment investigations. The analytical results identified SVOCs, particularly PAHs in soil and groundwater. Based on these results, a RI was proposed.

#### RI (1994-1996)

From September 1994 through January 1996, RI field activities were conducted to characterize the nature and extent of contamination at Site 3. These field activities included installation of monitoring wells, and the collection of surface soil, subsurface soil, and groundwater samples. The RI identified PAHs (primarily naphthalene) in both soil and groundwater, with the highest concentrations occurring within the former treatment area in the central portion of the Site. The PAHs detected at Site 3 were believed to be linked to the operation at the former creosote plant. Fuel constituents, such as ethylbenzene and xylenes, were also detected in soil and groundwater within the former treatment area. The HHRA identified potential human health risks due to exposure to SVOCs in subsurface soils and VOCs and SVOCs in groundwater. The ERA did not identify any potential ecological risks.

#### FS (1996)

In August 1996, a FS was prepared which developed and screened remedial alternatives for addressing soil and groundwater contamination.

#### PRAP (1996) and ROD (1997, 1999)

The PRAP for Site 3 was submitted for public review and comment in November 1996. The PRAP consisted of five alternatives to address soil contamination and three alternatives to address groundwater contamination at Site 3. The Final ROD for OU 12 was signed on April 3, 1997, and identified source removal with on-site biological treatment of PAH-contaminated subsurface soils, groundwater monitoring, and LUCs as the preferred remedial alternative. However, a pilot scale treatability study conducted in 1998 indicated that biological treatment of soils was not effective. As a result, an Amended ROD was signed on June 20, 2000 (Baker, 2000a), identifying soil excavation with off-site disposal, groundwater monitoring, and LUCs as the preferred remedial alternative.

#### Remedy-in-Place

The removal action identified in the Amended ROD was completed as a NTCRA in 2000, during which 3,295 tons of PAH-contaminated soil was removed from Site 3.

LTM at Site 3 was implemented in 1997 and is on-going, in accordance with the recommendations of the LTM Optimization Report (CH2M HILL, 2005). The LTM program for Site 3 is summarized on **Table 3-4**. **Table 3-7** provides a proposed schedule of LTM activities at Site 3. LUCs were implemented in 2001 and updated in 2002, as shown in **Table 3-5**.

### 3.5.1.5 IR Site 6 (OU 2) – Lots 201 and 203

Site 6 is located within OU 2 approximately two miles east of the New River and two miles south of State Route 24. OU 2 covers approximately 210 acres and includes Sites 6, 9, and 82 (Figure 3-35). Site 6 covers an area of approximately 177 acres that incorporates Storage Lots 201 and 203, a wooded area between the storage lots, and a ravine. From the 1940s to the late 1980s, Site 6 was used for disposal and storage of wastes and supplies, including pesticides transformers containing PCBs, solvents, electrolytes, and waste oils. Currently, Lot 201 is used to store military equipment, vehicles, hydraulic oils, and other “non-hazardous” supplies. Most of Lot 203 remains an open field; 21 acres are temporarily being used by the DRMO for metal staging operations.

#### Initial Assessment Study (1983)

The IAS (WAR, 1983) indicated the wastes present at Site 6 originated from dumping and storage activities and recommended that a confirmation study be conducted to verify the presence of contamination.

#### Confirmation Study (1984-1987)

A Confirmation Study, conducted from 1984 to 1987, included soil, groundwater, surface water, and sediment investigations. Low levels of pesticides were detected in soil samples. Groundwater samples collected from shallow monitoring wells at Site 6 revealed low levels of VOCs and benzene. Further, elevated levels of TCE, PCE, DCE, and vinyl chloride were identified in nearby water supply wells, at a depth of approximately 200 feet.

#### Soil Gas Survey (1989)

In February 1989, a soil gas survey was conducted to identify the presence of VOCs that may potentially affect personnel working within Lot 203. No imminent hazards were identified with the results of the survey.

#### RI (1992-1993)

A RI was conducted at OU 2 (Sites 6, 9, and 82) from August 1992 to May 1993. Field activities consisted of a preliminary site survey; a geophysical survey; a soil investigation including drilling and sampling; a groundwater investigation including monitoring well installation and sampling; drum waste sampling; test pit investigation; a surface water and sediment investigation; and an aquatic and ecological survey. Levels of organic compounds (primarily PCBs, pesticides, VOCs, and SVOCs) and inorganic compounds (primarily barium, cadmium, chromium, lead, manganese, and zinc) were identified throughout the site in various media (i.e. soil, groundwater, surface water, and sediments). The HHRA identified potential human health risks due to exposure to vinyl chloride, arsenic, and beryllium in groundwater and PCB-1260 in biota from Wallace Creek. Further, the findings of the ERA indicated past disposal practices at Site 6 may potentially be adversely impacting the ecological integrity of Wallace Creek and the ravine.

#### FS (1993)

In August 1993, a FS was completed for OU 2 (Sites 6, 9, and 82), which developed and screened remedial alternatives for addressing groundwater (TCE and vinyl chloride) and soil (pesticides, PAHs, and PCBs) contamination.

#### PRAP and ROD (1993)

The PRAP for OU 2 (Sites 6, 9, and 82) was submitted for public review and comment in August 1993 for a 30-day period. The PRAP consisted of seven alternatives to address soil

contamination and five alternatives to address groundwater contamination. The Final ROD for OU 2 was signed on September 4, 1993 (Baker, 1993a). The ROD identified on-site treatment and off-site disposal of contaminated soil and implementation of LTM of groundwater, surface water, and sediment as the selected remedies for Site 6.

#### Remedy-in-Place

The removal action identified in the ROD was completed under a TCRA in 1994. Twenty drums containing DDT were removed and contaminated soil was excavated. A second TCRA was conducted in 1995 and 1996 to remove more than 2,655 cubic yards of drums, batteries, and communications wire. The soil was contaminated with POLs.

LTM at Site 6 was implemented in 1996 and is on-going, in accordance with the recommendations of the LTM Optimization Report (CH2M HILL, 2005). The LTM program for Site 6 is summarized on **Table 3-4**. LUCs were implemented in 2001 and updated in 2002, as shown in **Table 3-5**.

Groundwater monitoring well IR06-GW16 has returned intermittent and varied detections of chlorobenzene. Accordingly, a focused field investigation near this monitoring well was completed in June 2004 to delineate the extent of the chlorobenzene contamination. Results of the investigation indicated localized chlorobenzene detections in both the soil and groundwater in the vicinity of the well. Future investigations are planned to complete the delineation. **Table 3-8** provides a proposed schedule of activities at Site 6.

#### 3.5.1.6 IR Site 7 (OU 11) – Tarawa Terrace Dump

Site 7, the Tarawa Terrace Dump, encompasses approximately five acres within OU 11, which is also comprised of Site 80 (**Figure 3-44**). 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 at this facility; only construction debris, water treatment plant filter media, and household trash.

#### Initial Assessment Study (1983)

The IAS (WAR, 1983) concluded that the quantity of any waste disposed at Site 7 was insignificant and did not warrant further investigation.

#### SI (1991)

In June 1991, a SI was conducted which included soil and groundwater investigations. The analytical results identified SVOCs and pesticides in soil and groundwater. Based on these results, a RI was proposed.

#### RI (1994-1996)

The RI field program at Site 7 was conducted in 1994 and consisted of a site survey, soil investigation, groundwater investigation, surface water and sediment investigation, a habitat evaluation, and an earthworm bioaccumulation study. The Final RI was submitted in February 1996 and identified infrequent pesticide detections in soil and sediment samples across the site at concentrations consistently at or below Base background levels. SVOCs (primarily PAHs) were detected in surface soil samples in the north and eastern portions of the study area; however, these contaminants were not detected in groundwater. Metals were the most prevalent and widely distributed contaminants in soil and groundwater at Site 7. The HHRA and ERA did not identify any unacceptable risks to human health and the environment due to site-related contaminants.

### PRAP (1996) and ROD (1997)

Based on the findings of the RI, a Final PRAP for OU 11 (Sites 7 and 80) was submitted for public review and comment in November 1996. The Final ROD for OU 11 (Sites 7 and 80) was signed on August 21, 1997 (Baker, 1997a). No remedial actions were required in the ROD for Site 7 due to the absence of contamination. Therefore, Site 7 was closed with NFA.

#### 3.5.1.7 IR Site 9 (OU 2) – Fire Fighting Training Pit at Piney Green Road

Site 9 is located within OU 2 approximately two miles east of the New River and two miles south of State Route 24. OU 2 covers approximately 210 acres and includes Sites 6, 9, and 82 (**Figure 3-35**). Site 9 includes the original fire-fighting training area, which is still presently in use. Flammable liquids such as heating oil, solvents, and fuels are used as accelerants during the training exercises. From the early 1960s to 1981, training exercises were conducted in an 800 square foot unlined fire training pit, located in the southern area of the site. In 1981 the pit was lined with asphalt and an oil water separator (OWS) was installed next to the pit; and in 2002 the pit was lined with concrete. Four 500-gallon ASTs were located near the training area but are no longer present.

### Initial Assessment Study (1983)

The IAS (WAR, 1983) estimated that 30,000 gallons per year of used oil, solvents, and contaminated fuels were burned during training exercises. Based on its findings, the IAS recommended that a confirmation study be conducted to verify the presence of contamination and determine whether migration was occurring.

### Confirmation Study (1984-1987)

From 1984 to 1987, a Confirmation Study was conducted, which included a groundwater investigation. Chromium, lead, phenols, and ethylene dibromide were detected in groundwater samples.

### RI (1992-1993)

An RI was conducted at OU 2 (Sites 6, 9, and 82) from August 1992 to May 1993. Field activities at Site 9 consisted of a preliminary site survey, a soil investigation, and a groundwater investigation. Analytical results did not reveal extensive contamination.

### PRAP and ROD (1993)

The PRAP for OU 2 (Sites 6, 9, and 82) was submitted for public review and comment in August 1993 for a 30-day period. The Final ROD for OU 2 was signed on September 4, 1993 (Baker, 1993a). No remedial actions were required in the ROD for Site 9 due to the absence of contamination.

### Removal Action (2000)

A new POL Fire Training Pit was completed in 2000. The new training facility employs a petroleum source for burning operations and the pit is lined with high-temperature concrete. During the installation of the new facility, POL-contaminated soil was excavated and removed from the site.

### Remedy-in-Place

Although the ROD did not require remedial action, for conservativeness, LUCs were implemented in 2001 and updated in 2002 (**Table 3-5**) due to the site's continued use as a fire-training area.

### 3.5.1.8 IR Site 10 (Pre-RI) - Original Base Dump

Site 10, the Original Base Dump, is located on the Mainside of the Base (**Figure 3-8**). Site 10 was approximately five to 10 acres in size during full operation of the landfill and was reportedly used for construction debris and as a burn dump during construction of the Base, prior to 1950.

#### Initial Assessment Study (1983)

During the IAS (WAR, 1983), it was determined that Site 10 did not require further investigation. However, the site was added to the IR program in 1994 when it was reported that two marines developed skin rashes after contacting a heavy oily material that may have been at the site.

#### SI (1998)

Project plans for Site 10 were finalized in January 1998. An SI was conducted at the site in two phases; the first was completed in March 1998 and the second was completed in February/March 2001. Field work conducted as part of the SI included a site survey and soil, groundwater, surface water, and sediment sampling. The HHRA identified no unacceptable risks to human health and the environment. The ERA identified potential risk to aquatic receptors due to the presence of metals in surface water; however, it was determined that the conservative nature of the screening overestimated the risks. Based on the findings, the Final SI recommended NFA at Site 10.

#### NFA Decision Document (2005)

A Final NFA Decision Document (DD) was completed May 12, 2005.

### 3.5.1.9 IR Site 12 (Pre-RI) - Explosive Ordnance Disposal Detonation Area

Site 12, the EOD Detonation Area, covers approximately eight to 10 acres, located on the Mainside of the Base (**Figure 3-9**). Since the early 1960s, Site 12 has operated as an EOD detonation area. Ordnance is disposed by burning or detonating when it is found to be inert, unserviceable, or defective. Materials disposed at Site 12 include ordnance, colored smokes, and white phosphorous. Any undestroyed residues are typically less than one pound.

#### Initial Assessment Study (1983)

The IAS (WAR, 1983) concluded that the quantity of any waste disposed at Site 12 was insignificant and did not warrant further investigation. However, during a disposal exercise in 1992, an explosive crater (approximately eight feet deep) uncovered an oily sheen and a suspected petroleum odor was noted.

#### Pre-RI Screening Study (1995-1998)

Project plans for Site 12 were finalized in January 1995, and a Pre-RI screening study was conducted from 1995 to 1998. During the Pre-RI field investigation, EOD personnel stated that disposal of small arms ammunition was carried out by piling up the rounds, sometimes inside a crater from a past disposal, dousing the pile with diesel fuel and exploding the pile with a small explosive. EOD personnel also stated that the range had been used for a brief time as a target range for aircraft to drop “dummy” bombs onto. Soil and groundwater sampling was conducted at Site 12 in January and February 1996. Analytical results indicated that soil and groundwater at Site 12 had not been impacted by site activities. As a result, the Pre-RI recommended site closeout.

### NFA Decision Document (2001)

The Final NFA DD was completed May 8, 2001. Because Site 12 is an active range, it now falls under the Navy's Active Range Program.

#### 3.5.1.10 IR Site 16 (OU 8) – Former Montford Point Burn Dump

Site 16, the Former Montford Point Burn Dump, encompasses approximately four acres in the Montford Point area of the Base (**Figure 3-41**). The Montford Point Burn dump was open from approximately 1958 to 1972, although, unauthorized dumping subsequently occurred. Trash from the surrounding housing area and buildings is suspected to have been burned and then covered with soil at Site 16. Records indicate that building debris, garbage, tires, and small amounts of waste oils were disposed of at the site. Materials, including asbestos insulating material for pipes, were also dumped on the surface. The quantity of asbestos material was estimated at less than one cubic yard, and mitigation was completed. Currently, Site 16 is vacant.

### Initial Assessment Study (1983)

The IAS (WAR, 1983) indicated that unauthorized dumping of asbestos posed a possible health threat and recommended an investigation or removal be completed. Corrective measures were undertaken to remove the asbestos material.

### RI/FS (1994-1995)

An RI/FS was initiated at Site 16 in June 1994 and completed in December 1994. Field activities included a site survey, soil investigation, groundwater investigation, and surface water and sediment investigation. A second round of groundwater samples was collected in February 1995, and a confirmatory soil investigation was conducted in December 1995. Several pesticides were detected among soil and sediment samples obtained from the site; however, the detected levels were similar to levels detected across the Base and were considered indicative of historical pest control operations. PCBs were also detected in surface soil samples collected across the site, and the likely source was considered to be the use of oils during burning activities. PCBs were not found in the groundwater, indicating that vertical migration to the water table had not occurred. SVOCs (primarily PAHs) were infrequently encountered at low levels in the surface soil; likely due to historical open burning. Benzene and ethylbenzene were detected in one groundwater sample collected during the first round of groundwater sampling; however, VOCs were absent in all groundwater samples collected as part of the second round of sampling. Site-related contaminants were not detected in surface water and sediment samples. The HHRA identified a potential risk to future residential receptors due to the ingestion of PCBs in the soil. However, an evaluation of the detected PCB concentrations in soil against the USEPA's *Guidance for Cleaning up PCBs under CERCLA* revealed that the maximum detected PCB concentration (2.1 ppm) was below the recommended remediation level for PCBs of 10 to 25 ppm for industrial areas. The ERA did not identify any potential risks to aquatic and terrestrial receptors.

### PRAP and ROD (1996)

Although several contaminants were detected among the various samples of environmental media, the levels were not high enough to warrant further action. The Final PRAP for Site 16 was submitted for public review and comment in February 1996 for a 30-day period. The Final ROD for Site 16 was signed on September 30, 1996 (Baker, 1996b). No remedial actions were required in the ROD for Site 16 due to the absence of contamination.

Remedy-in-Place

Although the ROD did not require remedial action, for conservativeness, LUCs were implemented in 2001 and updated in 2002 (**Table 3-5**) due to the site's past use as a dump.

**3.5.1.11 IR Site 21 (OU 1) – Transformer Storage Lot 140**

Site 21, Transformer Storage Lot 140, is located within OU 1 approximately one mile east of the New River and two miles south of State Route 24. OU 1 covers approximately 690 acres and includes Sites 21, 24, and 78. Site 21 is located within the boundaries of Site 78 on the Mainside of the Base (**Figure 3-34**). From 1950 to 1951, a pit located in the northern portion of the site was used as a drainage receptor for oil from transformers; however, the quantity of oil is unknown. Surface discharge of transformer oils was also reported. According to the IAS, the upper four inches of soil at Lot 140 was sampled for PCBs in 1980, and concentrations were less than 1 ppm. In 1958 the pest control shop was moved from Building 712 (Site 2) to Building 1105, located in the southern portion of Site 21. From 1958 to 1977, Building 1105 was used for pesticide mixing and as a cleaning area for pesticide application equipment. Overland discharge of waste water generated during cleaning operations was documented. The estimated quantity of wastewater discharged was approximately 350-gallons per week in 1977.

Initial Assessment Study (1983)

The IAS (WAR, 1983) indicated that past site operations may have impacted soil, groundwater, and surface water and recommended an additional investigation.

Confirmation Study (1984-1987)

A Confirmation Study, conducted from 1984 to 1987, included soil and groundwater investigations. Analytical results confirmed the presence of pesticides and PCBs in soils, but they were not detected in groundwater samples.

RI (1994)

A RI was completed for OU 1 (Sites 21, 24, and 78) in June 1994. Field activities at Site 21 included groundwater, soil, sediment, and surface water sampling. The analytical results indicated that soils and sediment at the site had been by former activities. The HHRA concluded that contaminants detected at Site 21 did not pose an unacceptable risk to human health. The ERA identified potential ecological impacts due to the presence of pesticide- and PCB-contaminated soils.

FS (1994)

In July 1994, a FS was completed for OU 1 (Sites 21, 24, and 78), which developed and screened remedial alternatives for addressing soil contamination at three separate areas at Site 21.

PRAP and ROD (1994)

The PRAP for OU 1 (Sites 21, 24, and Site 78) was submitted for public review and comment in July 1994 for a 30-day period. The PRAP consisted of four alternatives to address soil contamination at Site 21. The Final ROD for OU 1 (Sites 21, 24, and 78) was signed September 15, 1994 (Baker, 1994a). The selected remedial alternative was excavation and off-site disposal to address soil contamination at Site 21. Before implementing the soil remedy, an Explanation of Significant Differences (ESD) was issued to revise the cleanup level for PCBs to the Federal PCB action level for industrial sites due to the industrial nature of site activities at Site 21.

### Remedy-in-Place

The removal action identified in the ROD was performed during 1995, and approximately 650 tons of pesticide-contaminated soil and 161 tons of PCB-contaminated soil were excavated and disposed off-site. Because the removal action was only considered protective for industrial site use, a Land Use Control Implementation Plan (LUCIP) was completed in March 2001 that restricts development to industrial land use and use of groundwater. LUCs were implemented at Site 21 in 2001 and amended in 2002, as shown in **Table 3-5**.

#### 3.5.1.12 IR Site 24 (OU 1) – Industrial Area Fly Ash Dump

Site 24, the Industrial Area Fly Ash Dump, encompasses approximately 100 acres within OU 1 approximately one mile east of the New River and two miles south of State Route 24. OU 1 covers approximately 690 acres and includes Sites 21, 24, and 78 (**Figure 3-34**). From the late 1940s to 1980, Site 24 was used for the disposal of fly ash, cinders, solvents, used paint stripping compounds, sewage sludge, and water treatment sludge. An estimated 31,500 tons of fly ash was disposed at the site and an estimated 45,000 gallons of stripping compounds was disposed over a seven year period.

#### Initial Assessment Study (1983)

The IAS (WAR, 1983) indicated that past site operations may have impacted groundwater and surface water and recommended an additional investigation.

#### Confirmation Study (1984-1987)

A Confirmation Study, conducted from 1984 to 1987, included groundwater, surface water, and sediment investigations. Analytical results identified the presence of metals in groundwater, surface water, and sediment. However, the detected concentrations in surface water and sediment did not exceed regulatory standards.

#### RI (1994)

A RI was completed for OU 1 (Sites 21, 24, and 78) in June 1994. Field activities at Site 24 included a site survey, groundwater, soil, sediment, and surface water sampling. The analytical results identified pesticides and metals in soil and groundwater. The metals were considered site-related due to fly ash disposal. Based on the relatively low concentrations and widespread detections of pesticides found in the soil and groundwater at Site 24, the RI concluded that the pesticides resulted from routine spraying activities, not direct disposal. This conclusion was supported by the fact that there is no history of pesticide disposal at Site 24. The HHRA identified an unacceptable risk to future residential receptors from ingestion of groundwater due to the presence of vinyl chloride and metals. However, this risk was calculated based on data from all monitoring wells across OU 1. The ERA identified potential ecological impacts to terrestrial receptors due to the presence of metals. The RI recommended evaluation of metal-contaminated soil at Site 24.

#### FS (1994)

In July 1994, a FS was completed for OU 1 (Sites 21, 24, and 78), which developed and screened remedial alternatives for addressing groundwater contamination at Site 24. As part of the FS, contaminants of concern (COCs) were evaluated against risk-based remediation goals, and as such, the COCs identified in soil during the RI were not retained as COCs in the FS.

### PRAP and ROD (1994)

The PRAP for OU 1 (Sites 21, 24, and Site 78) was submitted for public review and comment in July 1994 for a 30-day period. The Final ROD for OU 1 (Sites 21, 24, and 78) was signed September 15, 1994 (Baker, 1994a). The selected remedial alternative was LTM for addressing site groundwater at Site 24.

### Remedy-in-Place

LTM at Site 24 was implemented in 1996 and was discontinued in 1998 after achieving four consecutive quarterly sampling periods without any detections of pesticides. Although not identified in the ROD, LUCs for OU 1 were implemented through a LUCIP that was completed in 2001, as shown in **Table 3-5**.

#### 3.5.1.13 IR Site 28 (OU 7) – Hadnot Point Burn Dump

Site 28, the Hadnot Point Burn Dump, is located within OU 7 on the Mainside of the Base. OU 7 includes Sites 1, 28, and 30 (**Figure 3-40**). Site 28 operated from 1946 to 1971 as a burn area for a variety of solid wastes generated on the Base. Industrial waste, trash, oil-based paint, and construction debris were reportedly burned and 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 on a surface area of 23 acres and a depth ranging from 5 to 10 feet. Currently, most of Site 28 is used for recreation and physical training exercises.

### Initial Assessment Study (1983)

The IAS (WAR, 1983) concluded that residuals due to past disposal practices could potentially impact Codgels Creek and the New River and recommended an additional investigation to determine the boundaries of the disposal area and verify the presence of hazardous wastes.

### Confirmation Study (1984-1987)

A Confirmation Study, conducted from 1984 to 1987, included groundwater, surface water, sediment, and fish tissue investigations. Metals detected in groundwater, surface water, and sediment were determined to be related to past site activities. Additionally, VOCs and O&G were detected in groundwater samples.

### RI (1994)

In 1994, a RI was conducted at OU 7 (Sites 1, 28, and 30). RI field activities at Site 28 consisted of a site survey, a soil investigation, a groundwater investigation, surface water and sediment investigation, and an aquatic and ecological survey. SVOCs (primarily PAHs) detected in soil samples were linked to past disposal practices. Metals and pesticides were widely detected in soil samples. Low levels of VOCs were detected in the surface soil and subsurface soil. Based upon their wide dispersion, infrequent detection, and low concentration, VOCs were not considered to be related to past disposal practices. Metals were the most prevalent and widely distributed contaminants in groundwater at Site 28 and were found distributed throughout the site. Concentrations of metals in samples obtained during both sampling rounds were generally higher in shallow groundwater samples than in samples collected from the deeper aquifer. The HHRA identified potential risks to current and future receptors due to the presence of metals in groundwater. The ERA did not identify any potential risk to ecological receptors.

### FS (1995)

Remedial alternatives for groundwater were evaluated during preparation of the FS, submitted in July 1995.

### PRAP (1995) and ROD (1996)

The Final PRAP for OU 7 (Sites 1, 28, and 30) was issued July 13, 1995 and the Final ROD was signed on May 16, 1996 (Baker, 1996a). The ROD identified LTM and LUCs as the selected remedy for Site 28.

### Remedy-in-Place

LTM (groundwater, surface water, and sediment sampling) at Site 28 was implemented in 1996. In 2001, one shallow monitoring well was installed in the area of the highest lead concentrations observed in soil found during the RI. Results from soil and groundwater sampling indicated lead concentrations in both media, but below the levels detected during the RI. The lead was found to be at naturally high levels because of natural soil conditions. This new well was added to the LTM program in 2001. The LTM program at Site 28 was discontinued in January 2001 when site-wide concentrations fell below the remedial action goals. A Final OU 7 RACR was completed in September 2002 to document the completion of the remedial action (monitoring). LUCs were implemented 2001 and updated in 2002, as shown in **Table 3-5**.

#### 3.5.1.14 IR Site 30 (OU 7) – Sneads Ferry Road Fuel Tank Sludge Area

Site 30, the Sneads Ferry Road Fuel Tank Sludge Area, is located within OU 7 on the Mainside of the Base. OU 7 includes Sites 1, 28, and 30 (**Figure 3-40**). Site 30 was reportedly used by a private contractor in 1970 to clean out two 12,000-gallon emptied fuel storage tanks when the contents of the tanks were converted from leaded gasoline to unleaded gasoline. Sludge and/or washout was reportedly drained from the tanks and disposed of along a tank trail which intersects Sneads Ferry Road. The composition of the waste is unknown, but it may have contained cleansing compounds and possibly diluted tetraethyl lead. An estimated minimum of 600 gallons was reportedly disposed.

### Initial Assessment Study (1983)

The IAS (WAR, 1983) concluded that sludge deposits could potentially impact groundwater and recommended an additional investigation to determine the boundaries of the impacted area and verify the presence of hazardous wastes.

### Confirmation Study (1984-1987)

A Confirmation Study, conducted from 1984 to 1987, included groundwater, surface water, and sediment investigations. Analytical results identified O&G in the disposal area and in stream bed sediments as well as lead in groundwater.

### RI (1994)

In 1994, a RI was conducted at OU 7 (Sites 1, 28, and 30). RI field activities at Site 30 consisted of a site survey, a soil investigation, a groundwater investigation, and surface water and sediment investigations. One VOC was detected in a limited number of surface and subsurface soil samples. No significant detections of any other potentially hazardous compounds were noted during the RI. The HHRA and ERA did not identify any unacceptable risks to human health and the environment.

### PRAP (1995) and ROD (1996)

The Final PRAP for OU 7 (Sites 1, 28, and 30) was issued July 13, 1995 and the Final ROD was signed on May 16, 1996 (Baker, 1996a). No remedial actions were required in the ROD for Site 30 due to the absence of contamination. Therefore, Site 30 was closed with NFA.

#### 3.5.1.15 IR Site 36 (OU 6) – Camp Geiger Dump Area Near Sewage Treatment Plant

Site 36, the Camp Geiger Dump Area, is located within OU 6 in the northwest portion of the Base. OU 6 is comprised of Sites 36, 43, 44, and 54 (**Figure 3-39**). Site 36 was originally estimated to be approximately 1.5 acres; however, based upon a review of aerial photographs and observations recorded during a site scoping visit, the size of the site was adjusted to include nearly 20 acres. Site 36 was 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.

### Initial Assessment Study (1983)

The IAS (WAR, 1983) reported that most of the waste material brought to the dump was first burned and then buried; however, some unburned material was reportedly buried. The IAS recommended that a confirmation study be conducted at Site 36 to verify the presence of contamination in groundwater, surface water, and sediment.

### Confirmation Study (1984-1987)

From 1984 to 1987 a Confirmation Study was conducted to verify the presence of potential contaminants in groundwater, surface water, and sediment. The results of the sampling activities indicated that metals were present in environmental media throughout Site 36.

### RI (1996)

An RI was completed in 1996 to further characterize the nature and extent of contamination at Site 36. Field activities included the installation of additional monitoring wells and the collection of surface and subsurface soil samples, groundwater samples, surface water samples, and sediment samples. The RI identified metals present in all media sampled at the site. Metals were predominantly present in the central and eastern portions of the site, which corresponded to former buried material and fill locations. The HHRA identified potential human health risks due to exposure to iron and lead in subsurface soils and iron in groundwater. Further, the ERA identified potential ecological risks due to exposure to metals in site soils, surface water, and sediment. Additionally, PCBs were detected in surface and subsurface soils and VOCs were detected in the groundwater (surficial aquifer), consisting primarily of 1,2-DCE, TCE, PCE, and 1,1,2,2-tetrachloroethane (1,1,2,2-PCA). The RI recommended LTM of groundwater due to the presence of VOCs and its proximity to other surface water bodies.

### TCRA (1997)

Based on the original RI soil results and subsequent soil analyses, a TCRA of PCB-contaminated soil was determined to be the most appropriate action for Site 36. A Final TCRA Design Package was completed on April 1997. In June 1997, approximately 240 tons of non-regulated and regulated PCB-contaminated soil was removed from the northwestern region of the site. Following completion of the PCB removal action, the soil remaining in the area contained met the USEPA's cleanup goal for industrial use.

### Post-Remedial Investigation Groundwater Monitoring (1998-present)

A post-RI monitoring program at Site 36 began in 1998 consisting of quarterly groundwater and surface water sampling. Monitoring was implemented to determine if MNA could be a viable remedial alternative for VOCs in groundwater and to evaluate plume movement.

### FS (1998)

Remedial alternatives for groundwater were evaluated during preparation of the FS, submitted in June 1998.

### Additional Groundwater Sampling (2000)

Three temporary groundwater monitoring wells were installed on private property across Brinson Creek from the Base and sampled (for TCE only) in June 2000 to ascertain whether contaminants were migrating off Base property. The data indicated non-detectable levels of TCE in all three wells. In addition, groundwater elevation data from the temporary wells confirmed that groundwater within the surficial aquifer discharges into Brinson Creek.

### Revised FS (2002)

In June 2002, a Revised FS was completed for OU 6 (Sites 36, 43, 44, and 54), which developed and screened remedial alternatives for addressing soil contamination (PAHs, pesticides, and lead) and groundwater contamination (TCE, 1,1,2,2-PCA, and vinyl chloride) at Site 36.

### PRAP (2002)

The PRAP for OU 6 (Sites 36, 43, 44, and 54) was submitted for public review and comment in June 2002 for a 30-day period. The PRAP consisted of three alternatives to address soil contamination and three alternatives to address groundwater contamination at Site 36. Owing to the national debate between USEPA and the DoD regarding enforcement issues of the LUCs, completion of the Final ROD was temporarily delayed.

### NTCRA (2003)

Accordingly, an EE/CA was also presented at the June 2002 public meeting for completing an interim response removal action at Site 36. The EE/CA was completed in October 2002 and the removal action was completed as an NTCRA in 2003, before the Final ROD was issued. The primary focus of the NTCRA was the removal of PAH and pesticide-contaminated soil in four areas within the south central portion of the site. A total of 1,630 tons of soil was excavated during the removal action (Shaw, 2003).

### ROD (2005)

The Final ROD for Site 36 was signed on July 6, 2005 (Baker, 2005). The ROD identified LUCs and MNA as the selected remedy for the site.

### Remedy-in-Place

LTM at Site 36 was implemented in 1998 and is on-going, in accordance with the recommendations of the LTM Optimization Report (CH2M HILL, 2005). The LTM program for Site 36 is shown on **Table 3-4**. **Table 3-10** provides a proposed schedule of LTM activities at Site 36. LUCs were implemented in 2005, as shown in **Table 3-5**.

A Final OU 6 IRACR was completed in August 2007 to document the remedy in place at Site 36 (monitoring and LUCs). The decision to restrict development of the site is based on the former use of the site as a dump. The Army Corps of Engineers may be involved with issues in the future regarding the chemical training agents.

### 3.5.1.16 IR Site 41 (OU 4) – Camp Geiger Dump near Former Trailer Park

Site 41, the Camp Geiger Dump near the Former Trailer Park, encompasses approximately 30 acres within OU 4 in the Camp Geiger area of the Base. OU 4 is comprised of Sites 41 and 74 (Figure 3-37). From 1946 to 1970, Site 41 was used as an open burn dump. Construction debris, POL compounds, solvents, batteries, ordnance, chemical training agents, and, in 1964, a bag of mirex (a pesticide), were reportedly disposed at Site 41. The debris was reportedly burned and graded over with soil. The dump area is contains an estimated 110,000 cubic yards of waste. The amount of solvents and oil disposed was estimated to be between 10,000 and 15,000 gallons; and the quantity of mirex was estimated at several tons.

#### Initial Assessment Study (1983)

The IAS (WAR, 1983) concluded that disposal of industrial wastes and pesticides may impact groundwater and recommended an additional investigation to verify the presence of hazardous wastes.

#### Confirmation Study (1984-1987)

A Confirmation Study, conducted from 1984 to 1987, included groundwater, surface water, and sediment investigations. O&G and phenols were detected in groundwater, surface water, and sediment samples. VOCs and metals were detected in a limited number of groundwater samples at concentrations above regulatory criteria. In addition, one nitroaromatic (RDX) was detected in one groundwater sample, suggesting groundwater may have been impacted by ordnance disposal.

#### RI (1993-1995)

An RI was initiated for OU 4 (Sites 41 and 74) in December 1993 and completed in May 1995. Field activities for Site 41 included a geophysical investigation, soil investigation, groundwater investigation, surface water and sediment investigation, and an aquatic and ecological survey. Results of the RI indicated that the site contains a significant amount of buried construction debris. Analytical results indicated that surface soil in the central portion of the study area was contaminated with PAH compounds that were most likely the result of previous burning activities. Groundwater samples obtained from the site exhibited levels of chromium, iron, lead, and manganese above the NCGWQS. No chemical agents were detected during borehole monitoring by the U.S. Army Technical Escort Unit (TEU), and no chemical surety degradation compounds were detected in soil samples. The HHRA stated that there were no risks to current receptors because groundwater in this area is not used as a potable supply. The HHRA did identify a potential risk to future residential receptors due to exposure to shallow groundwater containing metals; however, residential use of Site 41 is not likely due to the likelihood of buried CWM. The ERA concluded that potential adverse impacts to ecological receptors were low based on the low levels of contamination in soil, sediment, and surface water.

#### FS (1995)

In May 1995, a FS was prepared which developed and screened remedial alternatives for addressing soil, groundwater, and surface water contamination.

#### PRAP and ROD (1995)

The Final PRAP for OU 4 (Sites 41 and 74) was issued May 8, 1995 and the Final ROD was signed on December 5, 1995 (Baker, 1995a). The selected remedy for Site 41 included LTM and LUCs. NCDENR acceptance of the ROD was contingent on completion of a groundwater reclassification and surface water variance due to the nature of potential contamination that

could not feasibly be remediated. In August 1997, a letter from NCDENR Wilmington Regional Office informed the Base that based on limited site contamination; the groundwater reclassification and surface water variance were no longer required.

#### Remedy-in-Place

LTM (groundwater, surface water, and sediment sampling) at Site 41 was implemented in 1997 and was discontinued in 2004 when site-wide concentrations dropped below remediation goals. LUCs were implemented 2001 and updated in 2002, as shown in **Table 3-5**.

A Final OU 4 RACR was completed in July 2006 to document the completion of the remedial action (monitoring). The decision to restrict development of the site is based on the former use of the site as a dump. The Army Corps of Engineers may be involved with issues in the future regarding the chemical training agents.

#### 3.5.1.17 IR Site 43 (OU 6) – Agan Street Dump

Site 43, the Agan Street Dump, encompasses approximately 11 acres within OU 6 in the operations area of MCAS New River. OU 6 is comprised of Sites 36, 43, 44, and 54 (**Figure 3-39**). An abandoned Sewage Treatment Plant (STP) is adjacent to the site. The Agan Street Dump reportedly received inert material such as construction debris (i.e., fiberglass and lumber) and trash. Sludge from the former STP was also reportedly dumped onto the ground surface of Site 43; however, it is not clear when disposal operations took place.

#### Initial Assessment Study (1983)

The IAS (WAR, 1983) concluded that waste quantities at Site 43, regardless of their nature, were minor; therefore, a confirmation study was not recommended. However, the USEPA requested an additional investigation to determine whether hazardous waste contamination existed.

#### SI (1991)

From July to August 1991, a SI was conducted which included soil, groundwater, surface water, and sediment investigations. The analytical results identified low levels of PAHs in a single soil sample and several sediment samples. Additionally, metals were detected in groundwater and surface water. Based on these results, further characterization as part of a RI/FS was proposed.

#### RI (1995)

The RI field investigation commenced in February 1995 and continued through May 1995. Field activities included a site survey, soil investigation, groundwater investigation, surface water and sediment investigation, habitat evaluation, and bioassay study. Exploratory test pits completed as part of the soil investigation identified miscellaneous debris (i.e., metal straps, metal containers, bricks, and plastic) associated with the disposal of construction debris from the nearby housing area. SVOCs, pesticides, and metals were detected in surface and subsurface soil samples. SVOCs in soil (primarily PAHs) were attributed to former disposal operations at Site 43. Metals were detected in soil samples at locations corresponding to areas with buried containers, fill, and graded soil. Inorganic compounds were the most prevalent and widespread constituents in groundwater at Site 43. Pesticides and metals were detected in surface water and sediment samples above screening values; however, the pesticide concentrations were similar to those detected elsewhere at the Base and were not attributed to past activities. The HHRA identified a potential human health risk under the future land use scenario due to the presence of metals in groundwater; however, the presence of metals in groundwater was not considered attributable to past site use, rather it was considered indicative of the natural high

concentrations observed across the Base. The ERA identified slight potential impacts to ecological receptors due to PAHs and metals in soil and pesticides and metals in surface water and sediment; however, the detected concentrations only slightly exceeded screening values, and therefore, the risks were considered minimal and did not warrant further action. Based on the findings of the RI, a removal action was recommended.

#### TCRA (1995)

Based on the RI, a TCRA for debris removal was determined to be the most appropriate action for Site 43. A Final Remedial Action Work Plan was submitted in May 1995. In July 1995, approximately 7.3 tons of surficial metallic debris was removed for recycling recovery. Additionally, 1,400 pounds of hazardous materials were shipped off-site for disposal.

#### FS (2002)

In June 2002, a Revised FS (the original FS only included Site 36) was completed for OU 6 (Sites 36, 43, 44, and 54), which developed and screened remedial alternatives for addressing localized areas of higher PAH concentrations in soil at Site 43.

#### PRAP (2002)

The PRAP for OU 6 (Sites 36, 43, 44, and 54) was submitted for public review and comment in June 2002 for a 30-day period. The PRAP consisted of three alternatives to address soil contamination at Site 43. Owing to the national debate between EPA and the DoD regarding enforcement issues of the LUCs, completion of the Final ROD was temporarily delayed.

#### NTCRA (2003)

Accordingly, an EE/CA was also presented at the public meeting for completing an interim response removal action at Site 43. The EE/CA was completed in October 2002 and the removal action was completed as an NTCRA in 2003, before the Final ROD was issued. The primary focus of the NTCRA was the removal of PAH-contaminated soil in one area located in the western portion of the site. A total of 1,477 tons of soil was excavated during the removal action (Shaw, 2003).

#### ROD (2005)

The Final ROD for Site 43 was signed on July 6, 2005 (Baker, 2005). The ROD identified LUCs as the preferred remedial alternative for Site 43.

#### Remedy-in-Place

An RD was completed for OU 6 in September 2005 to document the LUC implementation, as shown in **Table 3-5**. A Final OU 6 IRACR was completed in August 2007 to document the remedy in place at Site 43 (LUCs).

### 3.5.1.18 IR Site 44 (OU 6) – Jones Street Dump

Site 44, the Jones Street Dump, encompasses approximately five acres within OU 6 in the operations area of MCAS New River. OU 6 is comprised of Sites 36, 43, 44, and 54 (**Figure 3-39**). Site 44 was reportedly in operation during the 1950s. Although the quantity of waste is not known, debris, cloth, lumber, and paint cans were reportedly disposed of at the site.

#### Initial Assessment Study (1983)

The IAS (WAR, 1983) concluded that due to the negligible quantity of inert material reportedly disposed at Site 44, a confirmation study was not recommended. However, the EPA requested an additional investigation to determine whether hazardous waste contamination existed.

### SI (1991)

From July to August 1991, a SI was conducted which included soil, groundwater, surface water, and sediment investigations. The analytical results identified PAHs, pesticides, and metals in soil; VOCs, PAHs, and metals in surface water; and pesticides and metals in sediment. Based on these results, further characterization as part of a RI/FS was proposed.

### RI (1995)

An RI field investigation at Site 44 commenced in February 1995 and continued through May 1995. Field activities included a site survey, soil investigation, groundwater investigation, surface water and sediment investigation, habitat evaluation, and bioassay study. Pesticides and metals were detected in soil samples across the site; however, their occurrence was not considered attributable to past site activities. Additionally, low levels of SVOCs (primarily PAHs) were detected in soil samples. Metals were the most prevalent and widely distributed constituents in groundwater at Site 44. VOCs were detected in two monitoring wells and from 13 surface water samples obtained from Edwards Creek, but were not detected in any of the 10 sediment samples obtained from the creek. The occurrence of VOCs among the limited groundwater and surface water samples obtained from the study area was attributed to Site 89, located upgradient of Site 44. The HHRA identified a potential human health risk under the future land use scenario due to the presence of iron in groundwater; however, the presence of iron in groundwater was not considered attributable to past site use, rather it was considered indicative of the natural high concentrations observed across the Base. The ERA identified slight potential impacts to ecological and terrestrial receptors due to pesticides in sediment and metals in surface water and soil; however, the detected concentrations only slightly exceeded screening values, and therefore, the risks were considered minimal and did not warrant further action.

### FS (2002)

In June 2002, a Revised FS (the original FS only included Site 36) was completed for OU 6 (Sites 36, 43, 44, and 54). Based on the findings of the RI, the FS recommended no action at Site 44.

### PRAP (2002)

The PRAP for OU 6 (Sites 36, 43, 44, and 54) was submitted for public review and comment in June 2002 for a 30-day period. Owing to the national debate between EPA and the DoD regarding enforcement issues of the LUCs, completion of the Final ROD was temporarily delayed.

### ROD (2005)

The Final ROD was signed on July 6, 2005 (Baker, 2005). Although no action was recommended for Site 44 during the FS, for conservativeness the Base identified potential risks based on the OU 6 sites formerly used for waste disposal. Therefore, LUCs were the preferred alternative presented in the ROD.

### Remedy-in-Place

An RD was completed for OU 6 in September 2005 to document the LUC implementation, as shown in **Table 3-5**. A Final OU 6 IRACR was completed in August 2007 to document the remedy in place at Site 44 (LUCs).

#### 3.5.1.19 IR Site 48 (OU 3) – MCAS Mercury Dump

Site 48, the MCAS Mercury Dump, encompasses approximately four acres within MCAS New River, in the northwest portion of the Base (**Figure 3-36**). Building AS-804 was constructed in

1955 and was used as the Administration Office and Photographic Lab from 1955 to 1990. From 1956 to 1966, mercury was drained from radar units and disposed in small quantities behind the building. It was reported that approximately one gallon of mercury per year over a 10-year period was disposed in this manner. Building AS-804 is currently used as a classroom training facility.

#### Initial Assessment Study (1983)

The IAS (WAR, 1983) estimated that 1,000 pounds of mercury may be dispersed over approximately 20,000 square feet adjacent to the New River. The IAS concluded that mercury disposal practices could potentially impact the New River and recommended a confirmation study to verify the presence of mercury.

#### Confirmation Study (1984-1987)

A Confirmation Study, conducted from 1984 to 1987, included soil and sediment investigations. Low levels of mercury were identified in both media, so further characterization was recommended.

#### Supplemental Characterization (1991)

In January 1991, a Supplemental Characterization Investigation was conducted, which included surface water and sediment sampling. Mercury was not detected in any samples collected during the investigation. Based on the findings of the IAS, Confirmation Study, and Supplemental Characterization, a Site Assessment report was completed in 1991. No additional sampling was conducted; however, a preliminary risk evaluation was completed. The risk evaluation did not identify mercury as a contaminant of potential concern (COPC); rather, it identified several other metals as COPCs.

#### RI (1992)

An RI was completed in 1992, which included a geophysical investigation, and soil, groundwater, surface water, and sediment investigations. During the RI, historical aerial photographs were obtained and evaluated to identify the suspected disposal area(s). The geophysical investigation did not identify any objects associated with mercury disposal. The soil and groundwater investigations focused on anomalies identified in the aerial photographs. The results of the RI did not identify mercury in any media sampled. Pesticides and metals were detected in surface soil samples, but their presence was not considered to be site-related. Low levels of organics and metals were detected in groundwater and surface water samples, and pesticides, PAHs, and metals were detected in sediment samples. The HHRA and ERA both concluded that the detected concentrations at Site 48 did not pose a threat to human health or the environment.

#### PRAP and ROD (1993)

The PRAP for Site 48 was submitted for public review and comment in June 1993 for a 30-day period. The Final ROD was signed on September 10, 1993 (Baker, 1993b). No remedial actions were required in the ROD for Site 48 due to the absence of contamination. Therefore, Site 48 was closed with NFA.

### 3.5.1.20 IR Site 54 (OU 6) – Crash Crew Fire Training Burn Pit

Site 54, the Crash Crew Fire Training Burn Pit, is located within OU 6 in the operations area of MCAS New River. OU 6 is comprised of Sites 36, 43, 44, and 54 (**Figure 3-39**). Site 54 has served as the fire training burn pit since the mid-1950s. The former Crash Crew Fire Training Burn Pit

was 90 feet in diameter and was situated at the center of this 1.5-acre site. Originally, fire training was conducted on the ground surface within a bermed area. The exercises were conducted within the burn pit using JP-type fuel, which was stored in a 8,000-gallon UST stored northwest of the burn pit. An OWS, located approximately 100 feet southeast of the burn pit, was used for temporary storage and collection of the spent fuel. In 1975, a lined burn pit was constructed and was used until 1999. Beginning in August 2000, the burn pit was converted to a training area that employs clean-burning fuels with operational and engineering controls. During the installation, POL-contaminated soil was removed. The IAS (WAR, 1983) reported that based on present POL usage rates, nearly one-half million gallons of POL may have been used at Site 54. Most of the POL was burned, but as many as 3,000 to 4,000 gallons may have soaked into the soil.

#### **Initial Assessment Study (1983)**

The IAS (WAR, 1983) concluded that waste fuels, oils, and solvents may remain in the soil at Site 54 and recommended an additional investigation to verify the presence of hazardous wastes. A Confirmation Study, conducted from 1984 to 1987, included groundwater, and sediment investigations. Due to the presence of low levels of petroleum compounds, further characterization was recommended.

#### **RI (1995)**

An RI field investigation at Site 54 began in February 1995 and continued through May 1995. Field activities included a site survey, soil investigation, groundwater investigation, and habitat evaluation. Soil borings were taken to assess the suspected impact of burn pit operations and were used to install monitoring wells. SVOCs were identified in both surface and subsurface soil samples from the southern and southwestern portions of the study area. 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 VOC and SVOC compounds in soil and groundwater samples obtained from this portion of the study area is consistent with former site operations. The HHRA identified a potential human health risk under the future land use scenario due to the presence of iron and lead in groundwater. The ERA identified slight potential impacts to terrestrial receptors due to SVOCs in soil.

#### **Post-RI Monitoring (1998-2002)**

Based on the findings of the RI, post-RI monitoring at Site 54 began in June 1997, which included collection of groundwater samples on a quarterly basis.

#### **Removal Action (2000-2001)**

A removal action was completed in 2000/2001 during conversion of the burn pit. Approximately 6,461 tons of POL-contaminated soils and construction debris from the former burn pit was removed from an area that was 128 feet long by 96.5 feet wide and extended nine feet bgs to the depth of groundwater. Based on groundwater data collected following the removal action, it was determined that lead, SVOCs, and VOCs no longer posed an impact to groundwater. Subsequently, groundwater monitoring was discontinued in 2002.

#### **FS (2002)**

In June 2002, a Revised FS (the original FS only included Site 36) was completed for OU 6 (Sites 36, 43, 44, and 54). Based on the findings of the RI, the FS recommended no action at Site 54.

### PRAP (2002)

The PRAP for OU 6 (Sites 36, 43, 44, and 54) was submitted for public review and comment in June 2002 for a 30-day period. Owing to the national debate between EPA and the DoD regarding enforcement issues of the LUCs, completion of the Final ROD was temporarily delayed.

### ROD (2005)

The Final ROD was signed on July 6, 2005 (Baker, 2005). Although no action was recommended for Site 54 during the FS, for conservativeness the Base identified potential risks based on the OU 6 sites formerly used for waste disposal. Therefore, LUCs were the preferred alternative presented in the ROD.

### Remedy-in-Place

An RD was completed for OU 6 in September 2005 to document the LUC implementation, as shown in **Table 3-5**. A Final OU 6 IRACR was completed in August 2007 to document the remedy in place at Site 54 (LUCs).

#### 3.5.1.21 IR Site 63 (OU 13) – Verona Loop Dump

Site 63, the Verona Loop Dump, encompasses approximately five acres, nearly two miles south of the MCAS New River operations area (**Figure 3-46**). Much of the site is heavily vegetated with dense understory and trees greater than three inches in diameter. Very little information is known regarding the history or occurrence of waste disposal practices at Site 63. The area reportedly received bivouac wastes generated during training exercises. No hazardous wastes were reportedly disposed of at Site 63. Currently, training exercises, maneuvers, and recreational hunting frequently take place in the area.

### Initial Assessment Study (1983)

The IAS (WAR, 1983) reported that the quantities of waste disposed at Site 63, whether hazardous or not, were insignificant and concluded that no further assessment was necessary. However, the EPA requested an additional investigation to determine whether hazardous waste contamination existed.

### SI (1991)

In 1991 an SI was completed at Site 63. Field activities included soil, groundwater, surface water, and sediment sampling. Fill materials were encountered in site soils, confirming that disposal of waste materials occurred at Site 63. SI results indicated inorganic and organic compounds detected in soil samples may be attributable to past disposal practices. Metals and organic compounds were detected in groundwater samples. Based on these findings, the SI recommended further evaluation.

### RI (1995)

The RI field investigation of Site 63 was completed during November 1995. The RI field program consisted of a site survey, a soil investigation, a groundwater investigation, surface water and sediment investigation, and a habitat evaluation. SVOCs, pesticides, and metals were detected at Site 63. Pesticide concentrations were low (i.e., less than 0.1 milligrams per kilogram) and primarily limited to areas within and adjacent to the suspected disposal portion of the study area. The presence of SVOCs and pesticides is most likely the result of former or ongoing activities at Site 63. The HHRA and ERA did not identify a risk to human health or the environment due to site-related contaminants.

### PRAP (1996) and ROD (1997)

The PRAP for Site 63 was submitted for public review and comment in November 1996 for a 30-day period. The Final ROD was signed on April 3, 1997 (Baker, 1997b). The ROD for Site 63 stipulated that no additional remedial action or monitoring was required.

### Remedy-in-Place

Although the ROD did not require remedial action, the Base implemented LUCs in 2001 and updated them in 2002 (**Table 3-5**), due to the site's history as a dump.

#### 3.5.1.22 IR Site 65 (OU 9) – Engineer Area Dump

Site 65, the Engineer Area Dump, is located in the Courthouse Bay area of MCB Camp Lejeune and is approximately five acres in size (**Figure 3-42**). Two separate disposal areas have been reported at Site 65, a battery acid disposal area and a liquid disposal area. The liquids that have been disposed are reported to have been POL types. In addition, the dump was used to burn construction debris. The dump was in operation from at least 1958 until 1972.

### Initial Assessment Study (1983)

The IAS (WAR, 1983) reported that no hazardous wastes were disposed at Site 65, and concluded that no further assessment was necessary since any wastes present at the site would be inert. However, the USEPA requested an additional investigation to determine whether hazardous waste contamination existed.

### SI (1991)

In 1991 an SI was completed at Site 65. Field activities included soil, groundwater, surface water, and sediment sampling. Fill materials were encountered in site soils, confirming that disposal of waste materials occurred at Site 63. SI results indicated low levels of PAHs in surface soil samples may be attributable to past disposal practices. Pesticides and metals were detected in groundwater and sediment samples. Based on these findings, the SI recommended further evaluation.

### RI (1995)

An RI was conducted at Site 65 in 1995, which included a soil investigation, groundwater investigation, surface water and sediment investigation, and ecological investigations. Findings from the RI indicate that there were no releases of hazardous substances from the waste disposal areas that would result in a risk to human health or the environment.

### Post-RI Sampling (2001)

In early 2001, several discarded containers were discovered near Site 65. The containers were heavily corroded and no materials were observed in the containers. Groundwater, soil, and surface water and sediment (from a nearby creek) were collected in April 2001 to determine if surrounding media had been affected by potential releases, but the data indicated there were no effects caused by the containers.

### PRAP and ROD (2001)

The PRAP for Site 65 was submitted for public review and comment in July 2001 for a 30-day period. The Final ROD was signed on September 30, 2001 (Baker, 2001a). The ROD for Site 65 stipulated that no additional remedial action or monitoring was required.

### 3.5.1.23 IR Site 68 (Pre-RI) - Rifle Range Dump

Site 68, the Rifle Range Dump, is located in the Rifle Range Area of the Base (**Figure 3-29**). From 1942 to 1972, this three to four acre area was used as a disposal site for various types of wastes, including garbage, building debris, waste treatment sludge, and solvents. 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. The amount of solvents disposed at Site 68 was estimated to be between 1,000 and 2,000 gallons.

#### Initial Assessment Study (1983)

The IAS (WAR, 1983) reported that organic compounds were identified in potable supply wells RR-45 and RR-97, located upgradient from the site. Even though these wells are located upgradient from the site, it was suspected that continuous pumping may have drawn contaminants to the wells. Based on these findings, the IAS recommended an additional investigation.

#### Pre-RI Screening Study (1995-1998)

Project plans for Site 68 were finalized in January 1995, and a Pre-RI screening study was conducted from 1995 to 1998. Field activities included soil, groundwater, surface water, and sediment sampling. One pesticide and one PCB compound were detected in the surface soil samples above the established screening criteria. One PCB was detected in subsurface soil samples at a concentration below the screening standard. Two VOCs and metals were detected in groundwater samples collected at the site. Sediment samples detected the presence of pesticides and metals. The BRA, completed as part of the Pre-RI, identified a slight risk due to the presence of metals in the shallow groundwater. However, these metals were considered to be naturally occurring and not site related. As a result, the Pre-RI recommended no further remedial action; however, because the site was a former dump, LUCs were implemented in June 2001 and updated in July 2002, as shown in **Table 3-5**.

#### NFA Decision Document (2001)

The Final NFA DD was completed May 8, 2001, which stated that all investigations or activities for the IR Program for Site 68 are complete. Although no remedial action was required, the Base implemented LUCs in 2001 and updated them in 2002 (**Table 3-5**), due to the site's history as a dump.

### 3.5.1.24 IR Site 74 (OU 4) – Mess Hall Grease Dump Area

Site 74, the Mess Hall Grease Dump, is located within OU 4, which is also comprised of Site 41 (**Figure 3-37**). From the early 1950s through the early 1960s, grease from the mess hall at Site 74 was reportedly disposed of in trenches. It was also reported that drums containing PCBs and pesticide-soaked bags were buried near the grease pit. Estimates of quantities include 1,100 gallons of PCB oil, 50 to 500 gallons of DDT, and 2,200 gallons of drummed pesticides. One internal memorandum reports that chemical training agents in the form of test kits, similar to the types documented at Site 69, also were reportedly taken to Site 74. A former Pest Control Area was also reportedly located in the southeastern portion of the Site; however information on past activities is unknown.

#### Initial Assessment Study (1983)

The IAS (WAR, 1983) concluded that disposal of pesticides and PCBs may impact groundwater and recommended an additional investigation to verify the presence of hazardous wastes.

### Confirmation Study (1984-1987)

A Confirmation Study, conducted from 1984 to 1987, included soil and groundwater investigations. Pesticides were detected in soil and groundwater samples collected from Site 74.

### RI (1993-1995)

An RI was initiated for OU 4 (Sites 41 and 74) in December 1993 and completed in May 1995. Field activities for Site 74 included a geophysical investigation, site survey, soil investigation, groundwater investigation, surface water and sediment investigation, and an aquatic and ecological survey. Historical aerial photographs of Site 74 depict extensive trenching operations. Results of the RI indicated that soils in the former pest control area had been impacted by site activities; however, the extent of impact was limited. Analytical results also indicated that soil and groundwater in the vicinity of the former grease pit had not been significantly impacted by site activities. No chemical agents were detected during borehole monitoring by the U.S. Army TEU, and no chemical surety degradation compounds were detected in soil samples. The HHRA stated that there were no risks to current receptors. The HHRA did identify a potential risk to future residential receptors due to exposure to shallow groundwater and soils. The ERA did not identify potential risks to ecological receptors.

### FS (1995)

In May 1995, a FS was prepared which developed and screened remedial alternatives for addressing soil and groundwater contamination.

### PRAP and ROD (1995)

The Final PRAP for OU 4 (Sites 41 and 74) was issued May 8, 1995 and the Final ROD was signed on December 5, 1995 (Baker, 1995a). The selected remedy for Site 74 included LTM and LUCs.

### Remedy-in-Place

LTM (groundwater sampling) at Site 74 was implemented in 1997 and was discontinued in 1998, because detected metal concentrations were deemed indicative of naturally occurring metals in the presence of acidic soil. A Final OU 4 RACR was completed in July 2006 to document the completion of the remedial action (monitoring). LUCs were implemented 2001 and updated in 2002, as shown in **Table 3-5**.

#### 3.5.1.25 IR Site 75 (Pre-RI) - MCAS Basketball Court Site

Site 75, the MCAS Basketball Court Site, is located in the MCAS New River operations area (**Figure 3-30**). Site 75 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 75 to 100 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.

### Initial Assessment Study (1983)

The IAS (WAR, 1983) concluded that degradation of the buried drums could result in the release of the suspected materials into the groundwater. This was of particular concern because of the site's proximity to several water supply wells in the area, two of them within 500 feet of

the alleged disposal site. Based on these findings, the IAS recommended additional investigation.

#### Pre-RI Screening Study (1995-1998)

Project plans for Site 75 were finalized in January 1995, and a Pre-RI screening study was conducted from 1995 to 1998. Field activities included a geophysical investigation, soil, and groundwater sampling. The geophysical survey did not detect any major subsurface anomalies that could have been the suspected drums. SVOCs, pesticides, and metals were detected in the soil samples. No organic compounds were detected in groundwater samples; however, several metals were detected at concentrations exceeding state and/or federal regulatory levels. The BRA, completed as part of the Pre-RI, did not identify any risk from the media sampled at the site. As a result, the Pre-RI recommended no further action.

#### NFA Decision Document (2001)

The Final NFA DD was completed May 8, 2001, which stated that all investigations or activities for the IR Program for Site 75 are complete.

#### 3.5.1.26 IR Site 76 (Pre-RI) - MCAS Curtis Road Site

Site 76, the MCAS Curtis Road Site, is located in the MCAS New River operations area (**Figure 3-31**). There are several base housing units to the immediate north of the Site 76 study area. Site 76 was reportedly used as a drum disposal area on two occasions in 1949. The estimated area of the disposal unit is  $\frac{1}{4}$ -acre, and approximately 25 to 75 55-gallon drums were allegedly disposed at this site. The drums reportedly contained a chloroacetophenone tear gas solution used for training similar to that allegedly buried at Site 75. Additional organic chemicals, such as chloroform, carbon tetrachloride, benzene, and chloropicrin, may have been present in the solution.

#### Initial Assessment Study (1983)

The IAS (WAR, 1983) concluded that degradation of the buried drums could result in the release of the suspected materials into the groundwater. Based on these findings, the IAS recommended an additional investigation.

#### Pre-RI Screening Study (1995-1998)

Project plans for Site 76 were finalized in January 1995, and a Pre-RI screening study was conducted from 1995 to 1998. Field activities included a geophysical investigation, soil, and groundwater sampling. The geophysical survey did not detect any major subsurface anomalies that could have been the suspected drums. Several VOCs, SVOCs, and pesticides were detected in the soil samples at Site 76. Metals were detected in each of the groundwater samples; however, only aluminum and iron exceeded state and/or federal regulatory levels. The BRA, completed as part of the Pre-RI, identified a slight risk to future residents due to the presence of metals in groundwater. However, these metals were considered to be naturally occurring and not site related. As a result, the Pre-RI recommended NFA. In response to an agency comment and because metals were previously detected above screening criteria, groundwater was sampled again in October 1999. This data showed the presence of some metals above screening criteria but within range of the natural background of groundwater at Camp Lejeune.

#### NFA Decision Document (2001)

The Final NFA DD was completed May 8, 2001, which stated that all investigations or activities for the IR Program for Site 76 are complete.

### 3.5.1.27 IR Site 78 (OU 1) – Hadnot Point Industrial Area

Site 78, the HPIA, is located within OU 1 approximately one mile east of the New River and two miles south of State Route 24. OU 1 covers approximately 690 acres and includes Sites 21, 24, and 78. (Figure 3-34). Site 78 covers approximately 590 acres comprised of maintenance shops, warehouses, painting shops, printing shops, auto body shops, and other small industrial facilities. The HPIA, constructed in the late 1930s, was the first developed area at MCB Camp Lejeune. Due to the industrial nature of the site, many spills and leaks have occurred over the years.

#### Initial Assessment Study (1983)

The IAS (WAR, 1983) identified four sites within the HPIA (Sites 21, 22, 24, and 28) requiring further investigation.

#### Confirmation Study (1984-1988)

From 1984 to 1988, a Confirmation Study was conducted, which included collecting groundwater samples from monitoring wells and existing supply wells within the HPIA. The Confirmation Study confirmed the presence of VOCs related to fuels and/or solvents in groundwater and nearby water supply wells. As a result, four supply wells (HP-601, HP-602, HP-608, and HP-634) were immediately shut down. In addition, three groundwater plumes were identified in the shallow portion of the surficial aquifer, centered in the vicinity of Building 902, Site 22, and Building 1601. The source of groundwater contamination was generally not linked to the existing sites, so Site 78 was created to investigate the entire HPIA.

#### Hadnot Point Fuel Farm Groundwater Study (1990)

In 1990, a groundwater study was conducted at the Hadnot Point Fuel Farm (Site 22) as part of the MCB Camp Lejeune UST Program. Although this study was conducted for Site 22, the results are applicable to Site 78 given the proximity of the sites. The study concluded that fuel losses of gasoline/fuels likely occurred predominantly through leaks in the transfer lines or valves. Analysis indicated that floating product had contributed significant levels of dissolved petroleum compounds including BTEX into the groundwater. Trace levels of non-petroleum VOCs including TCE and PCE were also detected within the fuel farm area. Based on the results of this study, a product recovery/groundwater treatment system was designed for the fuel farm and began operation in 1991.

#### Supplemental Characterization Study (1990-1991)

A Supplemental Characterization Study was performed in 1990 and 1991 to further evaluate the extent of contamination in the shallow and deeper portions of the aquifer and to characterize the contamination within the shallow soils at suspected source locations. The study concluded that TCE was only present in soils associated with a UST at Building 902, which was reportedly used to store spent solvents. The results of the shallow groundwater sampling confirmed findings from previous investigations; and the results from the intermediate and deep monitoring wells identified BTEX constituents downgradient of the fuel farm and at other areas of the site.

#### Interim Remedial Action RI/FS (1992)

An IRA RI/FS for the surficial aquifer at Site 78 was conducted in 1992. The IRA RI report identified three contaminant plumes within the shallow aquifer at Site 78. However, one plume was determined to be associated with the Hadnot Point Fuel Farm (Site 22) and was addressed under a separate UST program. The second plume was located in the vicinity of Building 903.

This plume contained solvent contamination (e.g., TCE) and low-levels of fuel-related contamination (BTEX). The third plume was believed to originate in the vicinity of Buildings 1502, 1601, and 1602, and contained solvent-related compounds, fuel-related compounds, and lead. The qualitative risk assessment concluded that benzene and TCE could impact human health if shallow groundwater were to migrate into the deep portions of the aquifer, or if the shallow aquifer were to be utilized in the future as potable water.

#### Interim PRAP and IROD (1992)

An IRA PRAP for addressing shallow groundwater at Site 78 was submitted for public review and comment in May 1992. The PRAP consisted of four alternatives to address shallow groundwater contamination at Site 78. The IROD was signed on September 23, 1992 (Baker, 1992). The preferred alternative for remediating shallow groundwater involved groundwater extraction and treatment through two separate pump and treat systems constructed in the northern and southern portions of the site. Design of the interim extraction/treatment system was completed in 1993 and construction was completed in December 1994.

#### RI (1994)

A RI was completed in June 1994 to further characterize potential environmental and ecological impacts, and to evaluate risks to human health resulting from previous storage, operation, and disposal activities at OU 1. The field program consisted of a soil gas survey, a site survey, a soil investigation, and groundwater investigation. The analytical results indicated groundwater in the surficial and Castle Hayne aquifers has been impacted by organics and metals, primarily due to former operational/disposal practices conducted within the industrial area. The RI also concluded that the Castle Hayne aquifer is contaminated due to vertical migration, but to a far lesser degree than the surficial aquifer. No specific source areas were identified during the RI, with the exception of a few suspected USTs and buildings where solvents are known to have been stored. The HHRA identified potential human health risks due to exposure to groundwater. The ERA indicated that pesticides in soil appear to be the most significant contaminant of concern for decreasing the viability of terrestrial organisms at Site 78.

#### FS (1994)

In July 1994, a FS was completed for OU 1, which developed and screened remedial alternatives for addressing soil contamination (PAHs, pesticides, metals) and groundwater contamination (PCE, TCE, 1,2-DCE, BTEX, and vinyl chloride).

#### PRAP and ROD (1994)

The PRAP for OU 1 (Sites 21, 24, and Site 78) was submitted for public review and comment in July 1994 for a 30-day period. The PRAP consisted of four alternatives to address soil contamination and five alternatives to address groundwater contamination at Site 78. The Final ROD for OU 1 (Sites 21, 24, and 78) was signed September 15, 1994 (Baker, 1994a). The ROD identified LUCs to address soil contamination and continuation and expansion of the groundwater treatment system and implementation of LTM to address groundwater contamination as the selected remedies for Site 78.

#### Natural Attenuation Evaluation (2001-2002)

Based on the findings of the LTM sampling, a NAE was conducted to further characterize the nature and extent of the southern contaminant plume and determine whether natural attenuation of chlorinated VOCs was occurring. As a result, operations at the south plant were temporarily discontinued from January 2000 through May 2002 to allow for the completion of

an NAE. The NAE was completed in July 2001 (Site 78 North) and February 2002 (Site 78 South). The NAE indicated there is “limited” to “adequate” evidence for natural attenuation processes at Site 78 South, and “adequate” to “strong” evidence for natural attenuation processes at Site 78 North. The NAE recommended that pilot studies should be performed at both 78 North and 78 South plumes.

#### Supplemental Investigation (2002)

A Supplemental Investigation was conducted in June 2002 to further characterize groundwater at Site 78 South in the ball field area of the site. Soil samples were also collected at several known “hot spot” areas within Sites 78 South and North. The additional groundwater data indicated that the plume at Site 78 South extends further south and southwest than delineated during the NAE study. Analytical data further identified VOCs and BTEX compounds in soil samples collected from within several known “hot spot” areas.

#### Technology Evaluation (2002)

In April 2002, a Technology Evaluation was completed to evaluate remedial alternatives for reducing groundwater concentrations in two “hot spot” areas in order to reduce the time needed to reach North Carolina cleanup goals. The Technology Evaluation recommended completing a pilot study using several of the technologies evaluated.

#### ORC® and HRC® Pilot Study (2003)

In 2003, two pilot studies were initiated to determine if in-situ technologies are effective in remediating chlorinated compounds in groundwater at Site 78. The pilot study performed at Site 78 North, near the corner of Building 903, included injection of Oxygen Release Compound® (ORC®) into groundwater at locations with vinyl chloride concentrations higher than 1,000 µg/L. The pilot study performed at Site 78 South, near the corner of Building 1601, included the injection of Hydrogen Release Compound® (HRC®), into groundwater at locations with TCE concentrations greater than 1,000 µg/L. The Final Pilot Study report, concluded that the concentration of vinyl chloride in groundwater at Site 78 North was reduced by 25 to 50 percent and that the concentration of TCE in groundwater at Site 78 South was reduced by an order of magnitude at the majority of wells. The pilot study report recommended continuation of LTM in order to observe further reductions in concentrations under natural conditions and testing for total oxidant demand in order to determine if the addition of another oxidant is feasible.

#### Remedy-in-Place

LTM at Site 78 was implemented in 1995 and is on-going, in accordance with the recommendations of the LTM Optimization Report (CH2M HILL, 2005). The LTM program for Site 78 is shown on **Table 3-4**. **Table 3-13** provides a proposed schedule of activities at Site 78. LUCs were implemented in June 2001 and updated in July 2002, as shown in **Table 3-5**.

#### 3.5.1.28 IR Site 80 (OU 11) – Paradise Point Golf Course Maintenance Area

Site 80, the Paradise Point Golf Course Maintenance Area, encompasses approximately one acre within OU 11, which is also comprised of Site 7 (**Figure 3-44**). Information regarding past maintenance procedures at Site 80 is unknown; however, the facility is currently in operation. Golf course maintenance operations which include the machine shop (a potential source of waste oils) and the routine spraying of pesticides and herbicides may have contributed to potential contamination at this site. It is unknown when the wash pad was constructed, and

what the exact procedure was for cleaning the maintenance equipment prior to the construction of the wash pad.

#### SI (1991)

In June 1991, a SI was conducted at Site 80 which included soil, groundwater, surface water, and sediment investigations. The analytical results identified pesticides and PCBs in soil, low level VOCs in groundwater and petroleum hydrocarbons in surface water. Based on these results, a RI was proposed.

#### RI (1994-1995)

The RI field program at Site 80 was conducted from 1994 to 1995 and consisted of a site survey, soil investigation and groundwater investigation. The Final RI was submitted in April 1996 and identified pesticides in soil samples collected in the west/northwest portion of the site at concentrations higher than those considered attributable to past historical applications. Low levels of pesticides, SVOCs, and metals were detected in groundwater at Site 80. The HHRA identified a potential risk to current and future receptors primarily due to the presence of pesticides in soil. The ERA did not identify any unacceptable risks to ecological receptors due to site-related contaminants.

#### TCRA (1996)

Based on the risk assessment presented in the RI, a TCRA was recommended to remove soil contaminated with pesticides to industrial levels. A Final TCRA Work Plan was submitted in April 1996. In July 1996, approximately 988 tons of contaminated soil was excavated from Site 80.

#### PRAP (1996) and ROD (1997)

The Final PRAP for OU 11 (Sites 7 and 80) was submitted for public review and comment in November 1996. The Final ROD for OU 11 (Sites 7 and 80) was signed on August 21, 1997 (Baker, 1997a). No remedial actions were required in the ROD for Site 80 due to the absence of contamination.

#### Remedy-in-Place

Although the ROD did not require remedial action, the soil remediation goals for the TCRA were based on industrial risk-based concentrations. Therefore, the Base implemented LUCs to protect human health and the environment by preventing future exposure to surface and subsurface soil within the site boundary, including the previous soil removal action area. In May 2007, LUCs were implemented through a LUCIP, as shown in **Table 3-5**.

### 3.5.1.29 IR Site 82 (OU 2) – Piney Green VOC Area

Site 82, the Piney Green Road VOC site, is located within OU 2 approximately two miles east of the New River and two miles south of State Route 24. OU 2 covers approximately 210 acres and includes Sites 6, 9, and 82 (**Figure 3-35**). Site 82 encompasses approximately 30 acres and is predominantly covered by woodlands. Before the late 1980s, much of the site was reportedly used for storage, disposal, and handling of potentially hazardous waste and material. Site 82 was identified as a result of the 1986 Confirmation Study at Site 6. At the time of the site assessment, the site was randomly littered with debris including spent ammunition casings, and empty or rusted drums. Some of the drums were marked as “lubrication oil” and “anti-freeze”.

### SI (1991)

A SI was conducted at Site 82 in June 1991, based on the results of the Confirmation Study. Surface water samples collected from Wallace Creek during this investigation contained VOCs, which were considered attributable to activities conducted at Site 82.

### RI (1992-1993)

A RI was conducted at OU 2 (Sites 6, 9, and 82) from August 1992 to May 1993. Field activities consisted of a preliminary site survey; a geophysical survey; a soil investigation including drilling and sampling; a groundwater investigation including monitoring well installation and sampling; drum waste sampling; test pit investigation; a surface water and sediment investigation; and an aquatic and ecological survey. Levels of organic compounds (primarily PCBs, pesticides, VOCs, and SVOCs) and inorganic compounds (primarily barium, cadmium, chromium, lead, manganese, and zinc) were identified throughout OU 2 in various media (i.e. soil, groundwater, surface water, and sediments). Chlorinated VOCs in groundwater were found as deep as 240 feet bgs. The HHRA identified potential human health risks due to exposure to vinyl chloride, arsenic, and beryllium in groundwater and PCB-1260 in biota from Wallace Creek. Further, the findings of the ERA indicated past disposal practices at Site 82 may potentially be adversely impacting the ecological integrity of Wallace Creek.

### FS (1993)

In August 1993, a FS was completed for OU 2 (Sites 6, 9, and 82), which developed and screened remedial alternatives for addressing groundwater (TCE and vinyl chloride) and soil (pesticides, PAHs, and PCBs) contamination.

### PRAP (1993) and ROD (1997)

The PRAP for OU 2 (Sites 6, 9, and 82) was submitted for public review and comment in August 1993 for a 30-day period. The PRAP consisted of seven alternatives to address soil contamination and five alternatives to address groundwater contamination. The Final ROD for OU 2 was signed on September 24, 1993 (Baker, 1993a). The ROD identified soil vapor extraction (SVE) to address soil contamination and groundwater extraction and treatment, implementation of LTM, and aquifer restrictions and LUCs to address groundwater contamination as the selected remedies for Site 82.

### Remedy-in-Place

The SVE system was in operation at Site 82 for six months in 1996 to remediate residual soil contamination in the vadose zone. Construction of the groundwater extraction and treatment system began in December 1994 and full-scale operation of the system began in July 1996. Groundwater from both the surficial and Castle Hayne aquifers is being treated by this system. Operation of the plant will continue in FY 2008. In February 2007, a groundwater pilot study was initiated at Site 82 to evaluate the performance of ERD via EVO and lactate injection and to determine whether it is a viable alternative to supplement, enhance, or replace the current groundwater extraction and treatment system. The final Pilot Study Report will be issued in FY 2008.

LTM at Site 82 was implemented in 1995 and is on-going, in accordance with the recommendations of the LTM Optimization Report (CH2M HILL, 2005). The LTM program for Site 82 is shown on **Table 3-4**. LUCs were implemented in June 2001 and updated July 2002, as shown in **Table 3-5**. **Table 3-14** provides a proposed schedule of activities at Site 82.

### 3.5.1.30 IR Site 85 (Pre-RI) - Camp Johnson Battery Dump

Site 85, the Camp Johnson Battery Dump, encompasses approximately 4.5 acres in the Camp Johnson support operations area of the Base (**Figure 3-32**). Site 85 was used as a battery dump during the 1950s. In 1992, decomposed batteries, which were used in military communication equipment during the Korean era, were unearthed as a roadway was being widened. Military personnel using 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 two-acre to three-acre area.

#### Pre-RI Screening Study (1995-1998)

Project plans for Site 85 were finalized in January 1995, and a Pre-RI screening study was conducted from 1995 to 1998. Field activities included soil and groundwater sampling. Samples were analyzed for metals only. Analytical results indicated that soil near the battery disposal piles has been contaminated by metals leaching from the batteries. The BRA, completed as part of the Pre-RI, identified a potential risk due to the presence of metals at the site. As a result, the Pre-RI recommended completion of an EE/CA to evaluate remedial alternatives for soil contamination at the site.

#### TCRA (1999)

Based upon comments by USEPA (Region 4), an EE/CA was completed on September 10, 1999, and an Action Memorandum was completed on September 17, 1999. The EE/CA recommended removal of the soil and battery packs through a TCRA followed by re-evaluation of site groundwater. The TCRA was completed from October to December 1999, and included the removal of 158 tons of contaminated soil and debris. The Final Closeout Report for this removal was submitted in February 2000. Post-removal groundwater monitoring was conducted from 2001 to 2005, when site-wide concentrations dropped below action levels.

#### NFA Decision Document (2005)

The Final NFA DD was completed May 12, 2005, which stated that all investigations or activities for the IR Program for Site 85 are complete.

### 3.5.1.31 IR Site 87 (Pre-RI) - MCAS Officers' Housing Area

Site 87, the MCAS Officers' Housing Area site (formerly Site A), is located on the west bank of the New River (**Figure 3-33**). This area was identified during the second round of sampling conducted as part of the Confirmation Study in 1986. Waste was identified eroding out of a cut bank along the New River near 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 and it is unclear how the materials got into the river bank.

#### Pre-RI Screening Study (1995-1998)

Project plans for Site 87 were finalized in January 1995, and a Pre-RI screening study was conducted from 1995 to 1998. Field activities included a site survey, exploratory test pits, and soil, groundwater, surface water, and sediment sampling. The Pre-RI study concluded that none of the media sampled had been significantly affected by site activities. The BRA, completed as part of the Pre-RI, did not identify any risk from the media sampled at the site. As a result, the Pre-RI recommended no further action. In response to an agency comment due to detection of

PCP in one groundwater sample above screening criteria, groundwater was sampled again in October 1999. No PCP was detected in groundwater from the October 1999 sampling event.

#### NFA Decision Document (2001)

The Final NFA DD was completed May 8, 2001, which stated that all investigations or activities for the IR Program for Site 87 are complete.

#### 3.5.1.32 IR Site 90 (OU 17) – Building BB-9

Site 90, Building BB-9, encompasses approximately six acres within OU 17, in the southeast portion of the Base in the Courthouse Bay Complex (**Figure 3-50**). OU 17 includes Sites 90, 91, and 92, which are all former UST program sites that have been placed in the IR Program because contaminants not typically related to petroleum UST sites were detected. Site 90 primarily refers to a former UST basin where three 1,000-gallon steel USTs, containing heating oil, were previously located. The former UST basin is located between a dry cleaning distribution facility and a heating plant. The USTs were removed in March 1993. Dry-cleaning processes were performed at this location for an unknown period of time, but were subsequently discontinued. During the years that dry cleaning operations were conducted at this location, a 250-gallon AST was located on-site.

#### Focused RI (1997-1999)

In 1997, a Focused RI was conducted for OU 17 (Sites 90, 91, and 92). Field activities at Site 90 included a site survey, soil investigation, and groundwater investigation. Analytical results identified the presence of toluene in soil samples. Groundwater samples identified PCE in a single sample and chloroform. A quantitative risk assessment, completed as part of the Focused RI, identified a potential risk due to the presence of PCE in groundwater. Based on these findings, which were presented in the Draft Focused RI report, NCDENR requested additional groundwater sampling to confirm the presence of the identified COPCs. Supplemental groundwater sampling was conducted in 1999 and 2000. The additional monitoring identified TCE as the only site-related contaminant present at Site 90. Further, the detected concentration only slightly exceeded screening criteria. As a result, the Final Focused RI recommended NFA at the site.

#### PRAP and ROD (2001)

The PRAP for OU 17 (Sites 90, 91, and 92) was submitted for public review and comment in July 2001 for a 30-day period. The Final ROD for OU 17 (Sites 90, 91, and 92) was signed on September 30, 2001 (Baker, 2001b). The ROD for Site 90 stipulated that no remedial actions were required due to the absence of contamination. Therefore, Site 90 was closed with NFA.

#### 3.5.1.33 IR Site 91 (OU 17) – Building BB-51

Site 91, Building BB-51, encompasses approximately eight acres within OU 17, in the southeast portion of the Base in the Courthouse Bay Complex (**Figure 3-50**). OU 17 includes Sites 90, 91, and 92, which are all former UST program sites that have been placed on the IR Program list because contaminants not typically related to petroleum UST sites were detected. Site 91 is currently used by the Marine Corps School of Engineering to train personnel. Site 91 primarily refers to a former UST basin where two 300-gallon steel USTs, used to store waste oil, were previously located. The former UST basin is located northeast of Building BB-51. The USTs were removed in August 1992. At the time of the UST closure, TPH contamination was detected in the soil samples.

Focused RI (1997)

In 1997, a Focused RI was conducted for OU 17 (Sites 90, 91, and 92). Field activities at Site 91 included a site survey, soil investigation, and groundwater investigation. Analytical results identified the presence of two VOCs (toluene and acetone) in several soil samples. Groundwater samples identified the presence of two VOCs (PCE and chloroform). A quantitative risk assessment, completed as part of the Focused RI, did not identify a potential risk due to site-related contaminants. However, chloroform and several metals were retained as COPCs. Based on these findings, which were presented in the Draft Focused RI report, NCDENR requested additional groundwater sampling to determine whether the presence of the identified COPCs was site-related and to confirm the detected levels of PCE. Supplemental groundwater sampling was conducted in 1999. The additional monitoring confirmed chloroform as a potentially site-related COPC; therefore, post-RI monitoring was recommended.

Post-RI Groundwater Monitoring (2000-2001)

Post-RI groundwater monitoring was initiated in July 2000, and included quarterly groundwater sampling for VOCs, SVOCs, iron, and arsenic. Results of the groundwater monitoring activities were documented in LTM reports for OU 17. In April 2001, groundwater monitoring was discontinued when concentrations dropped below NCGWQS or base background concentrations.

PRAP and ROD (2001)

The PRAP for OU 17 (Sites 90, 91, and 92) was submitted for public review and comment in July 2001 for a 30-day period. The Final ROD for OU 17 (Sites 90, 91, and 92) was signed on September 30, 2001 (Baker, 2001b). The ROD for Site 91 stipulated that no remedial actions were required due to the absence of contamination. Therefore, Site 91 was closed with NFA.

**3.5.1.34 IR Site 92 (OU 17) – Building BB-46**

Site 92, Building BB-46, is located within OU 17, in the southeast portion of the Base in the Courthouse Bay Complex (**Figure 3-50**). OU 17 includes Sites 90, 91, and 92, which are all former UST program sites that have been placed on the IR Program list because contaminants not typically related to petroleum UST sites were detected. Site 92 is approximately one acre, located in the vicinity of former Building BB-46, now replaced by Building BB-246. Site 92 primarily refers to a former UST basin where one 1,000-gallon steel UST, containing gasoline, were previously located. The former UST basin is located at the end of Front Street, within the confines of the Courthouse Bay Marina. The UST was installed in 1980, deactivated in 1989, and removed in January 1994. A subsequent site investigation identified the presence of chlorinated hydrocarbons in the groundwater.

Focused RI (1997)

In 1997, a Focused RI was conducted for OU 17 (Sites 90, 91, and 92). Field activities at Site 92 included a site survey, soil investigation, and groundwater investigation. No fuel-related contaminants were detected in soil or groundwater samples. Chloroform was detected in several groundwater samples. A quantitative risk assessment, completed as part of the Focused RI, did not identify a potential risk due to site-related contaminants. However, chloroform, acetone, and several metals were retained as COPCs. Based on these findings, the Focused RI recommended additional groundwater sampling to verify the presence or absence of contaminants identified as COPCs.

### Post-RI Groundwater Monitoring (2000-2001)

Post-RI groundwater monitoring was initiated in July 2000, and included quarterly groundwater sampling for VOCs, SVOCs, iron, arsenic, and manganese. Results of the groundwater monitoring activities were documented in LTM reports for OU 17. In April 2001, groundwater monitoring was discontinued when concentrations dropped below NCGWQS or base background concentrations.

### PRAP and ROD (2001)

The PRAP for OU 17 (Sites 90, 91, and 92) was submitted for public review and comment in July 2001 for a 30-day period. The Final ROD for OU 17 (Sites 90, 91, and 92) was signed on September 30, 2001 (Baker, 2001b). The ROD for Site 92 stipulated that no remedial actions were required due to the absence of contamination. Therefore, Site 92 was closed with NFA.

#### 3.5.1.35 IR Site 93 (OU 16) – Building TC-942

Site 93, Building TC-942, is located within OU 16, which is within Camp Geiger in the extreme northwest corner of the Base. OU 16 includes Sites 89 and 93 (**Figure 3-49**). The buildings in this portion of Camp Geiger were constructed during the Korean War and currently function as classrooms, barracks, and supply rooms for the Marine Infantry School. Historical records indicate that a 550-gallon UST storing waste oil was previously located on Site 93, off the southwest corner of Building TC-942; however no documentation was available regarding the installation date of the UST. The UST was permanently closed as part of a tank removal in December 1993, completed under the authority of the State of North Carolina's UST program. Based on elevated concentrations of oil and grease at the time of the tank removal, a release was suspected to have occurred. Upon removal of the UST, an investigation was conducted, which identified chlorinated VOCs in the groundwater. Investigations at Site 93 have been conducted since 1995 and have historically focused on the small area near the southwest corner of Building TC-942 that formerly contained the 550-gallon UST used to store waste oil. Over time, the investigations have expanded outward from TC-942.

### Geotechnical Investigation (1995-1996)

Between 1995 and 1996, a geotechnical investigation and environmental screening were conducted near the barracks area. Chlorinated solvent contamination was not observed in any of the soil borings located around the barracks; however, trace levels of chlorinated VOCs were detected in groundwater samples collected from one temporary well.

### RI (1996-1997)

From 1996 to 1997, a RI was conducted to characterize the nature and extent of soil and groundwater contamination at OU 16 (Sites 89 and 93). Field activities included the collection of soil and groundwater samples analyzed for VOCs. Soil analytical results for Site 93 indicated that soil had not been significantly impacted by site-related activities. Groundwater analytical results for Site 93 identified chlorinated VOC contamination (primarily TCE) concentrated in the surficial aquifer (less than 15 feet bgs) within the immediate area of the former UST. VOCs were not detected in any groundwater samples collected from the upgradient locations around the barracks. A chlorinated VOC groundwater plume was identified as generally extending from east of the barracks to "E" Street, between Ninth and Tenth streets. Groundwater analytical data also suggested contaminant discharge to Edwards Creek was occurring. The HHRA identified potential human health risks due to exposure to PCE and cis-1,2-DCE in groundwater. The ERA did not identify any risks to ecological receptors.

LTM (1999-2005)

Based on the results of the RI, LTM was implemented at Site 93 in April 1999 in order to assess plume stability. LTM was discontinued in 2005 due to the ongoing FS (CH2M HILL, 2005).

Natural Attenuation Evaluation (2001)

In 2001, a preliminary NAE was conducted to determine whether natural site conditions would encourage the natural attenuation process of degrading TCE. The results indicated limited natural attenuation of chlorinated VOCs was occurring. However, the reductive dechlorination process appeared to be stalling, indicating that the reduced state of the aquifer is not enough to encourage optimal dechlorination.

Additional Plume Characterization (2002)

At the request of the Partnering Team, additional plume characterization/delineation activities were conducted in 2002 in order to further delineate groundwater contamination at Site 93, characterize “hot spots”, and provide additional data to support the selection of an active remedial system. Field activities included groundwater sampling. The analytical results identified several “hot spot” areas. The primary plume appeared related to the former UST area, with smaller “hot spot” areas downgradient. The results indicated horizontal migration of groundwater contamination had been minimal since 1995; however, vertical migration was observed.

FS (2005)

In November 2005, the Final FS was completed for Site 93, which developed and screened remedial alternatives for addressing groundwater contamination (PCE, TCE, 1,2-DCE, 1,1,2,2-PCA, and vinyl chloride).

PRAP and ROD (2006)

The PRAP for Site 93 was submitted for public review and comment in January/February 2006 for a 30-day period. The PRAP consisted of five alternatives to address groundwater contamination at Site 93. The Final ROD for Site 93 was signed on October 2, 2006 (CH2M HILL, 2006b). The ROD identified in situ chemical oxidation (ISCO) via permanganate injection and MNA as the selected remedy for Site 93. Site 93 is currently in the CERCLA Investigation Stage and will be completed at a later date; therefore, the ROD served as a final ROD for Site 93 and an IROD for OU 16.

Remedy-in-Place

The remedial action was initiated in October 2006 and is expected to be completed by the end of FY 2007. The remedial action will be documented in an IRACR. Once the remedial action is complete, LTM at Site 93 will be implemented as shown on **Table 3-4**. **Table 3-19** provides a proposed schedule of activities at Site 93. LUCs were implemented in 2006, as shown in **Table 3-5**.

**3.5.1.36 IR Site 94 (OU 18) – PCX Service Station**

Site 94, the PCX Service Station (Building 1613), is located within the HPIA on the Mainside of the Base (**Figure 3-51**). Site 94 lies within the western portion of Site 78 (OU 1). Building 1613 is an active facility, providing refueling services for private vehicles, and consists of a single-story brick structure flanked by three concrete pump islands on two sides. Historical records indicate that two 10,000-gallon and two 30,000-gallon USTs storing various grades of gasoline were installed northeast of Building 1613 during the 1950s. The USTs and associated petroleum-

contaminated soil were removed in January 1995. During subsequent phases of investigation, free phase hydrocarbons and chlorinated organic contaminants were detected in groundwater. Soil and groundwater contamination resulting from the petroleum releases at the site is currently being remediated under NCDENR's UST program. Dissolved purgeable aromatic constituents were identified and delineated in the area of the former UST basin and the free product plume areas. Dissolved purgeable halocarbon compounds were identified at concentrations exceeding NCGWQS in three isolated areas, suggesting multiple sources. In addition, the vertical extent of purgeable halocarbons is at least 50 feet bgs. The extent of the chlorinated hydrocarbon plume is not defined. A final schedule for future actions at the site has not been established.

#### Groundwater Investigation (2000)

In September 2000, a Groundwater Investigation was conducted to evaluate groundwater conditions in an area of the site where monitoring wells had not been previously installed. Analytical results identified VOCs (primarily BTEX and methyl-tert butyl ether [MTBE]) and PAHs at concentrations exceeding NCGWQS. A December 1, 2000 letter from MCB Camp Lejeune to NCDENR requested the transfer of the PCX Service Station to the IR Program, which resulted in the subsequent CERCLA investigation activities.

#### RI (2004-2005)

Project plans for Site 94 were completed in April 2004, and a RI was conducted late in 2004 to further evaluate contamination near the site. Field activities included soil and groundwater sampling. The Final RI report was submitted in September 9, 2005 which concluded that groundwater contamination was determined to be from an upgradient source (Site 78). The HHRA did not identify a potential risk to future receptors due to site soil, and the ERA did not identify any potential risks to ecological receptors.

#### PRAP and ROD (2006)

The PRAP for Site 94 was submitted for public review and comment in January 2006 for a 30-day period. The Final ROD for Site 94 was signed on August 26, 2006 (CH2M HILL, 2006a). The ROD stipulated that no remedial actions were required at Site 94 because contamination present in groundwater at the surrounding site (Site 78) has migrated to the Site 94 area. Hence, the contaminants identified as posing unacceptable risks/hazards to current or future receptors will be addressed as part of IR Site 78. Therefore, Site 94 was closed with NFA.

## 3.5.2 MRP Sites

### 3.5.2.1

#### 3.5.2.2 MRP Site UXO-13 – Naval Regional Medical Center

Site UXO-13, the Naval Regional Medical Center, encompasses approximately 176 acres located on the Mainside of the Base (**Figure 3-68**). No known historic live fire activities were conducted within this area; rather it was designated as a "Maneuver Training Area" used to train troops in non-live fire operations. UXO-13 was administratively closed on March 24, 2004 due to no known historic live-fire activities on this range.

## SECTION 4

# 4. References

---

A.H. Environmental Consultants, 2002. *Wellhead Protection Plan – 2002 Update, Marine Corps Base Camp Lejeune, North Carolina.*

Baker Environmental, Inc., 2005. *Final Record of Decision for Operable Unit No. 6 (Sites 36, 43, 44, and 54), Marine Corps Base Camp Lejeune, North Carolina.*

Baker Environmental, Inc., 2001a. *Final Record of Decision for Operable Unit No. 9 (Site 65), Marine Corps Base Camp Lejeune, North Carolina.*

Baker Environmental, Inc., 2001b. *Final Record of Decision for Operable Unit No. 17 (Sites 90, 91, and 92), Marine Corps Base Camp Lejeune, North Carolina.*

Baker Environmental, Inc., 2000a. *Final Amended Record of Decision for Operable Unit No. 12 (Site 3), Marine Corps Base Camp Lejeune, North Carolina.*

Baker Environmental, Inc., 2000b. *Final Interim Record of Decision for Operable Unit No. 14 (Site 69), Marine Corps Base Camp Lejeune, North Carolina.*

Baker Environmental, Inc., 1998a. *Final Focused Remedial Investigation Report for Operable Unit No. 15 (Site 88), Marine Corps Base Camp Lejeune, North Carolina.*

Baker Environmental, Inc., 1998b. *Final Focused Remedial Investigation Report for Operable Unit No. 16 (Sites 89 and 93), Marine Corps Base Camp Lejeune, North Carolina.*

Baker Environmental, Inc., 1997a. *Final Record of Decision for Operable Unit No. 11 (Sites 7 and 80), Marine Corps Base Camp Lejeune, North Carolina.*

Baker Environmental, Inc., 1997b. *Final Record of Decision for Operable Unit No. 13 (Site 65), Marine Corps Base Camp Lejeune, North Carolina.*

Baker Environmental, Inc., 1996a. *Final Record of Decision for Operable Unit No. 7 (Sites 1, 28, and 30), Marine Corps Base Camp Lejeune, North Carolina. Marine Corps Base, Camp Lejeune, North Carolina.*

Baker Environmental, Inc., 1996b. *Final Record of Decision for Operable Unit No. 8 (Site 16), Marine Corps Base Camp Lejeune, North Carolina.*

Baker Environmental, Inc., 1995a. *Final Record of Decision for Operable Unit No. 4 (Sites 41 and 74), Marine Corps Base Camp Lejeune, North Carolina.*

Baker Environmental, Inc., 1995b. *Final Groundwater Interim Record of Decision for Operable Unit No. 10 (Site 35), Marine Corps Base Camp Lejeune, North Carolina.*

Baker Environmental, Inc., 1994a. *Final Record of Decision for Operable Unit No. 1 (Sites 21, 24, and 78), Marine Corps Base Camp Lejeune, North Carolina.*

Baker Environmental, Inc., 1994b. *Final Record of Decision for Operable Unit No. 5 (Site 2), Marine Corps Base Camp Lejeune, North Carolina.*

Baker Environmental, Inc., 1994c. *Final Soil Interim Record of Decision for Operable Unit No. 10 (Site 35), Marine Corps Base Camp Lejeune, North Carolina.*

Baker Environmental, Inc., 1993a. *Final Record of Decision for Operable Unit No. 2 (Sites 6, 9, and 82), Marine Corps Base Camp Lejeune, North Carolina.*

Baker Environmental, Inc., 1993b. *Final Record of Decision for Operable Unit No. 3, Site 48. Marine Corps Base Camp Lejeune, North Carolina.*

Baker Environmental, Inc., 1992. *Interim Record of Decision for Operable Unit No. 1, Site 78, Marine Corps Base Camp Lejeune, North Carolina.*

Cardinell, A.P., S.A. Berg, and O.B. Lloyd, Jr. 1993. *Hydrogeologic Framework of U.S. Marine Corps Base at Camp Lejeune, North Carolina.* Water Resources Investigations Report 93-4049. U.S. Geological Survey.

CH2M HILL, 2007. *Final Site Management Plan Fiscal Year 2007. Marine Corps Base Camp Lejeune, North Carolina.*

CH2M HILL, 2006a. *Final Record of Decision for Operable Unit No. 18, Site 94. Marine Corps Base Camp Lejeune, North Carolina.*

CH2M HILL, 2006b. *Final Record of Decision for Operable Unit No. 16, Site 93. Marine Corps Base Camp Lejeune, North Carolina.*

CH2M HILL, 2005. *Optimization of the Long-Term Monitoring Program. Marine Corps Base Camp Lejeune, North Carolina.*

Geophex, Ltd. 1991. *Wellhead Management Program Study Engineering Study 91-36. Marine Corps Base Camp Lejeune.*

Harned, D.A., O.B. Lloyd, Jr., and M.W. Treece, Jr. 1989. *Assessment of Hydrologic and Hydrogeologic Data at Camp Lejeune Marine Corps Base, North Carolina.* Water Resources Investigations Report 89-4096. U.S. Geological Survey.

Heath, Ralph. 1989. *Basic Groundwater Hydrology.* Water Supply Paper 2220. U.S. Geological Survey.

IT Corporation, 2001. *Final Closeout Report for TCRA of Site 89, MC, Camp Lejeune, North Carolina.*

MCB Camp Lejeune, 1991. *Federal Facility Agreement (FFA).*

Shaw Environmental, Inc., 2003. *Interim Removal Action Report Operable Unit No. 6, Sites 36 and 43 Marine Corps Base Camp Lejeune, North Carolina.*

USACE, 2001. *Range Identification and Preliminary Assessment Report.*

Water and Air Research Inc. 1983. *Initial Assessment Study for MCB Camp Lejeune, North Carolina.*

Winner, M.D. and R.W. Coble. 1989. *Hydrogeologic Framework of the North Carolina Coastal Plain Aquifer System.* USGS Water-Resources Investigations Report 87-690.

## Tables

---

**TABLE 3-1**  
 Summary of Sites By Operable Unit  
 FY 2008 Site Management Plan  
 MCB Camp Lejeune, North Carolina

OU	SITE NO.	SITE DESCRIPTION	PRIMARY REASON FOR OU SELECTION
1	21	Transformer Storage Lot 140	Geographic location of sites.
	24	Industrial Area Fly Ash Dump	
	78	Hadnot Point Industrial Area	
2	6	Storage Lots 201 and 203	Geographic location of sites.
	9	Fire Fighting Training Pit at Piney Green Road	
	82	Piney Green Road VOC Area	
3	48	MCAS Mercury Dump	Unique characteristic of suspected waste (mercury).
4	41	Camp Geiger Dump near Former Trailer Park	Unique characteristic of suspected waste (chemical warfare materials).
	74	Mess Hall Grease Dump Area	
5	2	Former Nursery/Day Care Center	Unique characteristics of material handled at site (pesticides).
6	36	Camp Geiger Dump Area Near Sewage Treatment Plant	Similar characteristics of material disposed (POL, waste oils, solvents) and contaminants detected (metals, VOCs, O&G). Geographic location of sites.
	43	Agan Street Dump	
	44	Jones Street Dump	
	54	Crash Crew Fire Training Burn Pit	
7	1	French Creek Liquids Disposal Area	Geographic location of sites. Unique characteristics of suspected waste (O&G, POL, and metals).
	28	Hadnot Point Burn Dump	
	30	Sneads Ferry Road Fuel Tank Sludge Area	
8	16	Former Montford Point Burn Dump	Geographic location of site.
9	65	Engineer Area Dump	Geographic location of site.
10	35	Camp Geiger Fuel Farm	Accelerated cleanup necessary to abate impacts to Brinson Creek.
11	7	Tarawa Terrace Dump	Geographic location of sites.
	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 with unique waste source.
14	69	Rifle Range Chemical Dump	Isolated site with unique waste source.
15	88	Base Dry Cleaners	Unique Characteristic of suspected waste (dry cleaning solvent).
16	89	Former DRMO	Geographic location of sites and adjacent surface water body. Unique characteristic of suspected waste (solvents).
	93	Building TC-942	
17	90	Building BB-9	Former UST sites with similar contamination detected in groundwater.
	91	Building BB-51	
	92	Building BB-46	
18	94	PCX Service Station	Geographic location of site, within Site 78, and similar contaminants adjacent shallow groundwater plume. Former UST site.
19	84	Building 45	Isolated site with unique waste (PCBs, POL).
20	86	Tank Area AS419-AS421 at MCAS	Operable Unit created for Site 86 due to increasing levels of VOCs. Site 86 was originally included under OU 6.
21	73	Courthouse Bay Liquids Disposal Area	Unique characteristic of suspected wastes (POL, solvents).
22	95	Dipping Vat Sites	Suspected wastes.

Notes:

- DRMO - Defense Reutilization and Marketing Office
- O&G - Oil and Grease
- OU - Operable Unit
- MCAS - Marine Corps Air Station
- PCBs - Polychlorinated biphenyls
- POL - Petroleum, oil, lubricants
- UST - Underground Storage Tank
- VOCs - Volatile Organic Compounds

TABLE 3-2  
 Summary of Environmental Studies, Investigations and Actions Completed to Date  
 FY 2008 Site Management Plan  
 MCB Camp Lejeune, North Carolina

SITE NO.	OU	HISTORIC SITE USE	PRELIMINARY STUDIES		PRELIMINARY INVESTIGATIONS	PA	SI	RI	FS	PILOT STUDY/TREATABILITY STUDY	ADDITIONAL INVESTIGATIONS	REMOVAL ACTIONS	PRAP	SIGNED INTERIM ROD	IROD ACTION	SIGNED ROD	ROD ACTION	OU CLOSEOUT	NFA STATUS
			IAS (1983)	Confirmation Study (1984-1987)															
<b>INSTALLATION RESTORATION PROGRAM SITES</b>																			
PA Site	--	HPIA Buildings 1102, 1409, and 1512	--	--	--	Final PA/SI (February 7, 2006)	--	--	--	--	--	--	--	--	--	--	--	--	X
PA Site	--	MCAS New Rivier Buildings SAS113, AS116, and AS119	--	--	--	Final PA/SI (February 7, 2006)	--	--	--	--	--	--	--	--	--	--	--	--	--
PA Site	--	Montford Point Buildings M119 and M315	--	--	--	Final PA/SI (February 7, 2006)	--	--	--	--	--	--	--	--	--	--	--	--	X (Building M315)
1	7	Artillery units disposing liquid wastes on ground surface (1940s)	X	X	- Soil Assessment (1991) - GW Study (1993) - Project Plans (December 15, 1993)	--	--	June 29, 1995	July 13, 1995	--	--	--	July 13, 1995	--	--	May 16, 1996	- LTM (1996-2001) - LUCs (2001)	September 6, 2002	X
2	5	Bldg. 712 used for storing, handling, and dispensing pesticides (1945-1958)	X	X	- Geophysical Invest.(1992-1994) - Limited GW Sampling (1992) - Project Plans (March 11, 1993)	--	--	June 14, 1994	June 23, 1994	--	--	- TCRA (1994)	June 23, 1994	--	--	September 15, 1994	- LTM (1995-present) - LUCs (2001)	--	--
3	12	Creosote plant (1951-1952)	X	--	- Project Plans (October 2, 1994)	--	June 1991	June 12, 1996	August 14, 1996	--	--	--	October 23, 1996	--	--	- April 3, 1997 - Amended June 20, 2000	- Soil removal & off-site disposal (2000) - LTM (1997-present) - LUCs (2001)	--	--
4	--	Surface disposal of construction debris including asphalt, old bricks, and cement (Unknown)	X	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
6	2	Lot 201 stored pesticides & transformers containing PCBs. Lot 203 served as a waste disposal area (1940s-1980s)	X	X	- Lot 203 soil gas survey (1989) - Project Plans (May 18, 1992)	--	--	August 20, 1993	August 20, 1993	--	- Chlorobenzene Invest. (June 2004)	- TCRA (1994) - TCRA (1995/96)	August 20, 1993	--	--	September 24, 1993	- Excavation & off-site disposal (1994) - LTM (1996-present)	--	--
7	11	Tarawa Terrace dump used during construction of Base housing (Closed 1972)	X	--	- Project Plans (October 2, 1994)	--	June 1991	February 6, 1996	--	--	--	--	November 27, 1996	--	--	August 21, 1997	- NFA	--	X
9	2	Fire fighting training exercises using flammable liquids conducted in an unlined pit (1960s-1981), asphalt-lined pit (1981-2000), & concrete-lined pit (2002-present)	X	X	- Project Plans (May 18, 1992)	--	--	August 20, 1993	August 20, 1993	--	--	--	August 20, 1993	--	--	September 24, 1993	- NFA	--	X
10	--	Original Base dump used for construction debris and burn dump (prior to the 1950s)	X	--	- Project Plans (January 20, 1998) - Groundwater Investigation (2001)	--	July 13, 2001	--	--	--	--	--	--	--	--	--	--	--	X (May 12, 2005)
12	--	Explosive ordnance disposal by burning or detonating (early 1960s)	X	--	- Project Plans (January 21, 1995) - Pre-RI Screening Study (November 1998)	--	--	--	--	--	--	--	--	--	--	--	--	--	X (May 8, 2001)
13	--	Surface disposal of construction debris including clippings, branches, and asphalt (1944)	X	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
16	8	Burn dump for trash from surrounding housing area and disposal of small amounts of waste oil (suspected 1958-1972)	X	--	- Project Plans (October 2, 1994)	--	--	January 31, 1996	--	--	--	--	February 15, 1996	--	--	September 30, 1996	- NFA	--	X
18	--	Disposal of construction materials and debris (1976-1978)	X	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

'X' indicates the site was included in the specified report or has achieved the specified status.

'--' indicates the specified report was not completed for the site.

TABLE 3-2  
 Summary of Environmental Studies, Investigations and Actions Completed to Date  
 FY 2008 Site Management Plan  
 MCB Camp Lejeune, North Carolina

SITE NO.	OU	HISTORIC SITE USE	PRELIMINARY STUDIES		PRELIMINARY INVESTIGATIONS	PA	SI	RI	FS	PILOT STUDY/TREATABILITY STUDY	ADDITIONAL INVESTIGATIONS	REMOVAL ACTIONS	PRAP	SIGNED INTERIM ROD	IROD ACTION	SIGNED ROD	ROD ACTION	OU CLOSEOUT	NFA STATUS
			IAS (1983)	Confirmation Study (1984-1987)															
19	--	Naval Research Lab used radionuclides for metabolic studies on animals (1947-1976)	X	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
20	--	Incineration of burnable wastes associated with Naval Research Lab (1956-1960)	X	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
21	1	Pit in northern portion of site used as drainage receptor for oil from transformers (1950-1951). Pesticide mixing and washdown area for equipment used for pesticide application (1958-1977)	X	X	- Project Plans (March 11, 1993)	--	--	June 23, 1994	July 22, 1994	--	--	--	July 22, 1994	--	--	September 15, 1994	- Excavation & off-site treatment (1995) - LUCs (2001)	--	X
23	--	Storage of insecticides and herbicides (1958-1977)	X	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
24	1	Disposal of fly ash, cinders, solvents, used paint stripping compounds, sewage sludge, and water treatment spiractor sludge (late 1940s-1980)	X	X	- Project Plans (March 11, 1993)	--	--	June 23, 1994	July 22, 1994	--	--	--	July 22, 1994	--	--	September 15, 1994	- LTM (1996-1998) - LUCs (2001)	--	X
25	--	Base incinerator burning trash and classified materials (1940-1960)	X	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
28	7	Burn area for disposal of a variety of solid wastes (industrial waste, trash, oil-based paint, and construction debris) generated on Base and covered with soil (1946-1971)	X	X	- Groundwater Study (1993) - Project Plans (December 15, 1993)	--	--	June 29, 1995	July 13, 1995	--	- Additional delineation (2001)	--	July 13, 1995	--	--	May 16, 1996	- LTM (1996-2001) - LUCs (2001)	September 6, 2002	X
30	7	Used by a private contractor as a cleaning area for emptied fuel storage tanks from other locations. Tanks stored leaded gasoline. (1970s)	X	X	- Groundwater Study (1993) - Project Plans (December 15, 1993)	--	--	June 29, 1995	--	--	--	--	July 13, 1995	--	--	May 16, 1996	- NFA	--	X
35	10	Camp Geiger Fuel Farm housing five 15,000-gallon ASTs, underground distribution lines, pump house, fueling pad, distribution island, & OWS (1945-1995)	X	X	- UST Site Characterization (1992) - Project Plans (December 20, 1993)	--	--	- IRA RI for Soil (July 20, 1994) - Comprehensive RI (May 31, 1996)	- IRA FS for Soil (July 20, 1994) - IRA FS for Surficial GW (June 13, 1995) - Draft FS (December 4, 1998)	- Air sparge trench (April 14, 1997) - Modified Fenton's/Permanganate Pilot Study (2003-2005) - Pilot Study Report (March 29, 2006)	- Supplemental GW Investigation (1997) - LTM (1999-2004) - Hot Spot Char. (October 2002) - Supplemental NAE (April 17, 2003) - Final NAE Report (December 2003) - Technology Evaluation (February 3, 2004) - EE/CA for GW (January 23, 2007) - Action Memo (May 2007)	- NTCRA (2007)	- PRAP for Soil (July 20, 1994) - PRAP for GW (June 8, 1995)	- September 15, 1994 (soil) - September 22, 1995 (shallow gw)	- Soil removal and disposal (1995-1996) - In-situ air sparging (1998-present)	--	--	--	--

'X' indicates the site was included in the specified report or has achieved the specified status.

'--' indicates the specified report was not completed for the site.

TABLE 3-2  
 Summary of Environmental Studies, Investigations and Actions Completed to Date  
 FY 2008 Site Management Plan  
 MCB Camp Lejeune, North Carolina

SITE NO.	OU	HISTORIC SITE USE	PRELIMINARY STUDIES		PRELIMINARY INVESTIGATIONS	PA	SI	RI	FS	PILOT STUDY/TREATABILITY STUDY	ADDITIONAL INVESTIGATIONS	REMOVAL ACTIONS	PRAP	SIGNED INTERIM ROD	IROD ACTION	SIGNED ROD	ROD ACTION	OU CLOSEOUT	NFA STATUS
			IAS (1983)	Confirmation Study (1984-1987)															
36	6	Disposal area for mixed industrial wastes including trash, waste oils, solvents, and hydraulic fluids. Some materials burned before burial. (1940s-1950s).	X	X	- Project Plans (December 2, 1994)	--	--	August 22, 1996	- FS (June 24, 1998) - Revised FS (June 19, 2002)	--	- Additional GW Sampling (2000) - EE/CA (October 22, 2002) - Action Memo (November 20, 2002) - Response Action WP (February 2003) - Response Action Closeout Report (October 2004)	- TCRA Design (April 1997) - TCRA (June 1997) - NTCRA (2003)	- PRAP (June 18, 1998) - Revised PRAP (June 18, 2002)	--	--	July 6, 2005	- LTM (1998-present) - LUCs (September 2005)	- IRACR (August 2007)	--
37	--	Surface disposal of wastes including motor parts, garbage, and wood (1950-1951)	X	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
38	--	Surface disposal of construction debris and branches (Unknown)	X	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
40	--	Disposal of auto parts and metal (1969-unknown)	X	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
41	4	Open burn dump containing construction debris, POL wastes, mirex, solvents, batteries, ordnance, and chemical training agents. (1946-1970)	X	X	- Project Plans (December 2, 1993)	--	--	May 8, 1995	May 8, 1995	--	--	--	May 8, 1995	--	--	December 5, 1995	- LTM (1997-2004)	- RACR (July 2006)	X
42	--	Surface disposal of debris including trees, tree stumps, and boards (1950-1960)	X	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
43	6	Dump receiving inert material (i.e., const. debris and trash) and sludge from a former sewage disposal facility. (Unknown)	X	--	- Project Plans (December 2, 1994)	--	January 31, 1994	August 22, 1996	- Draft FS (June 24, 1998) - Revised FS (June 19, 2002)	--	- EE/CA (October 22, 2002) - Action Memo (November 20, 2002) - Response Action WP (February 2003) - Response Action Closeout Report (October 2004)	- IRA (2003)	- PRAP (June 18, 1998) - Revised PRAP (June 18, 2002)	--	--	July 6, 2005	- NFA	- IRACR (August 2007)	X
44	6	Active dump site receiving debris, cloth, lumber, and paint cans (1950s)	X	--	- Project Plans (December 2, 1994)	--	1991	August 22, 1996	- FS (June 24, 1998) - Revised FS (June 19, 2002)	--	--	--	- PRAP (June 18, 1998) - Revised PRAP (June 18, 2002)	--	--	July 6, 2005	- NFA	- IRACR (August 2007)	X
46	--	Disposal of construction and demolition debris (1958-1962)	X	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
48	3	Mercury drained from radar units and disposed in small quantities in wooded area near Bldg. AS-804 (1956-1966)	X	X	- Supplemental Characterization (1991) - Project Plans (December 2, 1993)	--	--	June 21, 1993	--	--	--	--	June 21, 1993	--	--	September 10, 1993	- NFA	--	X
49	--	Disposal of paint cans (Unknown)	X	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
51	--	Empty container disposal, including paint cans and hydraulic fluid (1967-1968)	X	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
53	--	Liquid wastes sprayed on unimproved dirt roads to control dust. Waste mixture reportedly contained crankcase waste oil, JP fuels, and paint thinners (1970-1975)	X	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

'X' indicates the site was included in the specified report or has achieved the specified status.

'--' indicates the specified report was not completed for the site.

TABLE 3-2  
 Summary of Environmental Studies, Investigations and Actions Completed to Date  
 FY 2008 Site Management Plan  
 MCB Camp Lejeune, North Carolina

SITE NO.	OU	HISTORIC SITE USE	PRELIMINARY STUDIES		PRELIMINARY INVESTIGATIONS	PA	SI	RI	FS	PILOT STUDY/TREATABILITY STUDY	ADDITIONAL INVESTIGATIONS	REMOVAL ACTIONS	PRAP	SIGNED INTERIM ROD	IROD ACTION	SIGNED ROD	ROD ACTION	OU CLOSEOUT	NFA STATUS
			IAS (1983)	Confirmation Study (1984-1987)															
54	6	Fire training burn pit using JP fuel, stored in a nearby UST. Nearby OWS used for temporary storage and collection of spent fuel. (mid 1950s-1975).	X	X	- Project Plans (December 2, 1994)	--	--	August 22, 1996	- FS (June 24, 1998) - Revised FS (June 19, 2002)	--	- LTM (1998-2002)	- Burn pit and contaminated soil removed (2000)	- PRAP (June 18, 1998) - Revised PRAP (June 18, 2002)	--	--	July 6, 2005	- NFA	- IRACR (August 2007)	X
55	--	Disposal area for barrels, tires, trash, metal planking, and telephone poles (1950s-1960s)	X	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
61	--	Disposal area for wastes generated during bivouac exercises (Unknown)	X	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
62	--	Disposal area for wastes generated during bivouac exercises (Unknown)	X	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
63	13	Waste disposal generated during training exercises (Unknown)	X	--	- Project Plans (September 1, 1995)	--	January 31, 1994	October 18, 1996	--	--	--	--	November 1, 1996	--	--	April 3, 1997	- NFA	--	X
65	9	Battery acid and POL disposal, burning construction debris (1958-1972)	X	--	- Project Plans (March 7, 1995)	--	1991	November 7, 1997	--	--	- Post-RI Sampling (2001)	--	July 11, 2001	--	--	September 30, 2001	- NFA	--	X
66	--	Vehicle maintenance area during training exercises (Unknown)	X	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
67	--	TNT disposal by burning in 2-3 foot deep pits (1951)	X	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
68	--	Garbage, building debris, waste treatment sludge disposal. (1942-1972).	X	--	- Project Plans (January 21, 1995) - Pre-RI Screening Study (November 1998)	--	--	--	--	--	--	--	--	--	--	--	--	--	X (May 8, 2001)
69	14	Chemical waste disposal including PCBs, slovents, pesticides, calcium hypochlorite. Possible drums containing cyanide and other training agents known as CWM. (1950-1976)	X	X	- Project Plans (December 2, 1993)	--	--	- Draft (December 5, 1997) - Final (October 4, 1999)	--	- In-well Aeration Pilot Study (1996-1998) - Treatability Study Report (January 30, 1998)	--	--	May 1998	June 29, 2000	- LTM (1998-2005) - LUCs (2001)	--	--	--	--
73	21	Waste oil disposal approximately 400,000 gallons. Waste battery acid disposal approximately 20,000 gallons. (1946-1977)	X	X	- UST Investigations (1991-1993) - Preliminary Investigation (1994) - Project Plans (March 7, 1995)	--	--	November 7, 1997	--	- Air sparging (2002) - Hydrogen Sparging (2003-2006) - Air/ozone Sparging (2007)	- GW modeling (April 1998) - LTM (2000-2005) - NAE (January 7, 2002) - Tech Eval (May 8, 2003)	--	--	--	--	--	--	--	--
74	4	Grease, pesticide, chemical training agents disposal (Early 1950s to early 1960s)	X	X	- Project Plans (December 2, 1993)	--	--	May 8, 1995	May 8, 1995	--	--	--	May 8, 1995	--	--	December 5, 1995	- LTM (1997-1998)	July 2006	X
75	--	Estimated 75-100 buried drums thought to contain tear gas. Chloroform, carbon tetrachloride, benzene, and chloropicrin may also be present. (Early 1950s)	X	--	- Project Plans (January 21, 1995) - Pre-RI Screening Study (November 24, 1998)	--	--	--	--	--	--	--	--	--	--	--	--	--	X (May 8, 2001)
76	--	Approximately 25-75 buried drums likely containing tear gas, chloroform, carbon tetrachloride, benzene, and chloropicrin. (1949)	X	--	- Project Plans (January 21, 1995) - Pre-RI Screening Study (November 24, 1998)	--	--	--	--	--	--	--	--	--	--	--	--	--	X (May 8, 2001)
78	1	Petroleum and solvent related spills and leaks (Beginning in 1940s)	X	X	- GW Study at Hadnot Point Fuel Farm (1990) - Supplemental Characterization Study (1990/1991) - Project Plans (March 11, 1993)	--	--	- IRA RI (April 16, 1992) - RI (June 23, 1994)	- IRA FS (April 16, 1992) - FS (July 22, 1994)	- ORC/HRC GW Pilot Study (2003-2004)	- NAE (2002) - Supplemental Investigation (June 2002) - Technology Evaluation (April 16, 2002)	--	- IRA PRAP (May 8, 1992) - PRAP (July 22, 1994)	September 23, 1992	- GW Pump & Treat	September 15, 1994	- Continued pump & treat (1995-present) - LTM (1995-present)	--	--

'X' indicates the site was included in the specified report or has achieved the specified status.

'--' indicates the specified report was not completed for the site.

TABLE 3-2  
 Summary of Environmental Studies, Investigations and Actions Completed to Date  
 FY 2008 Site Management Plan  
 MCB Camp Lejeune, North Carolina

SITE NO.	OU	HISTORIC SITE USE	PRELIMINARY STUDIES		PRELIMINARY INVESTIGATIONS	PA	SI	RI	FS	PILOT STUDY/TREATABILITY STUDY	ADDITIONAL INVESTIGATIONS	REMOVAL ACTIONS	PRAP	SIGNED INTERIM ROD	IROD ACTION	SIGNED ROD	ROD ACTION	OU CLOSEOUT	NFA STATUS	
			IAS (1983)	Confirmation Study (1984-1987)																
80	11	Golf course maintenance, pesticides (Unknown to present)	--	--	- Project plans (October 2, 1994)	--	June 1991	April 5, 1996	--	--	--	- TCRA WP Soils (April 10, 1996) - Closeout Report (September 9, 1996)	--	--	--	August 21, 1997	- NFA	--	X	
82	2	Storage, disposal, and handling of potentially hazardous waste and material. (prior to late 1980s).	--	--	- Project Plans (May 18, 1992)	--	June 1991	August 20, 1993	August 20, 1993	- ERD Pilot Study (2007)	--	--	August 20, 1993	--	--	September 24, 1993	- SVE System (1996) - GW Pump & treat (1996-present) - LTM (1996-present) - LUCs (2001)	--	--	
84	19	Electrical powerhouse, transformers containing PCBs (possible buried), PCB dielectric oil. (Unknown)  Building 45 maintenance facility (1965-early 1990s)	--	--	- Pre-RI Screening Study (November 24, 1998) - Concrete and SW sampling (1999) - Preliminary EE/CA (1999) - UST Removal (1999) - Project Plans (June 1, 2001)	--	--	June 4, 2002	June 18, 2002	--	- Final EE/CA (October 22, 2002) - Action Memo (October 2002) - CAP (October 10, 2003)	- Phase I NTCRA (2002) - Phase I Closeout Report (January 15, 2003) - Phase II NTCRA (2003/2004) - Phase II Closeout Report (2005) - Phase III NTCRA (2006)	June 18, 2002	--	--	--	--	--	--	--
85	--	Battery disposal (1950s)	--	--	- Project Plans (January 21, 1995) - Pre-RI Screening Study (November 24, 1998)	--	--	--	--	--	- EE/CA (September 10, 1999) - Action Memo (September 17, 1999) - Groundwater Monitoring (2001-2005)	- TCRA (2000) - Final Closeout Report (December 2000)	--	--	--	--	--	--	X (May 12, 2005)	
86	20	Petroleum products storage (1954-1988). Three 25,000 gallon AST used for No. 6 fuel/waste oil storage (1954-1979)	--	--	- Preliminary Site Investigation (November 1990) - AST Removed (1992) - Site Assessment (1992) - Project Plans (December 12, 1994)	--	--	- RI (August 22, 1996) - Amended RI (May 21, 2003)	June 24, 1998	- Air sparge pilot study (2005-2006) - Pilot Study Report (September 5, 2006)	- LTM (1998-2005)	--	June 18, 1998	--	--	--	--	--	--	
87	--	Hospital waste materials including hypodermic needles and chlorine-based white powder (disc. 1986)	--	--	- Project Plans (January 21, 1995) - Pre-RI Screening Study (November 24, 1998)	--	--	--	--	--	--	--	--	--	--	--	--	--	X (May 8, 2001)	
88	15	- Base Dry Cleaners (1940s-2004) - Varsol stored in USTs (1940s-1970s) - PCE stored in ASTs (1970-1980s)	--	--	- Project Plans (February 21, 1997)	--	--	- Focused RI (May 15, 1998)	--	- SEAR Pilot Study (1999) - RABITT Pilot Study (2001)	- DNAPL Investigation (1998) - SEAR Investigation Report (January 25, 2000) - Supplemental Site Investigation (2002/2003) - EE/CA (September 24, 2004)	- NTCRA (2005)	--	--	--	--	--	--	--	
89	16	- Base Motor Pool (until 1988) - DRMO storing scrap and surplus metals, electronic equipment, vehicles, rubber tires, and fuel bladders (1988-2000).	--	--	- Project Plans (February 20, 1997)	--	--	June 15, 1998	--	- ERH Pilot Study (2003/2004) - Pilot Study Report (July 2005)	- Action Memo (June 9, 2000) - Remedial Design (June 16, 2000) - Supplemental Inv. (2002/2003) - EE/CA - GW (December 18, 2002) - LTM (1999-2005)	- TCRA (2000)	--	--	--	--	--	--	--	--
90	17	Three heating oil USTs, toluene (Unknown)	--	--	- UST Removal (1993) - Project Plans (June 31, 1996)	--	--	April 27, 2001	--	--	--	--	July 11, 2001	--	--	September 30, 2001	- NFA	--	X	
91	17	Two waste oil USTs (unknown-1992)	--	--	- UST Removal (1992) - Project Plans (June 31, 1996)	--	--	April 27, 2001	--	--	- Post-RI Monitoring (2000/2001) - Supplemental GW Report (2001)	--	July 11, 2001	--	--	September 30, 2001	- NFA	--	X	
92	17	Gasoline UST (1980-1994)	--	--	- UST Removal (1994) - Project Plans (June 31, 1996)	--	--	April 27, 2001	--	--	- Post-RI Monitoring (2000/2001)	--	July 11, 2001	--	--	September 30, 2001	- NFA	--	X	
93	16	Heating oil UST (unknown to 1993)	--	--	- UST Investigation (1995) - Geotechnical Investigation (1995/1996) - Project Plans (February 20, 1997)	--	--	June 15, 1998	November 14, 2005	--	- Additional Plume Char. (April 2, 2002) - LTM (1999-2005) - NAE (2001) - Supplemental Site Investigation (2005)	--	February 9, 2006	--	--	October 2, 2006	- Permanganate inj. (2006/2007) - LTM - LUCs	--	--	

'X' indicates the site was included in the specified report or has achieved the specified status.

'--' indicates the specified report was not completed for the site.

TABLE 3-2  
 Summary of Environmental Studies, Investigations and Actions Completed to Date  
 FY 2008 Site Management Plan  
 MCB Camp Lejeune, North Carolina

SITE NO.	OU	HISTORIC SITE USE	PRELIMINARY STUDIES		PRELIMINARY INVESTIGATIONS	PA	SI	RI	FS	PILOT STUDY/TREATABILITY STUDY	ADDITIONAL INVESTIGATIONS	REMOVAL ACTIONS	PRAP	SIGNED INTERIM ROD	IROD ACTION	SIGNED ROD	ROD ACTION	OU CLOSEOUT	NFA STATUS
			IAS (1983)	Confirmation Study (1984-1987)															
94	18	PCX Service Station containing two 10,000-gallon and two 30,000-gallon gasoline USTs (1950s-1995)	--	--	- USTs/contaminated soil removed (1995) - GW Investigation (September 2000) - Project Plans (April 16, 2004)	--	--	September 9, 2005	--	--	--	--	January 30, 2006	--	--	August 26, 2006	- NFA	--	X
95	22	Livestock dipping vats (1906-1961)	--	--	- Initial Assessment (2004) - Site Investigation WP (February 6, 2006)	--	June 2007	--	--	--	--	--	--	--	--	--	--	--	--
<b>MUNITIONS RESPONSE PROGRAM SITES</b>																			
UXO-01	--	Live hand grenade course used for firing live ammunition (1945-1946)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
UXO-02	--	Explosive range (1973-2002)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
UXO-03	--	Practice hand grenade course (1953-1959)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
UXO-04	--	Bulldozer uncovered a live WWII MK-II high-explosive hand grenade during excavation (between 1974 and 1976)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
UXO-05	--	Miniature Anti-Tank range using .22 caliber small arms to fire at a moving target (1942-1944) Gas chamber using chemical warfare training agents (1953-1958)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
UXO-06	--	Range using small arms, 3.5-in practice rockets, rifle grenades, hand grenades (1953-1977)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
UXO-07	--	Practice hand grenade course (1953)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
UXO-08	--	Bazooka range (1970s-1990s). Gas chamber using tear gas (1953-1961).	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
UXO-09	--	Triangulation range using service munitions and automatic rifles (~1953)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
UXO-10	--	Range using flame throwers and small arms blank ammunition (1970-1977)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
UXO-11	--	Practice hand grenade course (1953)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
UXO-12	--	Small arms range, including .33 caliber weapons (1945-1946)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
UXO-13	--	Maneuver training area used to train troops in non-live fire operations (Unknown)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	X
UXO-14	--	Indoor pistol range using small caliber weapons (1950-1996), and gas chamber using tear gas (1950-1954)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

'X' indicates the site was included in the specified report or has achieved the specified status.

'--' indicates the specified report was not completed for the site.

TABLE 3-3  
 Installation Resotration Program Sites and Status for FY 2008, FY 2009, and FY 2010  
 FY 2008 Site Management Plan  
 MCB Camp Lejeune, North Carolina

SITE NO.	OU	SITE DESCRIPTION	CURRENT SITE STATUS	FY 2008 ACTIVITIES <sup>1,2</sup>		FY 2009 ACTIVITIES <sup>1,2</sup>		FY 2010 ACTIVITIES <sup>1,2</sup>	
				Document	Anticipated Submittal Date	Document	Anticipated Submittal Date	Document	Anticipated Submittal Date
<b>INSTALLATION RESTORATION PROGRAM SITES</b>									
PA Site	--	HPIA Bldgs 1120 (Auto Hobby Shop), 1409 (Carpenter/Boat Repair), & 1512 (Auto Repair Shop)	NFA	--	--	--	--	--	--
PA Site	--	MCAS New River Buildings SAS113 (Auto Hobby Shop), AS116 (Vehicle Maintenance Shop), & AS119 (Vehicle Maintenance Shop)	PA/SI	--	--	--	--	--	--
PA Site	--	Montford Point Buildings M119 (Weapons/Auto Maintenance) & M315 (Laundry Pickup Facility)	PA/SI (Building M119 only)	--	--	--	--	--	--
1	7	French Creek Liquids Disposal Area	RIP (LUC)	--	--	--	--	--	--
2	5	Former Nursery/Day Care Center	RIP (LUC)	<b>Final Closeout Report</b>	<b>June 2008</b>	--	--	--	--
3	12	Old Creosote Plant	RIP (LTM and LUC)	FY 2007 Annual LTM Report	April 2008	FY 2008 Annual LTM Report	April 2009	FY 2009 Annual LTM Report	April 2010
4	--	Sawmill Road Construction Debris Dump	PA/SI	--	--	--	--	--	--
6	2	Storage Lots 201 and 203	RIP (LTM and LUC)	FY 2007 Annual LTM Report	April 2008	FY 2008 Annual LTM Report	April 2009	FY 2009 Annual LTM Report	April 2010
7	11	Tarrawa Terrace Dump	NFA	--	--	--	--	--	--
9	2	Flre Fighting Training Pit at Piney Green Road	RIP (LUC)	--	--	--	--	--	--
10	--	Original Base Dump	NFA	--	--	--	--	--	--
12	--	Explosive Ordnance Disposal	NFA	--	--	--	--	--	--
13	--	Golf Course Construction Debris Dump	PA/SI	--	--	--	--	--	--
16	8	Former Montford Point Burn Dump	RIP (LUC)	--	--	--	--	--	--
18	--	Watkins Village (E) Site	PA/SI	--	--	--	--	--	--
19	--	Naval Research Lab Dump	PA/SI	--	--	--	--	--	--
20	--	Naval Research Lab Incinerator	PA/SI	--	--	--	--	--	--
21	1	Transformer Storage Lot 140	RIP (LUC)	--	--	--	--	--	--
23	--	Roads and Grounds Building 1105	PA/SI	--	--	--	--	--	--
24	1	Industrial Area Fly Ash Dump	RIP (LUC)	--	--	--	--	--	--
25	--	Base Incinerator	PA/SI	--	--	--	--	--	--
28	7	Hadnot Point Burn Dump	RIP (LUC)	--	--	--	--	--	--
30	7	Sneads Ferry Road Fuel Tank Sludge Area	NFA	--	--	--	--	--	--
35	10	Camp Geiger Fuel Farm	RI/FS	<b>Final Supplemental RI</b> <b>Final FS</b>	<b>February 2008</b> <b>September 2008</b>	Final NTCRA Report <b>Final PRAP</b> <b>Final ROD</b> <b>RD/RA Work Plan</b>	November 2008 <b>February 2009</b> <b>June 2009</b> <b>TBD</b>	Remedial Action Implementation	TBD
36	6	Camp Geiger Dump Area Near Sewage Treatment Plant	RIP (LTM and LUC)	FY 2007 Annual LTM Report	April 2008	FY 2008 Annual LTM Report	April 2009	FY 2009 Annual LTM Report	April 2010
37	--	Camp Geiger Area Surface Dump	PA/SI	--	--	--	--	--	--
38	--	Camp Geiger Construction Dump	PA/SI	--	--	--	--	--	--
40	--	Camp Geiger Area Borrow Pit	PA/SI	--	--	--	--	--	--
41	4	Camp Geiger Dump near Former Trailer Park	RIP (LUC)	--	--	--	--	--	--
42	--	Building 705 BOQ Dump	PA/SI	--	--	--	--	--	--
43	6	Agan Street Dump	RIP (LUC)	--	--	--	--	--	--
44	6	Jones Street Dump	RIP (LUC)	--	--	--	--	--	--
46	--	MCAS Main Gate Dump	PA/SI	--	--	--	--	--	--
48	3	MCAS Mercury Dump	NFA	--	--	--	--	--	--
49	--	MCAS Suspected Minor Dump	PA/SI	--	--	--	--	--	--
51	--	MCAS Football Field	PA/SI	--	--	--	--	--	--
53	--	MCAS Warehouse Building 3525 Area	PA/SI	--	--	--	--	--	--
54	6	Crash Crew Fire Training Burn Pit	RIP (LUC)	--	--	--	--	--	--
55	--	Air Station East Perimeter Dump	PA/SI	--	--	--	--	--	--
61	--	Rhodes Point Road Dump	PA/SI	--	--	--	--	--	--
62	--	Race Couse Area Dump	PA/SI	--	--	--	--	--	--
63	13	Verona Loop Dump	RIP (LUC)	--	--	--	--	--	--
65	9	Engineer Area Dump	NFA	--	--	--	--	--	--

TABLE 3-3  
 Installation Resotration Program Sites and Status for FY 2008, FY 2009, and FY 2010  
 FY 2008 Site Management Plan  
 MCB Camp Lejeune, North Carolina

SITE NO.	OU	SITE DESCRIPTION	CURRENT SITE STATUS	FY 2008 ACTIVITIES <sup>1,2</sup>		FY 2009 ACTIVITIES <sup>1,2</sup>		FY 2010 ACTIVITIES <sup>1,2</sup>	
				Document	Anticipated Submittal Date	Document	Anticipated Submittal Date	Document	Anticipated Submittal Date
66	--	AMTRAC Landing Site and Storage Area	PA/SI	--	--	--	--	--	--
67	--	Engineer's TNT Burn Site	PA/SI	--	--	--	--	--	--
68	--	Rifle Range Dump	RIP (LUC)	--	--	--	--	--	--
69	14	Rifle Range Chemical Dump	RI/FS	Final Amended RI Work Plan Final Chemical Safety Sub.	December 2007 August 2008	Amended RI Field Investigation	thru April 2009	Final Amended RI Final Amended FS	December 2009 June 2010
73	21	Courthouse Bay Liquids Disposal Area	RI/FS	Final Supplemental RI Final FS Final Pilot Study Report	April 2008 June 2008 July 2008	Final PRAP Final ROD RD/RA Work Plan Remedial Action Implementation	November 2008 February 2009 TBD TBD	--	--
74	4	Mess Hall Grease Dump Area	RIP (LUC)	--	--	--	--	--	--
75	--	MCAS Basketball Court Site	NFA	--	--	--	--	--	--
76	--	MCAS Curtis Road Site	NFA	--	--	--	--	--	--
78	1	Hadnot Point Industrial Area	RIP (LTM and LUC)	FY 2007 Annual LTM Report	April 2008	FY 2008 Annual LTM Report	April 2009	FY 2009 Annual LTM Report	April 2010
80	11	Paradise Point Golf Course Maintenance Area	RIP (LUC)	--	--	--	--	--	--
82	2	Piney Green Road VOC Area	RIP (LTM and LUC)	Final Pilot Study Report FY 2007 Annual LTM Report	March 2008 April 2008	FY 2008 Annual LTM Report	April 2009	FY 2009 Annual LTM Report	April 2010
84	19	Building 45	ROD	Final Closeout Report Final Focused FS Final PRAP Final ROD	November 2007 April 2008 June 2008 September 2008	--	--	--	--
85	--	Camp Johnson Battery Dump	NFA	--	--	--	--	--	--
86	20	Tank Area AS419-AS421 at MCAS	RI/FS	Supplemental RI Field Investigation	thru December 2007	Final Supplemental RI Final FS Final PRAP Final ROD	October 2008 November 2008 February 2009 September 2009	RD/RA Work Plan Remedial Action Implementation	TBD TBD
87	--	MCAS Officers' Housing Area	NFA	--	--	--	--	--	--
88	15	Base Dry Cleaners	RI/FS	Final Amended RI Final FS Final PRAP	November 2007 March 2008 September 2008	Final ROD RD/RA Work Plan Remedial Action Implementation	March 2009 TBD TBD	--	--
89	16	Former DRMO	RI/FS	Final Amended RI Final NTCRA Workplan (Source area) Final Pilot Study Report	November 2007 November 2007 January 2008	Final EE/CA (Ecological) Final NTCRA Workplan (Ecological)	October 2008 May 2009	Final NTCRA Report (Source area) Final NTCRA Report (Ecological) Final FS	December 2009 December 2009 July 2010
90	17	Building BB-9	NFA	--	--	--	--	--	--
91	17	Building BB-51	NFA	--	--	--	--	--	--
92	17	Building BB-46	NFA	--	--	--	--	--	--
93	16	Building TC-942	RIP (LTM and LUC)	Final IRACR	June 2008	FY 2008 Annual LTM Report	April 2009	FY 2009 Annual LTM Report	April 2010
94	18	PCX Service Station	NFA	--	--	--	--	--	--
95	22	Dipping Vat Sites	PA/SI	--	--	Final EE/CA Final NTCRA Workplan	November 2008 July 2009	Final Site Closeout Report	April 2010
<b>MUNITIONS RESPONSE PROGRAM SITES</b>									
UXO-01	--	Former Live Hand Grenade Range	PA/SI	Final PA/SI Workplan	November 2007	Final PA/SI Report	December 2008	--	--
UXO-02	--	Unnamed Explosive Range	PA/SI	--	--	--	--	--	--
UXO-03	--	Practice Hand Grenade Course	PA/SI	Final PA/SI Workplan	November 2007	Final PA/SI Report	December 2008	--	--
UXO-04	--	Knox Trailer Park	PA/SI	Final ESI Workplan Final ESI Report	October 2007 June 2008				
UXO-05	--	Miniature Anti-Tank Range and Former B-3 Gas Chamber	PA/SI	Final PA/SI Workplan	November 2007	Final PA/SI Report	December 2008	--	--
UXO-06	--	Fotified Beach Assault Area	PA/SI	Final PA/SI Workplan	November 2007	Final PA/SI Report	December 2008	--	--
UXO-07	--	Practice Hand Grenade Course	PA/SI	--	--	--	--	--	--
UXO-08	--	Bazooka Range and Gas Chambers	PA/SI	Final PA/SI Workplan	November 2007	Final PA/SI Report	December 2008	--	--
UXO-09	--	Triangulation Range	PA/SI	Final PA/SI Workplan	November 2007	Final PA/SI Report	December 2008	--	--
UXO-10	--	Flame Tank and Flame Thrower Range	PA/SI	--	--	--	--	--	--

TABLE 3-3  
 Installation Resotration Program Sites and Status for FY 2008, FY 2009, and FY 2010  
 FY 2008 Site Management Plan  
 MCB Camp Lejeune, North Carolina

SITE NO.	OU	SITE DESCRIPTION	CURRENT SITE STATUS	FY 2008 ACTIVITIES <sup>1,2</sup>		FY 2009 ACTIVITIES <sup>1,2</sup>		FY 2010 ACTIVITIES <sup>1,2</sup>	
				Document	Anticipated Submittal Date	Document	Anticipated Submittal Date	Document	Anticipated Submittal Date
UXO-11	--	Practice Hand Grenade Course	PA/SI	--	--	--	--	--	--
UXO-12	--	New River 1,000-inch Range	PA/SI	--	--	--	--	--	--
UXO-13	--	Naval Regional Medical Center	NFA	--	--	--	--	--	--
UXO-14	--	Indoor Pistol Range and Gas Chamber	PA/SI	--	--	--	--	--	--

Note:

1. Not all of the dates are available at this time for all future document submittals. These dates are listed as to be determined (TBD) and will be updated in future deliveries of the SMP.
2. Reports and deliverable dates in bold text are EPA milestones.

**TABLE 3-4**  
 Summary of the Long-Term Monitoring Program  
 FY 2008 Site Management Plan  
 MCB Camp Lejeune, North Carolina

SITE NO.	OU	SAMPLE POINT	SAMPLE MATRIX	SAMPLE FREQUENCY	ANALYSES
3	12	IR03-MW02	Groundwater	Annual	VOCs, SVOCs
		IR03-MW02IW	Groundwater	Annual	VOCs, SVOCs
		IR03-MW06	Groundwater	Annual	VOCs, SVOCs
		IR03-MW11	Groundwater	Annual	VOCs, SVOCs
6	2	IR06-GW03	Groundwater	Annual	VOCs
		IR06-MW03	Groundwater	Annual	VOCs
		IR06-MW03D	Groundwater	Annual	VOCs
		IR06-GW15D	Groundwater	Annual	VOCs
		IR06-GW16	Groundwater	Annual	VOCs
		IR06-GW23	Groundwater	Annual	VOCs
		IR06-GW31	Groundwater	Annual	VOCs
		IR06-GW38D	Groundwater	Annual	VOCs
36	6	IR36-GW10	Groundwater	Annual	VOCs, NAIPs
		IR36-GW10IW	Groundwater	Annual	VOCs, NAIPs
		IR36-GW10DW	Groundwater	Annual	VOCs, NAIPs
		IR36-GW13	Groundwater	Annual	VOCs, NAIPs
		IR36-GW13IW	Groundwater	Annual	VOCs, NAIPs
		IR36-GW16IW	Groundwater	Annual	VOCs, NAIPs
		IR36-GW18	Groundwater	Annual	VOCs, NAIPs
		IR36-GW18IW	Groundwater	Annual	VOCs, NAIPs
		IR36-GW20IW	Groundwater	Annual	VOCs, NAIPs
		IR36-GW21IW	Groundwater	Annual	VOCs, NAIPs
		IR36-SW01	Surface Water	Semi-Annual	VOCs
		IR36-SW02	Surface Water	Semi-Annual	VOCs
		IR36-SW03	Surface Water	Semi-Annual	VOCs
		IR36-SW04	Surface Water	Semi-Annual	VOCs
78 North	1	IR78-GW22	Groundwater	Annual	VOCs
		IR78-GW23	Groundwater	Quarterly	VOCs
		IR78-GW24	Groundwater	Annual	VOCs
		IR78-GW24IW	Groundwater	Annual	VOCs
		IR78-GW24DW	Groundwater	Annual	VOCs
		IR78-GW25	Groundwater	Annual	VOCs
		IR78-GW40	Groundwater	Annual	VOCs
		IR78-GW41	Groundwater	Annual	VOCs
		IR78-GW44	Groundwater	Annual	VOCs
		IR78-GW45	Groundwater	Annual	VOCs
		IR78-GW46	Groundwater	Annual	VOCs
		IR78-GW47	Groundwater	Annual	VOCs
		IR78-RW10	Groundwater	Annual	VOCs
		IR78-RW11	Groundwater	Annual	VOCs
IR78-RW12	Groundwater	Annual	VOCs		

VOCs - Volatile Organic Compounds  
 SVOCs - Semi-Volatile Organic Compounds  
 NAIP - Natural Attenuation Indicator Parameters

**TABLE 3-4**  
 Summary of the Long-Term Monitoring Program  
 FY 2008 Site Management Plan  
 MCB Camp Lejeune, North Carolina

<b>SITE NO.</b>	<b>OU</b>	<b>SAMPLE POINT</b>	<b>SAMPLE MATRIX</b>	<b>SAMPLE FREQUENCY</b>	<b>ANALYSES</b>
78 South	1	IR78-GW01	Groundwater	Annual	VOCs
		IR78-GW04	Groundwater	Annual	VOCs
		IR78-GW05	Groundwater	Annual	VOCs
		IR78-GW08	Groundwater	Annual	VOCs
		IR78-GW09	Groundwater	Annual	VOCs
		IR78-GW09DW	Groundwater	Annual	VOCs
		IR78-GW10	Groundwater	Annual	VOCs
		IR78-GW11	Groundwater	Annual	VOCs
		IR78-GW39	Groundwater	Annual	VOCs
		IR78-GW42	Groundwater	Quarterly	VOCs
		IR78-GW49	Groundwater	Annual	VOCs
		IR78-GW50	Groundwater	Annual	VOCs
		IR78-GW51	Groundwater	Annual	VOCs
		IR78-GW52	Groundwater	Annual	VOCs
		IR78-GW53	Groundwater	Quarterly	VOCs
		IR78-GW54	Groundwater	Annual	VOCs
		IR78-GW58	Groundwater	Annual	VOCs
		IR78-GW59	Groundwater	Annual	VOCs
		IR78-GW60	Groundwater	Quarterly	VOCs
		IR78-GW61	Groundwater	Annual	VOCs
		IR78-GW62	Groundwater	Annual	VOCs
		IR78-GW63	Groundwater	Annual	VOCs
		IR78-GW64	Groundwater	Annual	VOCs
		IR78-GW65	Groundwater	Annual	VOCs
		IR78-GW73	Groundwater	Annual	VOCs
		IR78-GW74	Groundwater	Annual	VOCs
		IR78-GW78	Groundwater	Quarterly	VOCs
		IR78-RW05	Groundwater	Annual	VOCs
		IR78-RW06	Groundwater	Annual	VOCs
		IR78-RW07	Groundwater	Annual	VOCs
IR78-RW08	Groundwater	Annual	VOCs		
IR78-RW09	Groundwater	Annual	VOCs		
IR78-RW14	Groundwater	Annual	VOCs		
IR78-RW15	Groundwater	Annual	VOCs		

VOCs - Volatile Organic Compounds  
 SVOCs - Semi-Volatile Organic Compounds  
 NAIP - Natural Attenuation Indicator Parameters

**TABLE 3-4**  
 Summary of the Long-Term Monitoring Program  
 FY 2008 Site Management Plan  
 MCB Camp Lejeune, North Carolina

<b>SITE NO.</b>	<b>OU</b>	<b>SAMPLE POINT</b>	<b>SAMPLE MATRIX</b>	<b>SAMPLE FREQUENCY</b>	<b>ANALYSES</b>
82	2	IR06-GW01	Groundwater	Annual	VOCs
		IR06-GW01D	Groundwater	Annual	VOCs
		IR06-GW01DA	Groundwater	Annual	VOCs
		IR06-GW01DB	Groundwater	Annual	VOCs
		IR06-GW27DW	Groundwater	Annual	VOCs
		IR06-GW27DA	Groundwater	Annual	VOCs
		IR06-GW28	Groundwater	Annual	VOCs
		IR06-GW28DW	Groundwater	Quarterly	VOCs
		IR06-GW30	Groundwater	Annual	VOCs
		IR06-GW32	Groundwater	Annual	VOCs
		IR06-GW33	Groundwater	Quarterly	VOCs
		IR06-GW35D	Groundwater	Annual	VOCs
		IR06-GW36D	Groundwater	Annual	VOCs
		IR06-GW37D	Groundwater	Annual	VOCs
		IR06-GW40DW	Groundwater	Annual	VOCs
		IR06-GW41	Groundwater	Annual	VOCs
		IR06-GW42	Groundwater	Annual	VOCs
		IR06-GW43DW	Groundwater	Annual	VOCs
		IR06-82MW02	Groundwater	Annual	VOCs
		IR06-82MW03	Groundwater	Annual	VOCs
		IR06-SRW01	Groundwater	Annual	VOCs
		IR06-SRW02	Groundwater	Annual	VOCs
		IR06-SRW03	Groundwater	Annual	VOCs
		IR06-SRW04	Groundwater	Annual	VOCs
		IR06-SRW05	Groundwater	Annual	VOCs
		IR06-SRW06	Groundwater	Annual	VOCs
		IR06-DRW01	Groundwater	Annual	VOCs
		IR06-DRW02	Groundwater	Annual	VOCs
		IR06-DRW03	Groundwater	Annual	VOCs
		IR06-DRW04	Groundwater	Annual	VOCs
		IR06-SW01	Surface Water	Semi-Annual	VOCs
		IR06-SW02	Surface Water	Semi-Annual	VOCs
		IR06-SW03	Surface Water	Semi-Annual	VOCs
IR06-SD01	Sediment	Semi-Annual	VOCs		
IR06-SD02	Sediment	Semi-Annual	VOCs		
IR06-SD03	Sediment	Semi-Annual	VOCs		

VOCs - Volatile Organic Compounds  
 SVOCs - Semi-Volatile Organic Compounds  
 NAIP - Natural Attenuation Indicator Parameters

**TABLE 3-4**  
 Summary of the Long-Term Monitoring Program  
 FY 2008 Site Management Plan  
 MCB Camp Lejeune, North Carolina

<b>SITE NO.</b>	<b>OU</b>	<b>SAMPLE POINT</b>	<b>SAMPLE MATRIX</b>	<b>SAMPLE FREQUENCY</b>	<b>ANALYSES</b>
93	16	IR93-MW02	Groundwater	Quarterly	VOCs, NAIPs
		IR93-MW02IW	Groundwater	Quarterly	VOCs, NAIPs
		IR93-MW02DW	Groundwater	Quarterly	VOCs, NAIPs
		IR93-MW03	Groundwater	Quarterly	VOCs, NAIPs
		IR93-MW03IW	Groundwater	Quarterly	VOCs, NAIPs
		IR93-MW04	Groundwater	Quarterly	VOCs, NAIPs
		IR93-MW04IW	Groundwater	Quarterly	VOCs, NAIPs
		IR93-MW05	Groundwater	Quarterly	VOCs, NAIPs
		IR93-MW05IW	Groundwater	Quarterly	VOCs, NAIPs
		IR93-MW06	Groundwater	Quarterly	VOCs, NAIPs
		IR93-MW08	Groundwater	Quarterly	VOCs, NAIPs
		IR93-MW09	Groundwater	Quarterly	VOCs, NAIPs
		IR93-MW10	Groundwater	Quarterly	VOCs, NAIPs
		IR93-MW11	Groundwater	Quarterly	VOCs, NAIPs
		IR93-MW11IW	Groundwater	Quarterly	VOCs, NAIPs
		IR93-MW12	Groundwater	Quarterly	VOCs, NAIPs
		1 New Well	Groundwater	Quarterly	VOCs, NAIPs

VOCs - Volatile Organic Compounds  
 SVOCs - Semi-Volatile Organic Compounds  
 NAIP - Natural Attenuation Indicator Parameters

TABLE 3-5  
 Summary of Land Use Controls  
 FY 2008 Site Management Plan  
 MCB Camp Lejeune, North Carolina

OPERABLE UNIT	SITE NO.	LUC BOUNDARY	ESTIMATED AREA (Acres)	FINAL SUBMITTED	VERSION II UPDATE
1	21, 24, 78	Non-Industrial Land Use Control - Soil	0.815	June 15, 2001	July, 2002
		Intrusive Activities - Groundwater	102.28		
		Aquifer Restriction (1000 feet)	501.54		
2	6, 9, 82	Non-Industrial Land Use Control - Soil	206.75	June 15, 2001	July, 2002
		Intrusive Activities - Groundwater	99.4		
		Aquifer Restriction (1000 feet)	404.91		
4	41, 74	Non-Industrial Land Use Control - Soil (Site 41)	36.6	June 15, 2001	July, 2002
		Intrusive Activities - Groundwater (Site 41)	16.4		
		Intrusive Activities - Soil (Site 41)	36.6		
		Aquifer Restriction (500 feet - Site 41)	86.4		
		Access Control Boundary (Site 41)	30		
		Non-Industrial Land Use Control - Soil (Site 74)	23.8		
		Intrusive Activities - Groundwater (Site 74)	13.9		
		Intrusive Activities - Soil (Site 74)	23.8		
		Aquifer Restriction (500 feet - Site 74)	71.2		
Access Control Boundary (Site 74)	8				
5	2	Non-Industrial Land Use Control - Soil	3.2	June 15, 2001	July, 2002
		Intrusive Activities - Groundwater	1.8		
		Aquifer Restriction (1000 feet)	31.5		
6	36, 43, 44, 54	Non-Industrial Land Use Control - Soil (Site 36)	4.8	September 22, 2005	--
		Intrusive Activities - Soil (Site 36)	4.8		
		Intrusive Activities - Groundwater (Site 36)	4.8		
		Aquifer Restriction (1000 feet) - (Site 36)	64.8		
		Non-Industrial Land Use Control - Soil (43)	0.14		
		Intrusive Activities - Soil (Site 43)	13.2		
		Non-Industrial Land Use Control - Soil (Site 44)	5.6		
		Intrusive Activities - Soil (Site 44)	5.6		
		Non-Industrial Land Use Control - Soil (Site 54)	0.29		
Intrusive Activities - Soil (Site 54)	0.29				
7	1, 28	Non-Industrial Land Use Control - (combined)	33.8	June 15, 2001	July, 2002
		Intrusive Activities - Groundwater (Site 28)	4		
		Aquifer Restriction (1000 feet - combined)	171.6		
8	16	Non-Industrial Land Use Control - Soil	2.1	June 15, 2001	July, 2002
		Intrusive Activities - Groundwater	0.169		
		Aquifer Restriction (1000 feet)	60.2		
11	80	Non-Industrial Land Use Control - Soil	2.93	May 24, 2007	--
		Intrusive Activities - Soil	2.93		
12	3	Non-Industrial Land Use Control - Soil	0.14	June 15, 2001	July, 2002
		Intrusive Activities - Groundwater	4.1		
		Aquifer Restriction (1000 feet)	134.1		
13	63	Intrusive Activities - Groundwater	2	June 15, 2001	July, 2002
		Aquifer Restriction (1000 feet)	100.1		
14	69	Non-Industrial Land Use Control - Soil	13.9	June 15, 2001	July, 2002
		Intrusive Activities - Soil	13.9		
		Intrusive Activities - Groundwater	8		
		Aquifer Restriction (1000 feet)	127.2		
		Site Access Controls	13.9		
16	93	Intrusive Activities - Groundwater	16.2	December 20, 2006	--
		Aquifer Restriction (1000 feet)	56.2		
19	84	TBD		--	--
Pre-RI Site	68	Non-Industrial Land Use Control - Soil	26.9	June 15, 2001	July, 2002
		Intrusive Activities - Soil	26.9		
		Intrusive Activities - Groundwater	26.9		
		Aquifer Restriction (1000 feet)	202.8		











Table 3-11  
 Schedule for IR Site 69 (OU 14), FY 2008  
 MCB Camp Lejeune, North Carolina

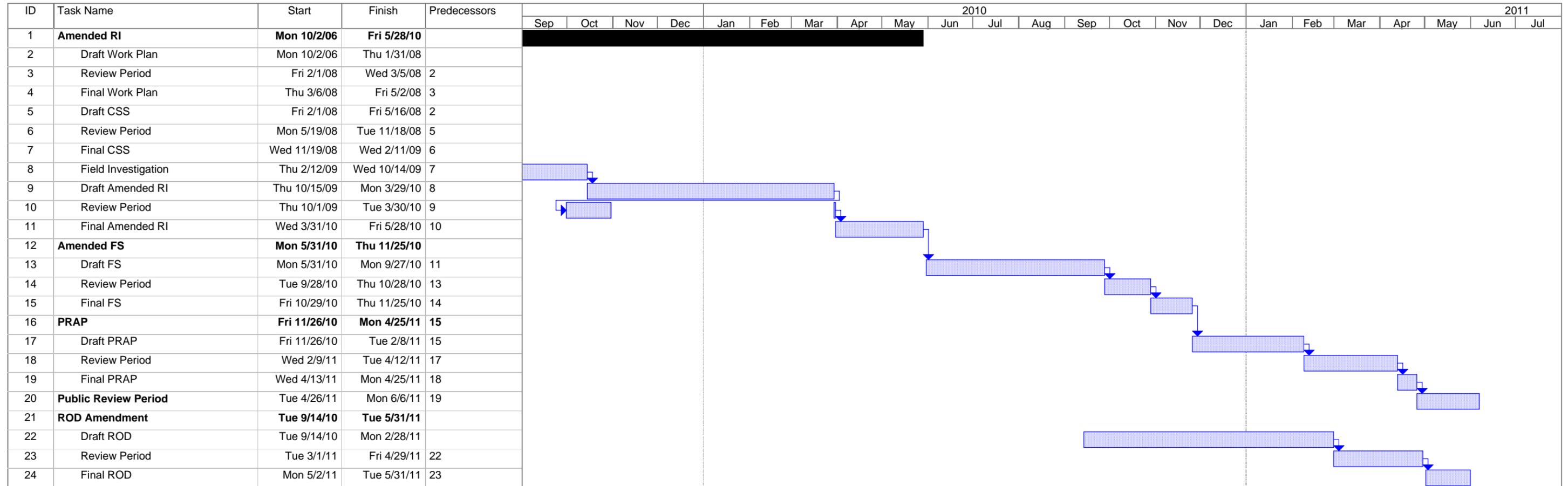


Table 3-12  
 Schedule for IR Site 73 (OU 21), FY 2008  
 MCB Camp Lejeune, North Carolina

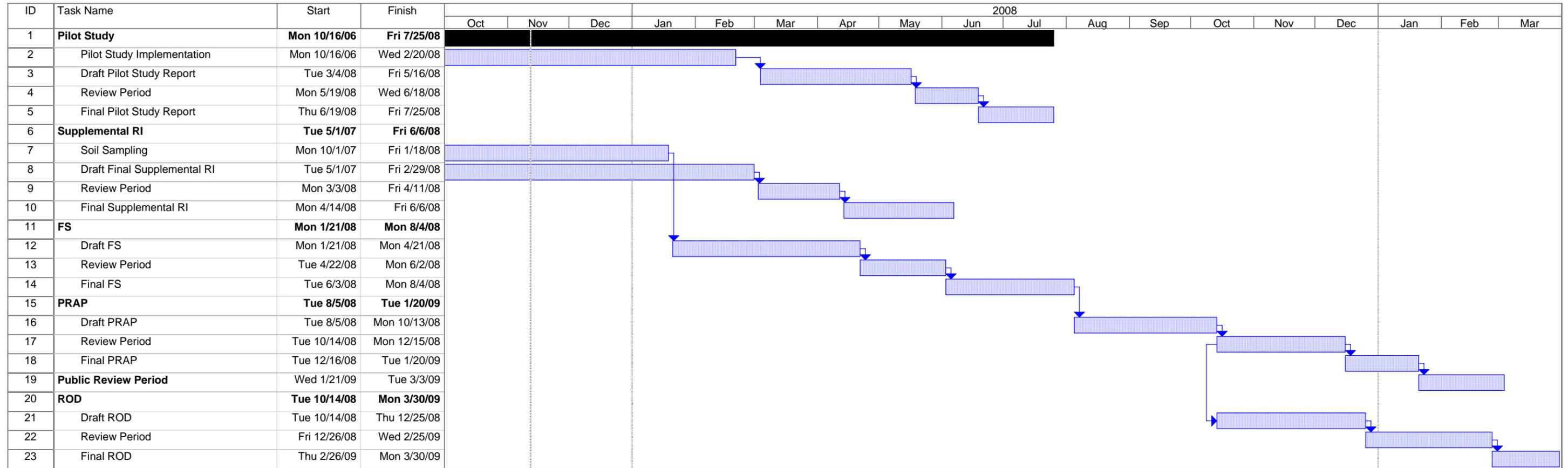


Table 3-13  
 Schedule for IR Site 78 (OU 1), FY 2008  
 MCB Camp Lejeune, North Carolina

ID	Task Name	Start	Finish	2008											
				Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	<b>LTM</b>	<b>Mon 10/1/07</b>	<b>Tue 9/30/08</b>												
2	Draft LTM Report for FY 2007	Mon 11/5/07	Thu 1/31/08												
3	Review Period	Fri 2/1/08	Fri 3/7/08												
4	Final LTM Report for FY 2007	Mon 3/10/08	Wed 4/30/08												
5	LTM for FY 2008	Mon 10/1/07	Tue 9/30/08												

Project: CT0-171  
 Date: Mon 11/12/07

Task



Milestone



Dates to be determined

Progress



Tentative Schedule



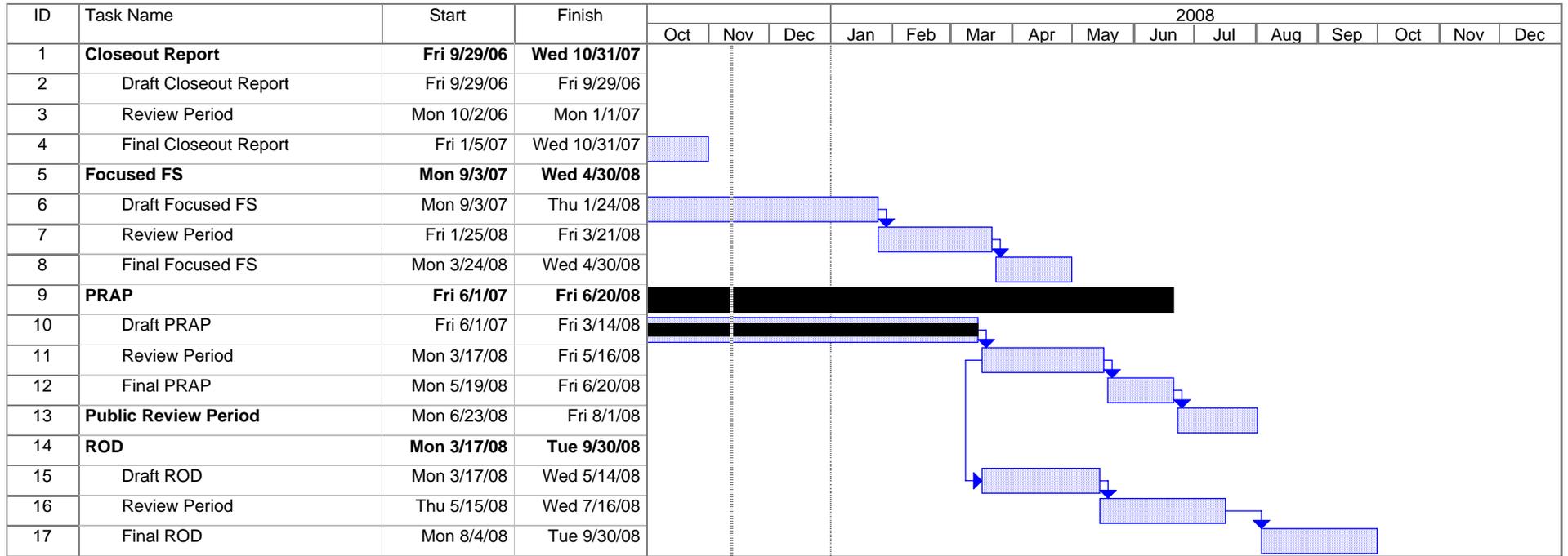
Table 3-14  
 Schedule for IR Site 82 (OU 2), FY 2008  
 MCB Camp Lejeune, North Carolina

ID	Task Name	Start	Finish	2008											
				Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	<b>Pilot Study</b>	<b>Thu 11/30/06</b>	<b>Mon 3/3/08</b>	Tentative Schedule											
2	Pilot Study Implementation & Monitoring	Thu 11/30/06	Fri 9/28/07	↓											
3	Draft Pilot Study Report	Mon 10/1/07	Mon 12/31/07	↓											
4	Review Period	Tue 1/1/08	Fri 2/1/08	↓											
5	Final Pilot Study Report	Mon 2/4/08	Mon 3/3/08	↓											
6	<b>Long-Term Monitoring</b>	<b>Mon 10/1/07</b>	<b>Tue 9/30/08</b>	↓											
7	Draft LTM Report for FY 2007	Mon 11/5/07	Thu 1/31/08	↓											
8	Review Period	Fri 2/1/08	Fri 3/7/08	↓											
9	Final LTM Report for FY 2007	Mon 4/7/08	Wed 4/30/08	↓											
10	LTM for FY 2008	Mon 10/1/07	Tue 9/30/08	Tentative Schedule											

Project: CT0-171  
 Date: Mon 11/12/07



Table 3-15  
 Schedule for IR Site 84 (OU 19), FY 2008  
 MCB Camp Lejeune, North Carolina



Project: CT0-171  
 Date: Mon 11/12/07



Table 3-16  
 Schedule for IR Site 86 (OU 20), FY 2008  
 MCB Camp Lejeune, North Carolina

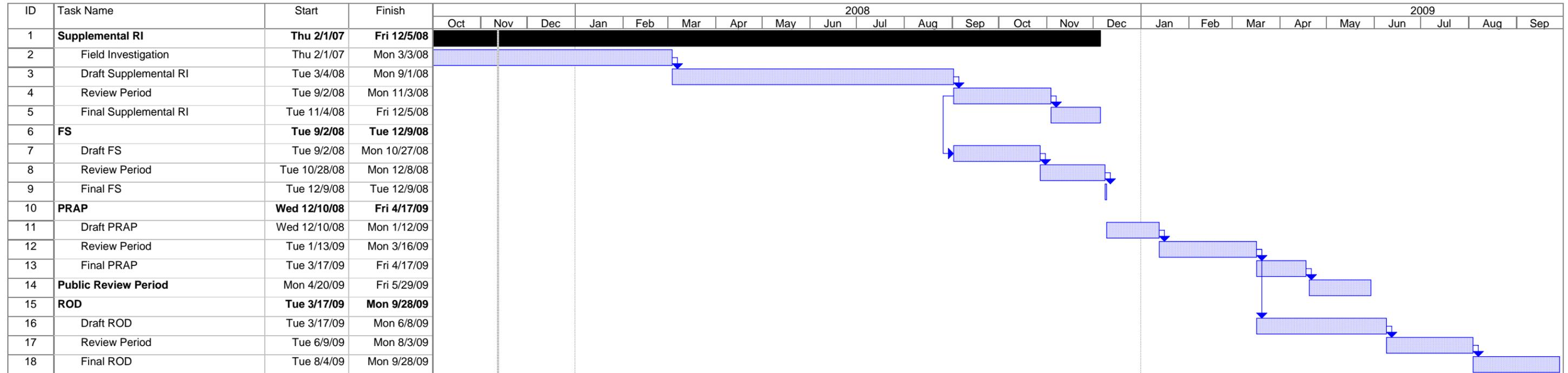
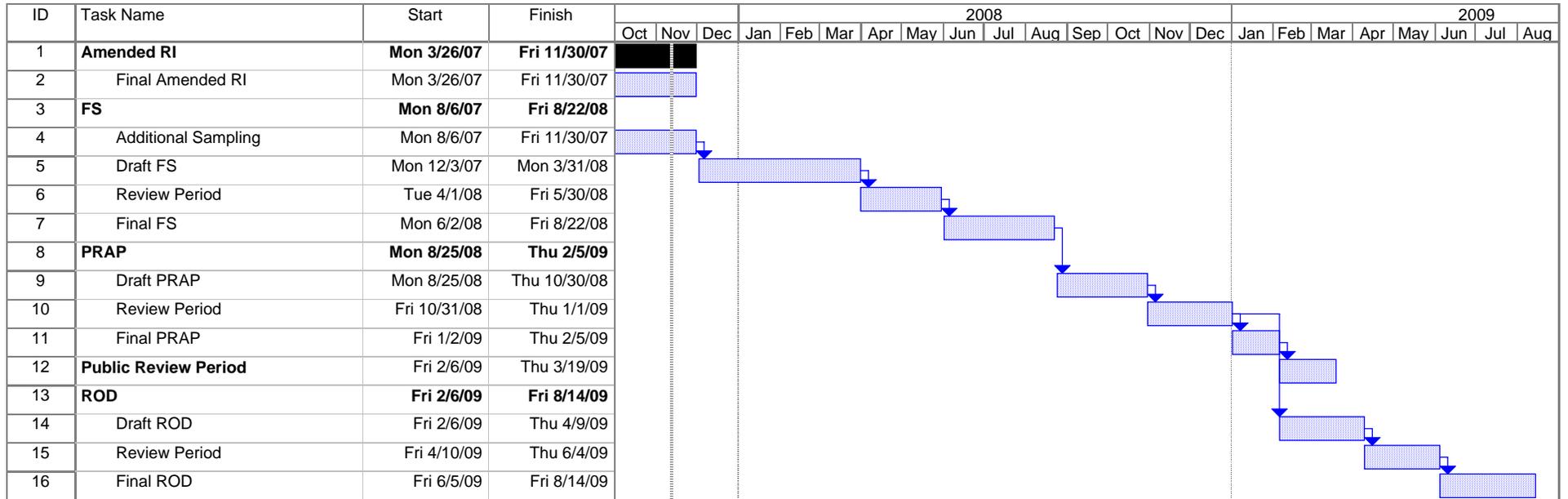


Table 3-17  
 Schedule for IR Site 88 (OU 15), FY 2008  
 MCB Camp Lejeune, North Carolina



Project: CT0-171  
 Date: Mon 11/12/07

Task  Milestone   
 Progress  Tentative Schedule 

Table 3-18  
 IR Site 89 (OU 16), FY 2008  
 MCB Camp Lejeune, North Carolina

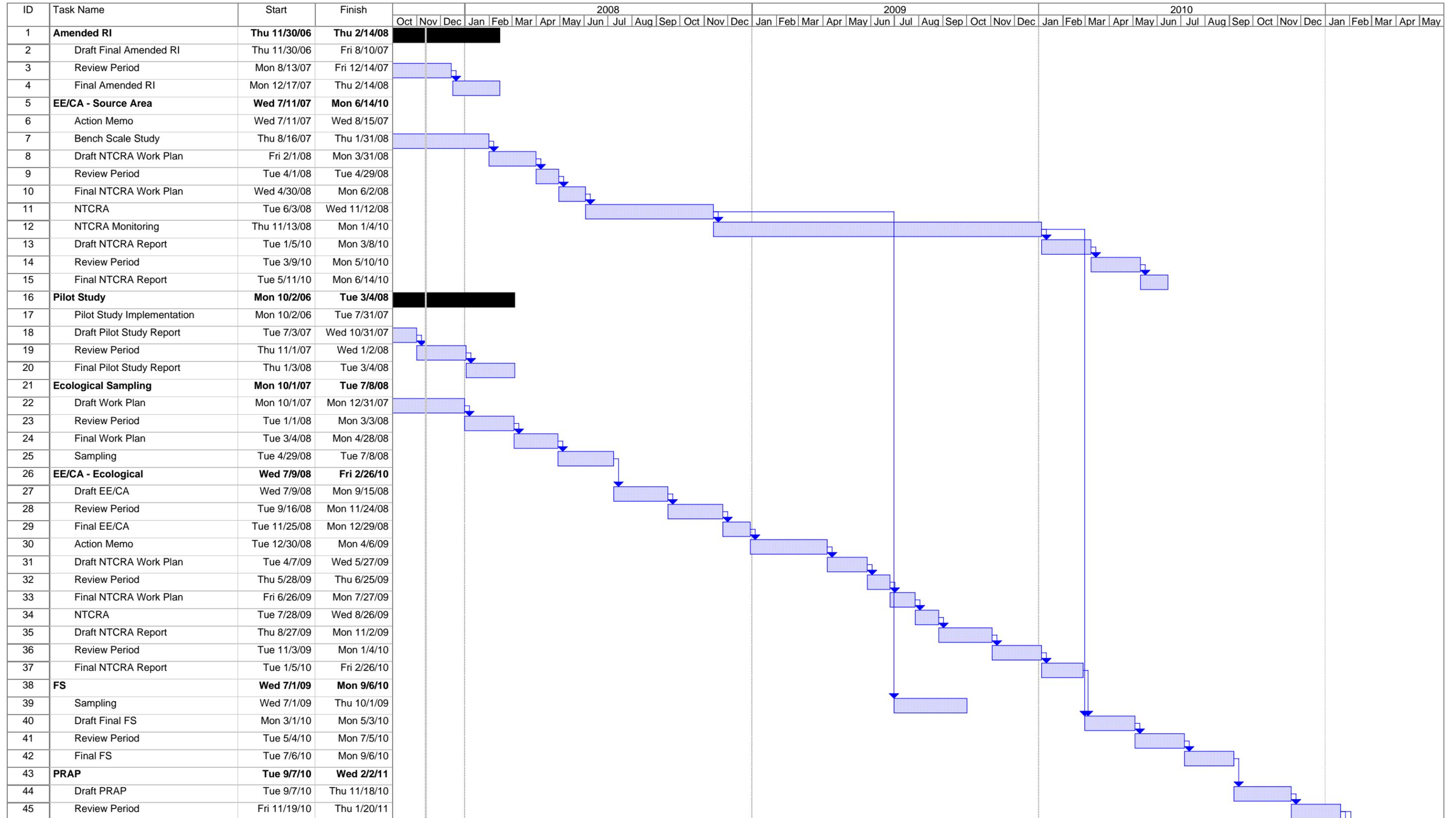




Table 3-19  
 Schedule for IR Site 93 (OU 16), FY 2008  
 MCB Camp Lejeune, North Carolina

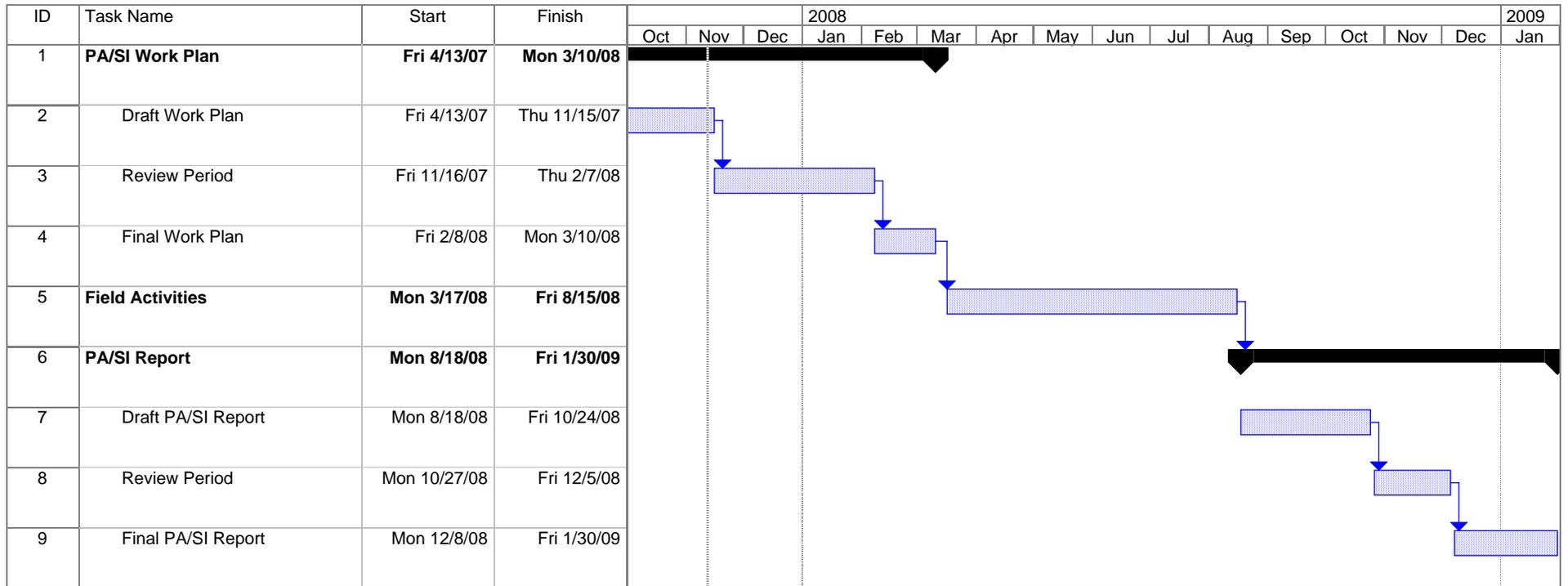
ID	Task Name	Start	Finish	2008													
				Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
1	<b>Remedial Action</b>	<b>Fri 2/29/08</b>	<b>Thu 9/25/08</b>														
2	Draft IRACR	Fri 2/29/08	Thu 7/3/08														
3	Review Period	Fri 7/4/08	Thu 8/14/08														
4	Final IRACR	Fri 8/15/08	Thu 9/25/08														
5	<b>LTM</b>	<b>Fri 7/4/08</b>	<b>Tue 9/30/08</b>														
6	LTM for FY 2008	Fri 7/4/08	Tue 9/30/08														

Project: CT0-171  
 Date: Mon 11/12/07





Table 3-21  
 Schedule for MRP Site UXO-01, FY 2008  
 MCB Camp Lejeune, North Carolina



Project: CTO-171  
 Date: Mon 11/12/07

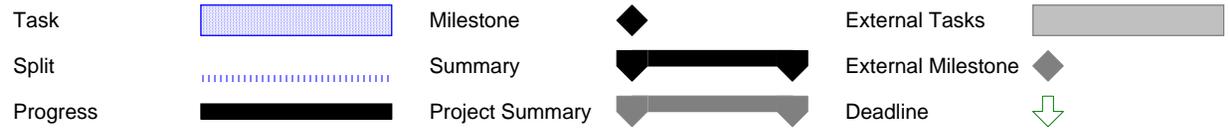
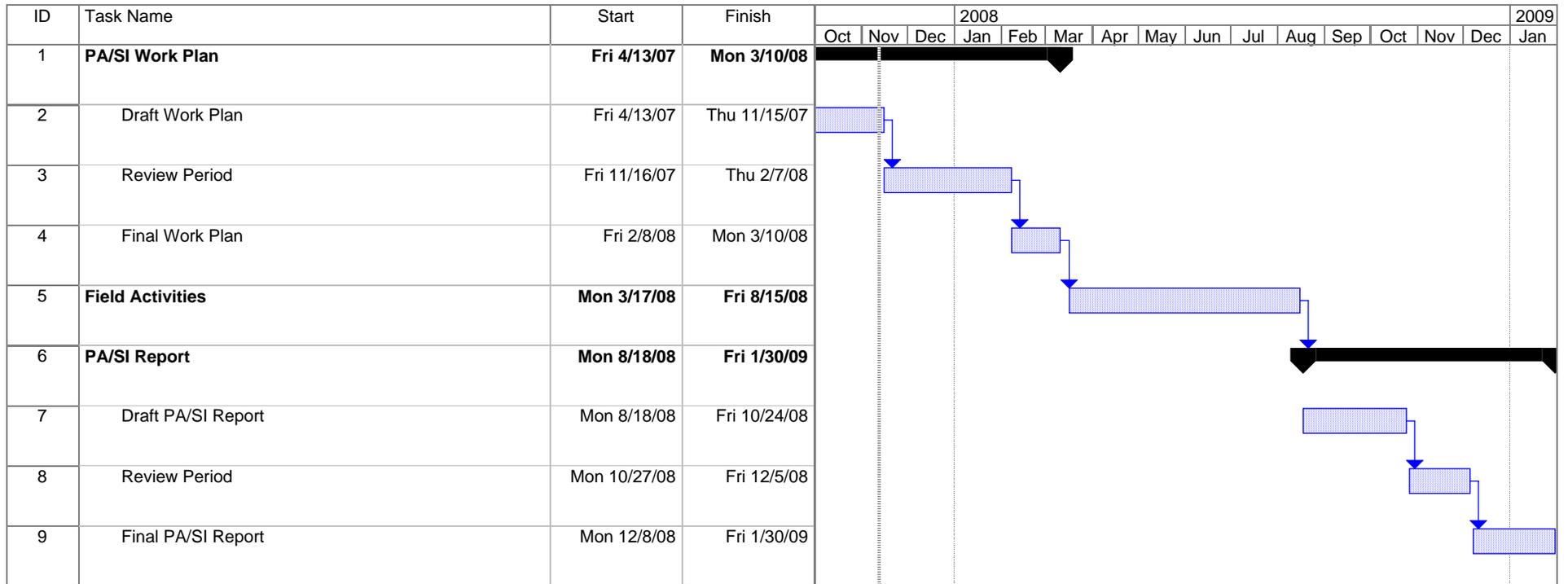


Table 3-22  
 Schedule for MRP Site UXO-03, FY 2008  
 MCB Camp Lejeune, North Carolina



Project: CTO-171  
 Date: Mon 11/12/07

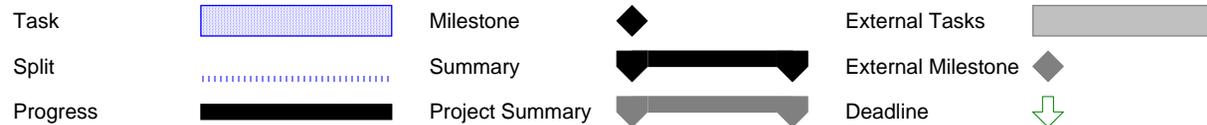
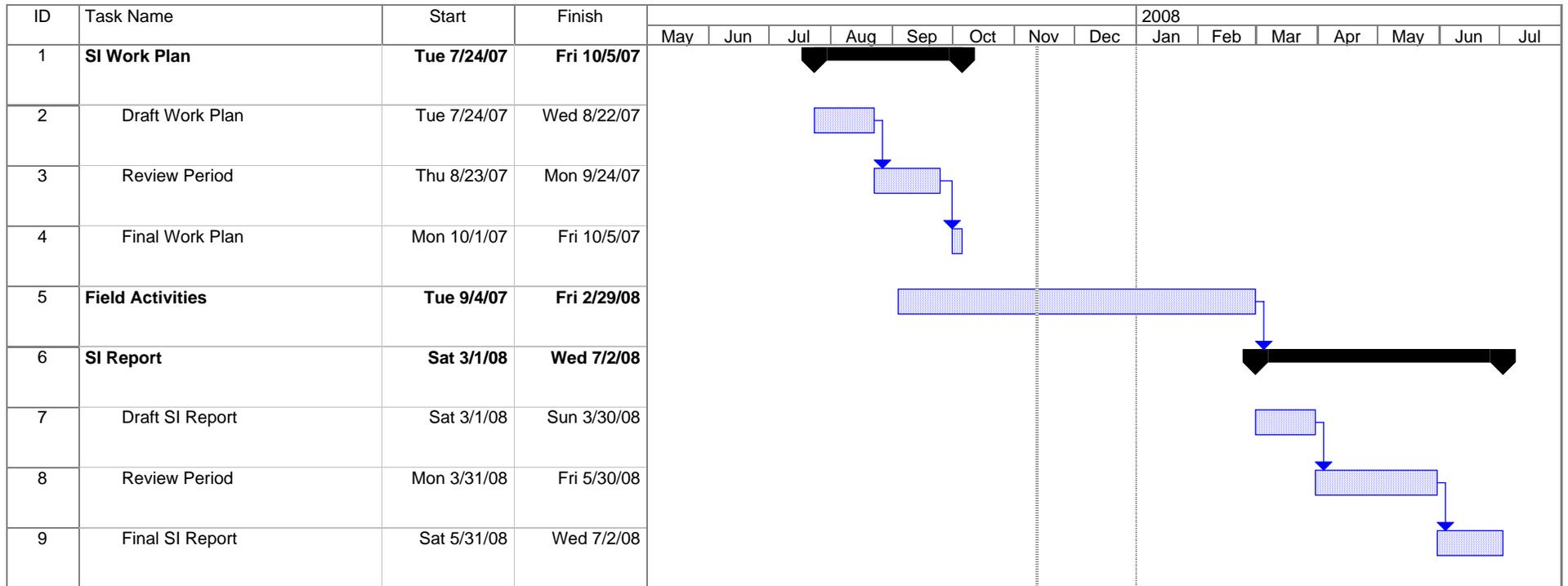


Table 3-23  
 Schedule for MRP Site UXO-04, FY 2008  
 MCB Camp Lejeune, North Carolina



Project: CTO-171  
 Date: Mon 11/12/07

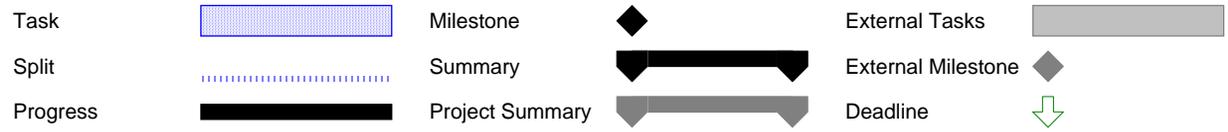
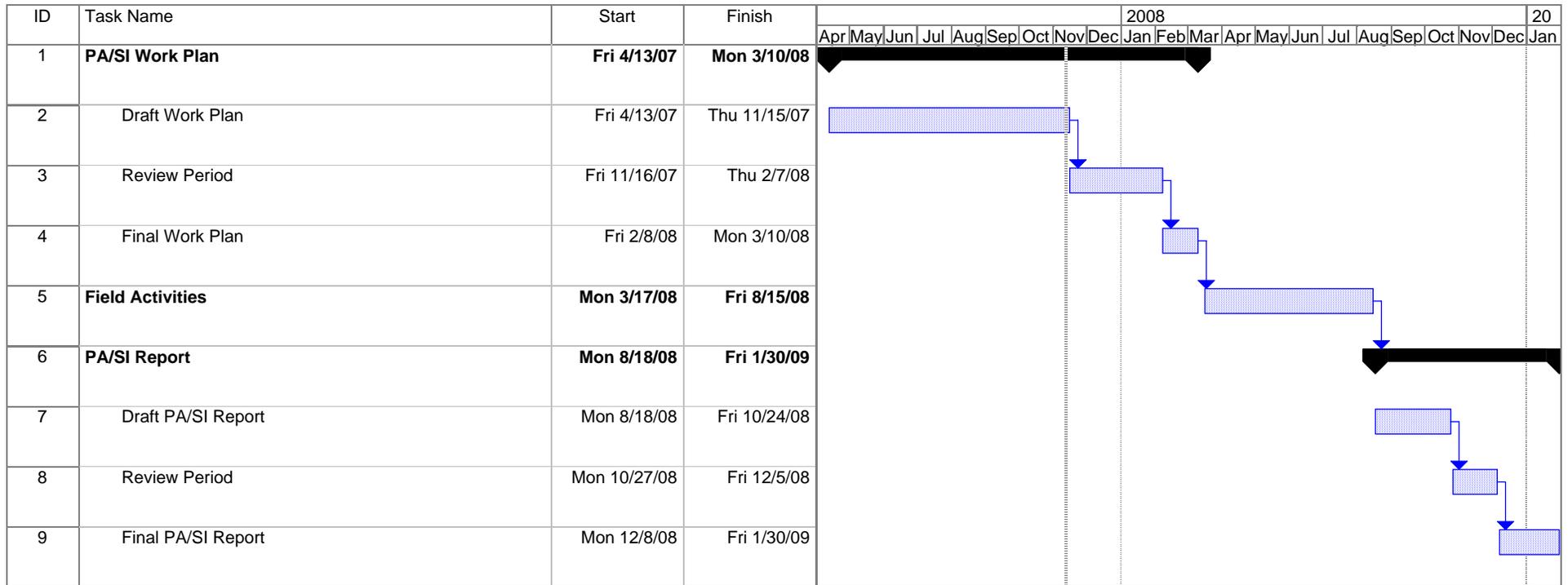


Table 3-24  
 Schedule for MRP Site UXO-05, FY 2008  
 MCB Camp Lejeune, North Carolina



Project: CTO-171  
 Date: Mon 11/12/07

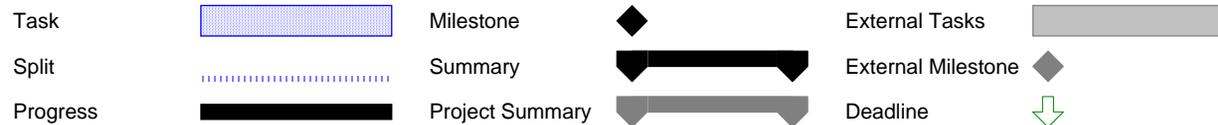
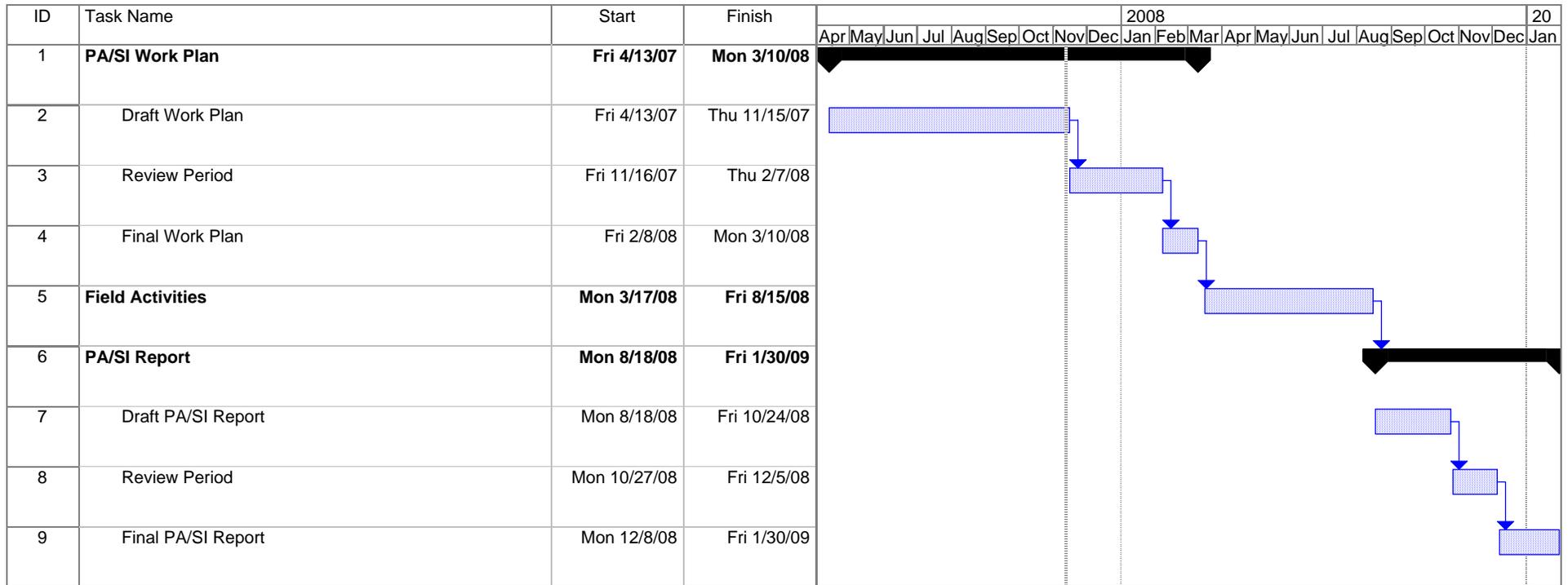


Table 3-25  
 Schedule for MRP Site UXO-06, FY 2008  
 MCB Camp Lejeune, North Carolina



Project: CTO-171  
 Date: Mon 11/12/07

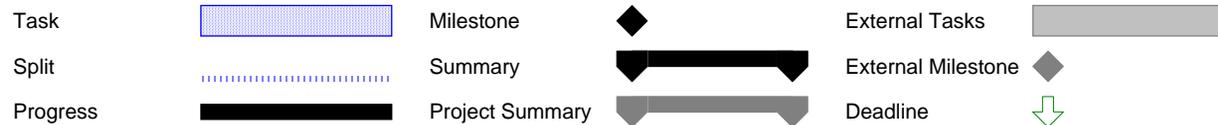
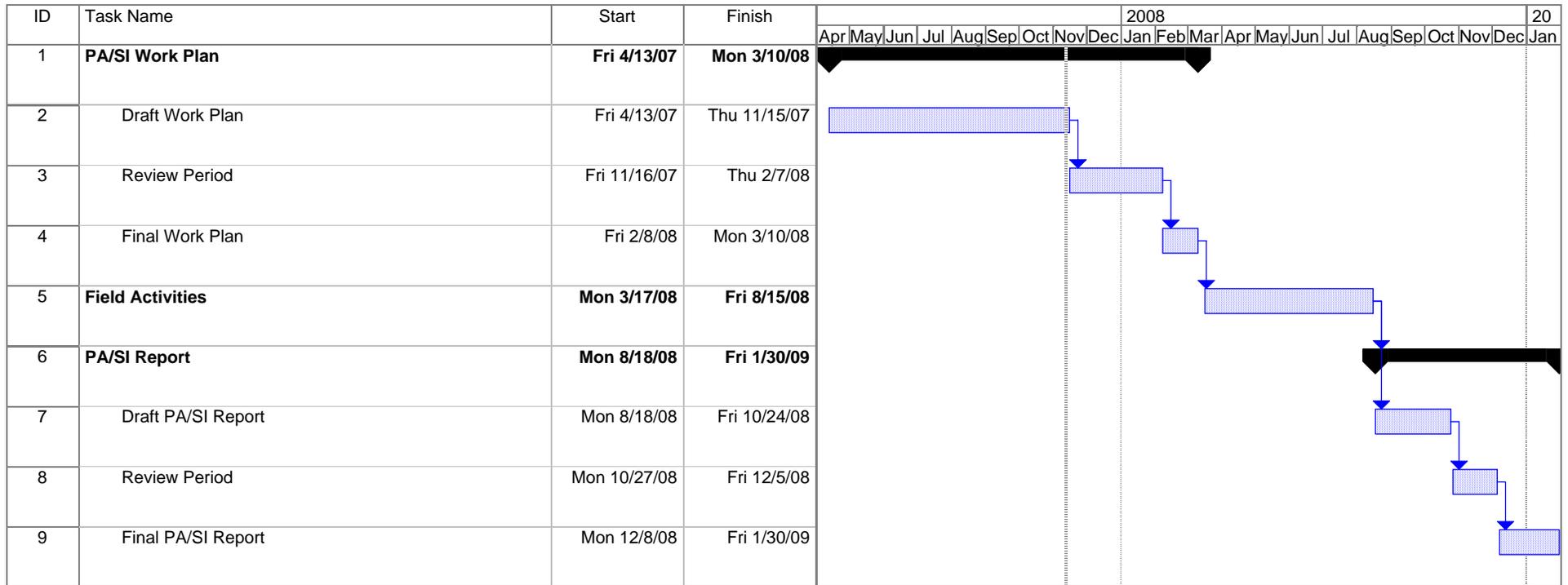


Table 3-26  
 Schedule for MRP Site UXO-08, FY 2008  
 MCB Camp Lejeune, North Carolina



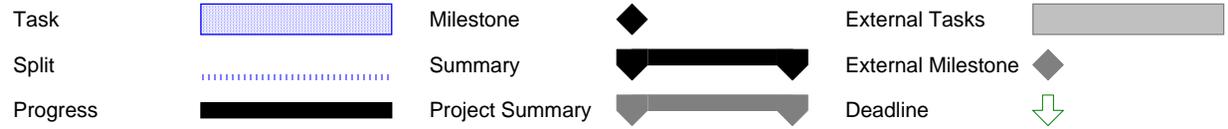
Project: CTO-171  
 Date: Mon 11/12/07



Table 3-27  
 Schedule for MRP Site UXO-09, FY 2008  
 MCB Camp Lejeune, North Carolina

ID	Task Name	Start	Finish	2008												20											
				Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar		Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	
1	<b>PA/SI Work Plan</b>	<b>Fri 4/13/07</b>	<b>Mon 3/10/08</b>																								
2	Draft Work Plan	Fri 4/13/07	Thu 11/15/07																								
3	Review Period	Fri 11/16/07	Thu 2/7/08																								
4	Final Work Plan	Fri 2/8/08	Mon 3/10/08																								
5	<b>Field Activities</b>	<b>Mon 3/17/08</b>	<b>Fri 8/15/08</b>																								
6	<b>PA/SI Report</b>	<b>Mon 8/18/08</b>	<b>Fri 1/30/09</b>																								
7	Draft PA/SI Report	Mon 8/18/08	Fri 10/24/08																								
8	Review Period	Mon 10/27/08	Fri 12/5/08																								
9	Final PA/SI Report	Mon 12/8/08	Fri 1/30/09																								

Project: CTO-171  
 Date: Mon 11/12/07



## Figures

---



- Legend**
- Installation Area
  - Limited Access Highway
  - Highway
  - Local Roads
  - Cities

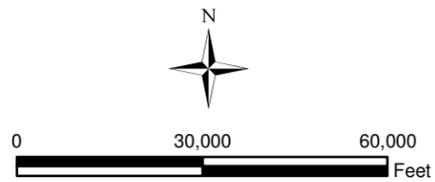


Figure 2-1  
Base Location Map  
Site Management Plan  
Marine Corps Base Camp Lejeune  
North Carolina



- Legend**
- PA/SI Sites
  - RI/FS Sites
  - ROD Site
  - RIP Sites
  - NFA Sites



1,500 0 1,500 3,000  
Meters

Figure 3-1  
Installation Restoration Sites  
Site Management Plan  
Marine Corps Base Camp Lejeune  
North Carolina



**Legend**  
PA/SI Sites



0 5,000 10,000 15,000 20,000  
Feet

Figure 3-2  
IR Sites Requiring Re-Evaluation  
Site Management Plan  
Marine Corps Base Camp Lejeune  
North Carolina



**Legend**

- NFA Sites
- PA/SI Sites

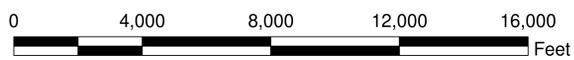
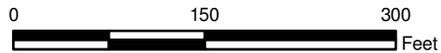


Figure 3-3  
Munitions Response Program Sites  
Site Management Plan  
Marine Corps Base Camp Lejeune  
North Carolina



**Legend**  
□ PA/SI Sites



1 inch = 150 feet

Figure 3-4  
PA Site - MCAS New River Buildings SAS113, AS116, and AS119  
Site Management Plan  
Marine Corps Base Camp Lejeune  
North Carolina



**Legend**

 PA/SI Sites

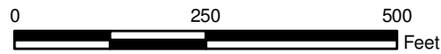


1 inch = 300 feet

Figure 3-5  
PA Site - Montford Point Buildings M119 and M315  
Site Management Plan  
Marine Corps Base Camp Lejeune  
North Carolina

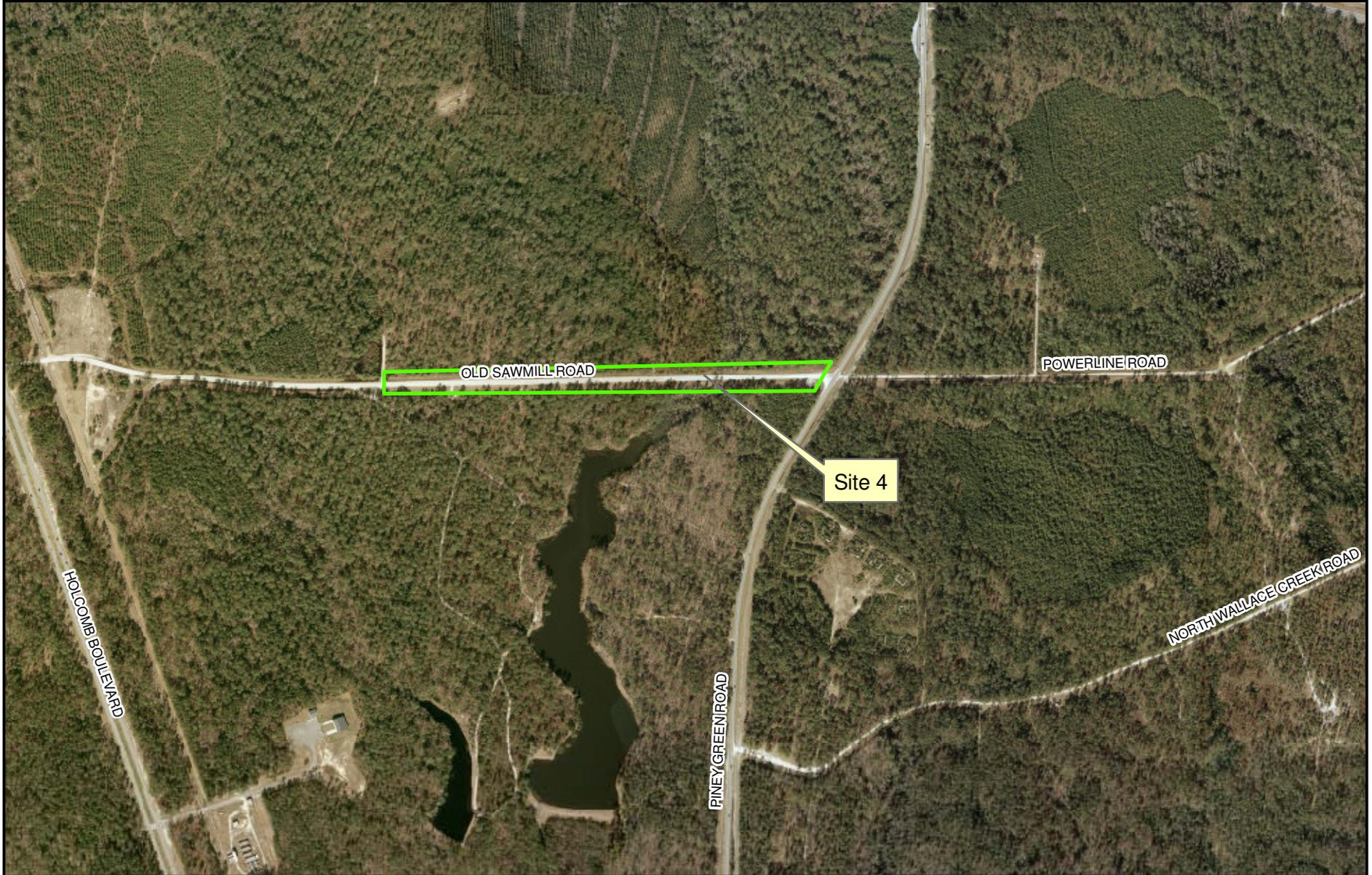


**Legend**  
□ PA/SI Sites



1 inch = 250 feet

Figure 3-6  
PA Site - Hadnot Point Industrial Area Buildings 1120, 1409, and 1512  
Site Management Plan  
Marine Corps Base Camp Lejeune  
North Carolina



**Legend**

 PA/SI Sites

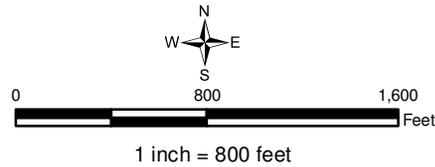
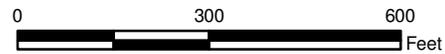


Figure 3-7  
IR Site 4  
Site Management Plan  
Marine Corps Base Camp Lejeune  
North Carolina

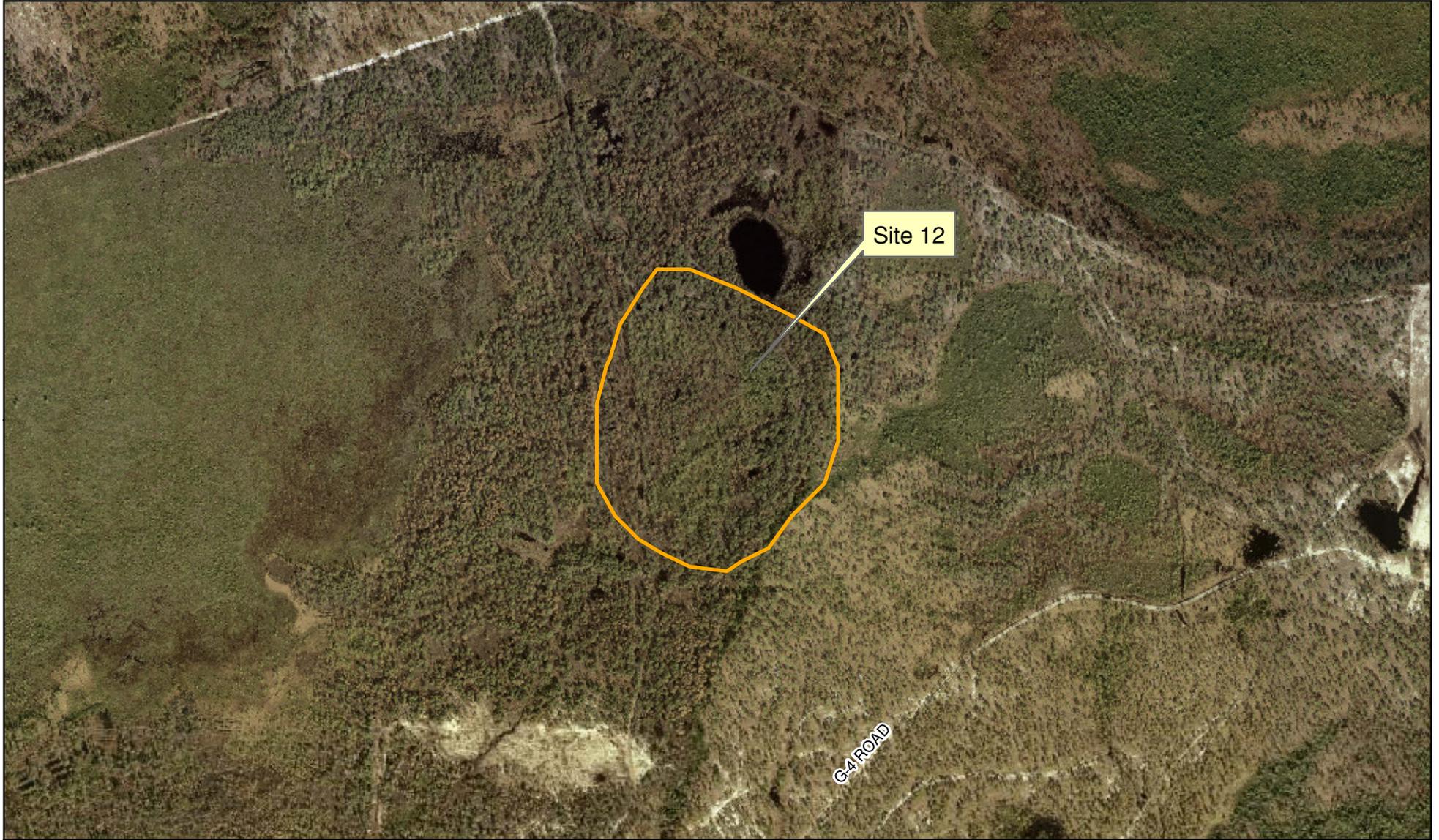


**Legend**  
□ NFA Sites

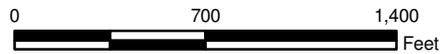


1 inch = 300 feet

Figure 3-8  
IR Site 10 (Pre-RI)  
Site Management Plan  
Marine Corps Base Camp Lejeune  
North Carolina



**Legend**  
NFA Sites



1 inch = 700 feet

Figure 3-9  
IR Site 12 (Pre-RI)  
Site Management Plan  
Marine Corps Base Camp Lejeune  
North Carolina



Site 13

BOY SCOUT ROAD

BREWSTER BOULEVARD

CHARLES STREET

ST. MARYS DRIVE

**Legend**

 PA/SI Sites



1 inch = 500 feet

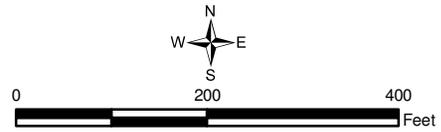
Figure 3-10  
IR Site 13  
Site Management Plan  
Marine Corps Base Camp Lejeune  
North Carolina

**CH2MHILL**



**Legend**

 PA/SI Sites



1 inch = 200 feet

Figure 3-11  
IR Site 18  
Site Management Plan  
Marine Corps Base Camp Lejeune  
North Carolina

**CH2MHILL**

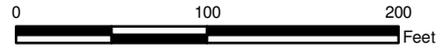


Site 19

PARACHUTE TOWER ROAD

**Legend**

 PA/SI Sites



1 inch = 100 feet

Figure 3-12  
IR Site 19  
Site Management Plan  
Marine Corps Base Camp Lejeune  
North Carolina





**Legend**

-  Approximate Location of Lab Incinerator
-  PA/SI Sites

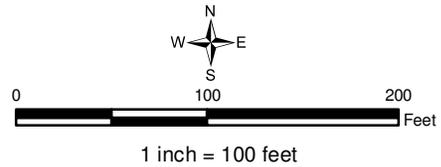
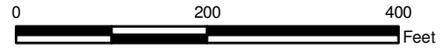


Figure 3-13  
IR Site 20  
Site Management Plan  
Marine Corps Base Lejeune  
North Carolina



**Legend**

 PA/SI Sites



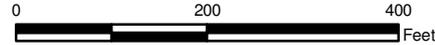
1 inch = 200 feet

Figure 3-14  
IR Site 23  
Site Management Plan  
Marine Corps Base Camp Lejeune  
North Carolina



**Legend**

 PA/SI Sites



1 inch = 200 feet

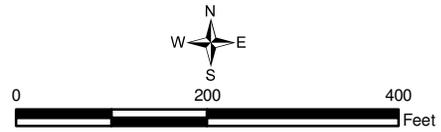
Figure 3-15  
IR Site 25  
Site Management Plan  
Marine Corps Base Camp Lejeune  
North Carolina

**CH2MHILL**



**Legend**

 PA/SI Sites



1 inch = 200 feet

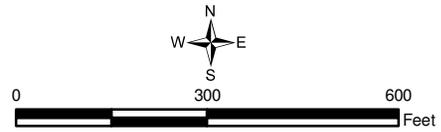
Figure 3-16  
IR Site 37  
Site Management Plan  
Marine Corps Base Camp Lejeune  
North Carolina

**CH2MHILL**



**Legend**

 PA/SI Sites



1 inch = 300 feet

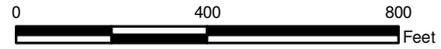
Figure 3-17  
IR Site 38  
Site Management Plan  
Marine Corps Base Lejeune  
North Carolina

**CH2MHILL**



**Legend**

 PA/SI Sites



1 inch = 400 feet

Figure 3-18  
IR Site 40  
Site Management Plan  
Marine Corps Base Camp Lejeune  
North Carolina





**Legend**

 PA/SI Sites

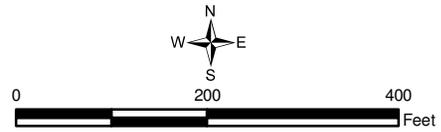


Figure 3-19  
IR Site 42  
Site Management Plan  
Marine Corps Base Camp Lejeune  
North Carolina



Site 46

CURTIS ROAD

WHITE STREET

BAXTER STREET

COMPTON STREET

**Legend**

 PA/SI Sites



0 200 400 Feet

1 inch = 200 feet

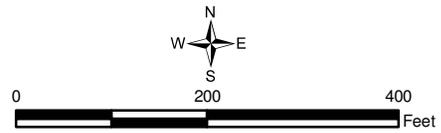
Figure 3-20  
IR Site 46  
Site Management Plan  
Marine Corps Base Camp Lejeune  
North Carolina

**CH2MHILL**



**Legend**

 PA/SI Sites



1 inch = 200 feet

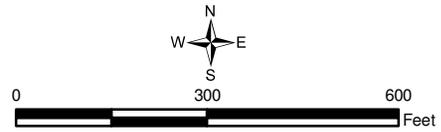
Figure 3-21  
IR Site 49  
Site Management Plan  
Marine Corps Base Camp Lejeune  
North Carolina

**CH2MHILL**



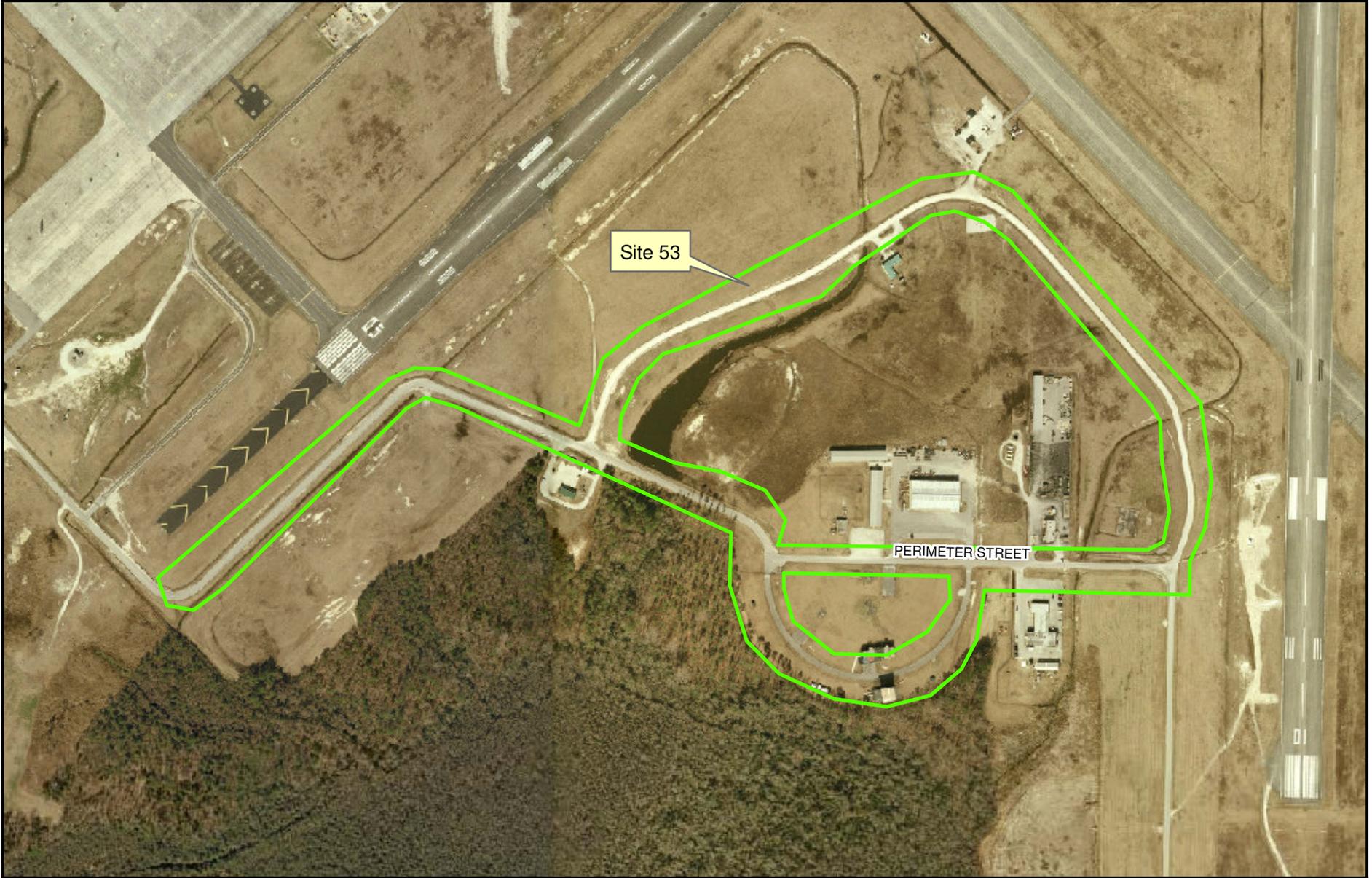
**Legend**

 PA/SI Sites



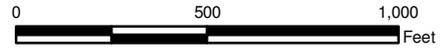
1 inch = 300 feet

Figure 3-22  
IR Site 51  
Site Management Plan  
Marine Corps Base Camp Lejeune  
North Carolina



**Legend**

 PA/SI Sites



1 inch = 500 feet

Figure 3-23  
IR Site 53  
Site Management Plan  
Marine Corps Base Camp Lejeune  
North Carolina

**CH2MHILL**



**Legend**

 PA/SI Sites

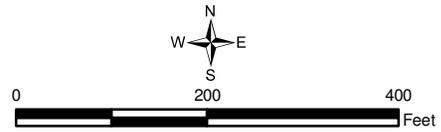
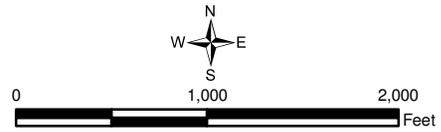


Figure 3-24  
IR Site 55  
Site Management Plan  
Marine Corps Base Camp Lejeune  
North Carolina



**Legend**

 PA/SI Sites



1 inch = 1,000 feet

Figure 3-25  
IR Site 61  
Site Management Plan  
Marine Corps Base Lejeune  
North Carolina

**CH2MHILL**



**Legend**

 PA/SI Sites

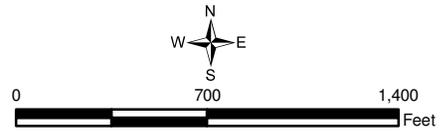
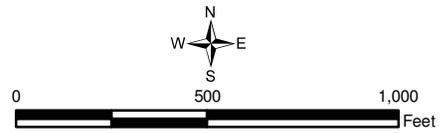


Figure 3-26  
IR Site 62  
Site Management Plan  
Marine Corps Base Camp Lejeune  
North Carolina



**Legend**

 PA/SI Sites



1 inch = 500 feet

Figure 3-27  
IR Site 66  
Site Management Plan  
Marine Corps Base Camp Lejeune  
North Carolina

**CH2MHILL**



**Legend**

 PA/SI Sites

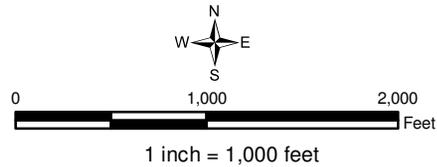


Figure 3-28  
IR Site 67  
Site Management Plan  
Marine Corps Base Lejeune  
North Carolina



**Legend**

-  CERCLA BOUNDARY OF AQUIFER USE
-  CERCLA NON-IND LUC AND INTRUSIVE ACTIVITIES - SOIL/GROUNDWATER

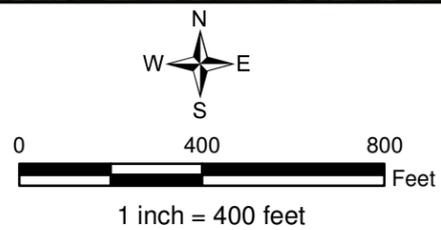


Figure 3-29  
IR Site 68 (Pre-RI)  
Site Management Plan  
Marine Corps Base Camp Lejeune  
North Carolina



**Legend**  
[Orange Box] NFA Site

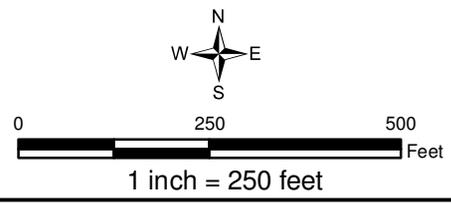
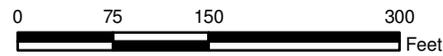


Figure 3-30  
IR Site 75 (Pre-RI)  
Site Management Plan  
Marine Corps Base Camp Lejeune  
North Carolina



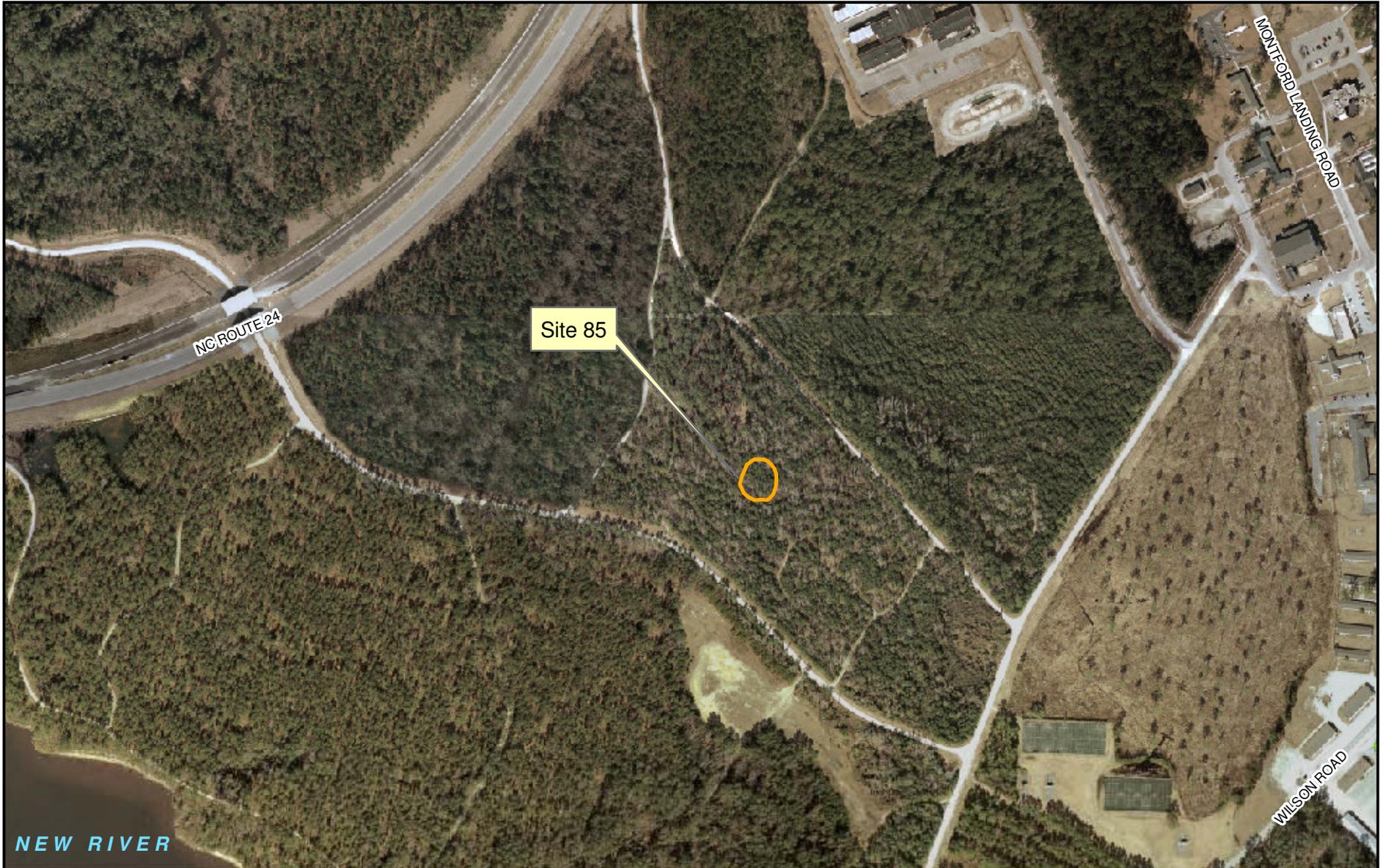


**Legend**  
[Orange Outline] NFA Site



1 inch = 150 feet

Figure 3-31  
IR Site 76 (Pre-RI)  
Site Management Plan  
Marine Corps Base Camp Lejeune  
North Carolina



**Legend**

 NFA Site

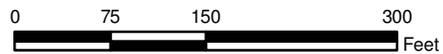


1 inch = 500 feet

Figure 3-32  
IR Site 85 (Pre-RI)  
Site Management Plan  
Marine Corps Base Camp Lejeune  
North Carolina



**Legend**  
NFA Site



1 inch = 150 feet

Figure 3-33  
IR Site 87 (Pre-RI)  
Site Management Plan  
Marine Corps Base Camp Lejeune  
North Carolina



**Legend**

- CERCLA BOUNDARY OF AQUIFER USE
- CERCLA INTRUSIVE ACTIVITIES - GROUNDWATER
- CERCLA NON-IND LUC AND INTRUSIVE ACTIVITIES - SOILGROUNDWATER
- Operable Unit 1

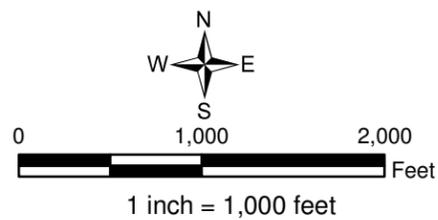
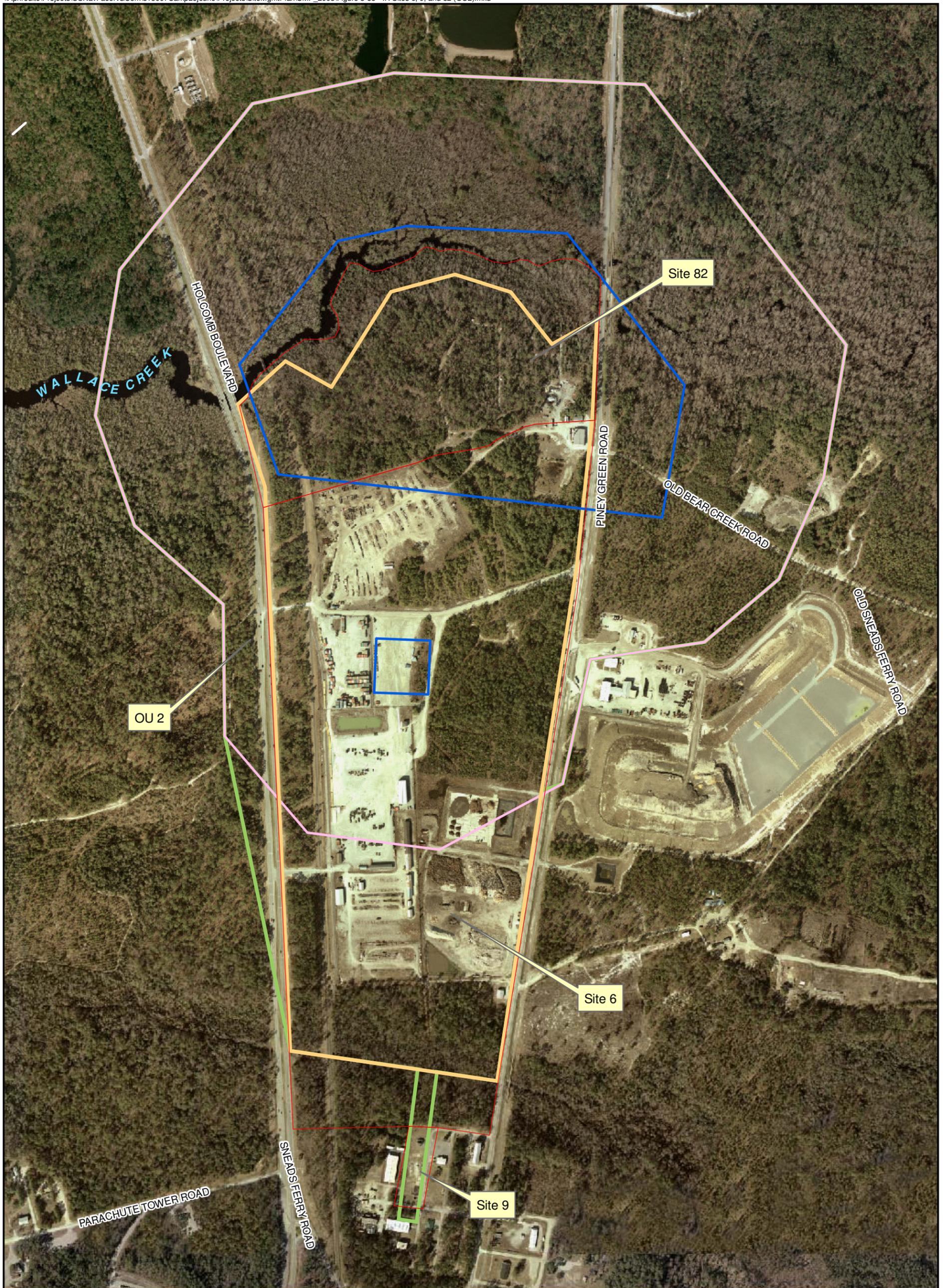


Figure 3-34  
 IR Sites 21, 24, and 78 (OU1)  
 Site Management Plan  
 Marine Corps Base Camp Lejeune  
 North Carolina



**Legend**

- ▭ IR Sites
- ▭ CERCLA BOUNDARY OF AQUIFER USE
- ▭ CERCLA INTRUSIVE ACTIVITIES - GROUNDWATER
- ▭ CERCLA NON-IND LUC AND INTRUSIVE ACTIVITIES - SOIL/GROUNDWATER
- ▭ Operable Unit 2



1 inch = 600 feet

Figure 3-35  
 IR Sites 6, 9, and 82 (OU2)  
 Site Management Plan  
 Marine Corps Base Camp Lejeune  
 North Carolina



**Legend**  
NFA Site  
Operable Unit 3

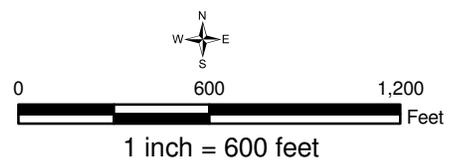


Figure 3-36  
IR Site 48 (OU3)  
Site Management Plan  
Marine Corps Base Camp Lejeune  
North Carolina



Site 41, Camp Geiger Dump  
Near Former Trailer Park

Site 74, Mess Hall Grease  
Disposal Area

OU 4

OU 4

- Legend**
- Access Controls
  - CERCLA BOUNDARY OF AQUIFER USE
  - CERCLA INTRUSIVE ACTIVITIES - GROUNDWATER
  - CERCLA INTRUSIVE SOIL BOUNDARY
  - CERCLA NON-IND LUC AND INTRUSIVE ACTIVITIES - SOILGROUNDWATER
  - Operable Unit 4

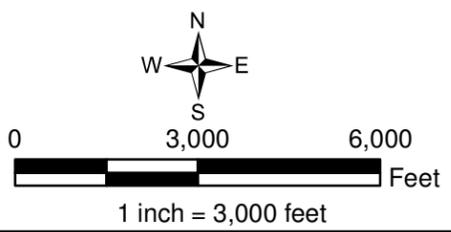
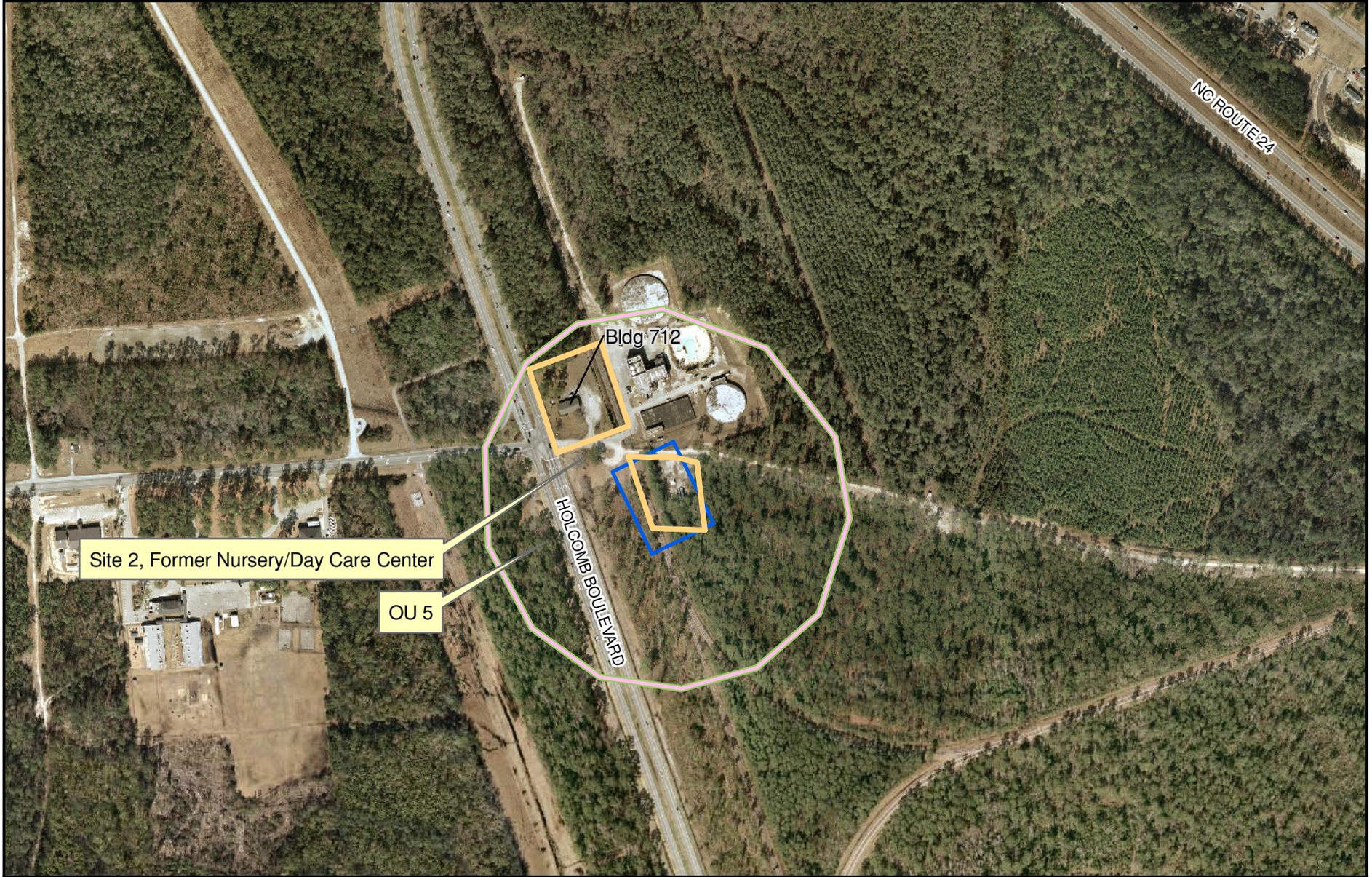


Figure 3-37  
IR Sites 41 and 74 (OU4)  
Site Management Plan  
Marine Corps Base Camp Lejeune  
North Carolina





**Legend**

-  CERCLA BOUNDARY OF AQUIFER USE
-  CERCLA INTRUSIVE ACTIVITIES - GROUNDWATER
-  CERCLA NON-IND LUC AND INTRUSIVE ACTIVITIES - SOIL/GROUNDWATER
-  Operable Unit 5



1 inch = 500 feet

Figure 3-38  
IR Site 2 (OU5)  
Site Management Plan  
Marine Corps Base Camp Lejeune  
North Carolina





- Legend**
- ▭ CERCLA BOUNDARY OF AQUIFER USE
  - ▭ CERCLA INTRUSIVE ACTIVITIES - GROUNDWATER
  - ▭ CERCLA INTRUSIVE SOIL BOUNDARY
  - ▭ CERCLA NON-IND LUC AND INTRUSIVE ACTIVITIES - SOILGROUNDWATER
  - ▭ Operable Unit 3
  - ▭ Installation Area

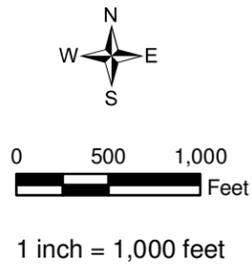


Figure 3-39  
 IR Sites 36, 43, 44, and 54 (OU6)  
 Site Management Plan  
 Marine Corps Base Camp Lejeune  
 North Carolina



- Legend**
- CERCLA BOUNDARY OF AQUIFER USE
  - CERCLA INTRUSIVE ACTIVITIES - GROUNDWATER
  - CERCLA NON-IND LUC AND INTRUSIVE ACTIVITIES - SOILGROUNDWATER
  - NFA Sites
  - Operable Unit 7

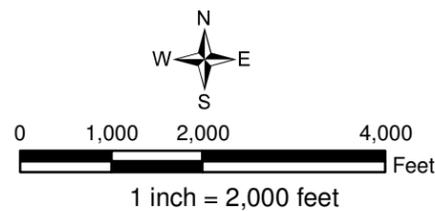
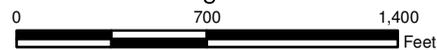


Figure 3-40  
 IR Sites 1, 28, and 30 (OU7)  
 Site Management Plan  
 Marine Corps Base Camp Lejeune  
 North Carolina



**Legend**

-  CERCLA BOUNDARY OF AQUIFER USE
-  CERCLA INTRUSIVE ACTIVITIES - GROUNDWATER
-  CERCLA NON-IND LUC AND INTRUSIVE ACTIVITIES - SOILGROUNDWATER
-  Operable Unit 8



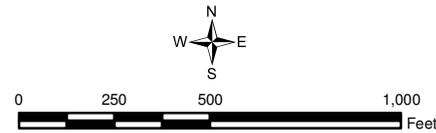
1 inch = 700 feet

Figure 3-41  
IR Site 16 (OU8)  
Site Management Plan  
Marine Corps Base Camp Lejeune  
North Carolina



**Legend**

-  NFA Site
-  Operable Unit 9



1 inch = 500 feet

Figure 3-42  
IR Site 65 (OU9)  
Site Management Plan  
Marine Corps Base Camp Lejeune  
North Carolina

**CH2MHILL**



Site 35, Camp Geiger Area Fuel Farm

OU10

Bldg G480

**Legend**

-  RI/FS Site
-  Operable Unit 10



1 inch = 1,500

Figure 3-43  
IR Site 35 (OU10)  
Site Management Plan  
Marine Corps Base Camp Lejeune  
North Carolina





- Legend**
-  NFA Site
  -  CERCLA NON-IND LUC AND INTRUSIVE ACTIVITIES - SOIL/GROUNDWATER
  -  Operable Unit 11

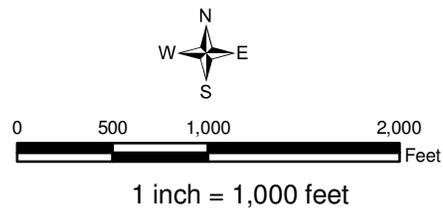
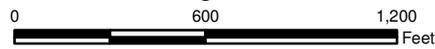


Figure 3-44  
IR Sites 7 and 80 (OU11)  
Site Management Plan  
Marine Corps Base Camp Lejeune  
North Carolina



**Legend**

-  CERCLA BOUNDARY OF AQUIFER USE
-  CERCLA INTRUSIVE ACTIVITIES - GROUNDWATER
-  CERCLA NON-IND LUC AND INTRUSIVE ACTIVITIES - SOIL/GROUNDWATER
-  Operable Unit 12



1 inch = 600 feet

Figure 3-45  
IR Site 3 (OU12)  
Site Management Plan  
Marine Corps Base Camp Lejeune  
North Carolina

**CH2MHILL**



**Legend**

-  CERCLA BOUNDARY OF AQUIFER USE
-  CERCLA INTRUSIVE ACTIVITIES - GROUNDWATER
-  Operable Unit 13

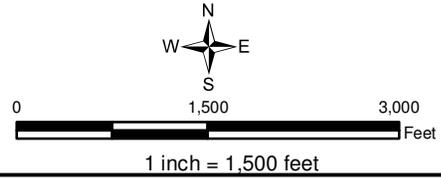


Figure 3-46  
IR Site 63 (OU13)  
Site Management Plan  
Marine Corps Base Camp Lejeune  
North Carolina





Site 69, Rifle Range Chemical Dump

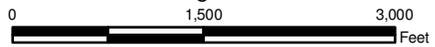
OU 14

NEW RIVER

EVERETT CREEK

**Legend**

-  CERCLA BOUNDARY OF AQUIFER USE
-  CERCLA INTRUSIVE ACTIVITIES - GROUNDWATER
-  CERCLA INTRUSIVE SOIL BOUNDARY
-  CERCLA NON-IND LUC AND INTRUSIVE ACTIVITIES - SOILGROUNDWATER
-  Operable Unit 14



1 inch = 1,500 feet

Figure 3-47  
IR Site 69 (OU14)  
Site Management Plan  
Marine Corps Base Camp Lejeune  
North Carolina

**CH2MHILL**



**Legend**  
RI/FS Sites  
Operable Unit 15

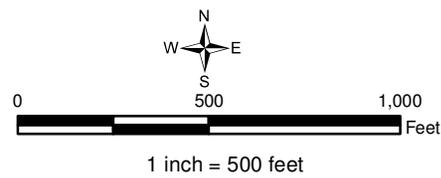


Figure 3-48  
IR Site 88 (OU15)  
Site Management Plan  
Marine Corps Base Camp Lejeune  
North Carolina  
**CH2MHILL**



**Legend**

-  RI/FS Sites
-  Operable Unit 15

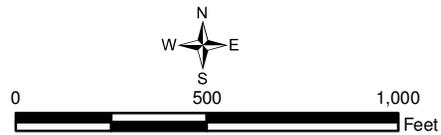


Figure 3-48  
IR Site 88 (OU15)  
Site Management Plan  
Marine Corps Base Camp Lejeune  
North Carolina



**Legend**

- RI/FS Sites
- Operable Unit 16
- CERCLA BOUNDARY OF AQUIFER USE
- CERCLA INTRUSIVE ACTIVITIES - GROUNDWATER
- Site Access Boundary (Fence)

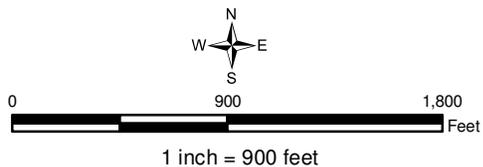


Figure 3-49  
 IR Sites 89 and 93 (OU16)  
 Site Management Plan  
 Marine Corps Base Camp Lejeune  
 North Carolina



**Legend**

-  NFA Sites
-  Operable Unit 17

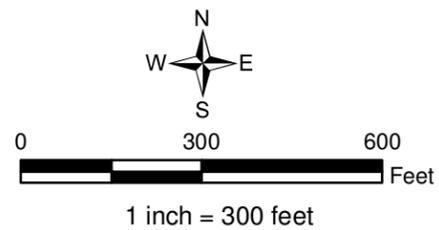
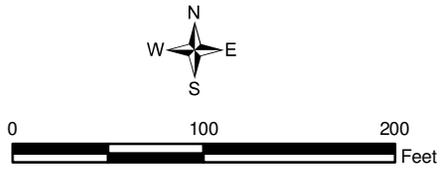


Figure 3-50  
IR Sites 90, 91, and 92 (OU17)  
Site Management Plan  
Marine Corps Base Camp Lejeune  
North Carolina



- Legend**
-  NFA Site
  -  Operable Unit



1 inch = 100 feet

Figure 3-51  
IR Site 94 (OU18)  
Site Management Plan  
Marine Corps Base Camp Lejeune  
North Carolina



**Legend**

- CERCLA BOUNDARY OF AQUIFER USE
- CERCLA INTRUSIVE ACTIVITIES - GROUNDWATER
- CERCLA INTRUSIVE SOIL BOUNDARY
- CERCLA NON-IND LUC AND INTRUSIVE ACTIVITIES - SOILGROUNDWATER
- Operable Unit 19

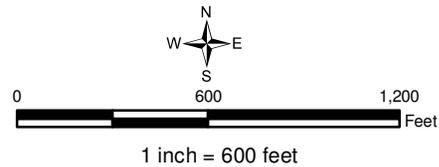
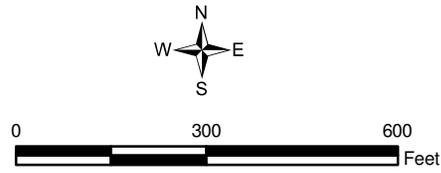


Figure 3-52  
IR Site 84 (OU19)  
Site Management Plan  
Marine Corps Base Camp Lejeune  
North Carolina



- Legend**
- RI/FS Site
  - Operable Unit 20



1 inch = 300 feet

Figure 3-53  
IR Site 86 (OU20)  
Site Management Plan  
Marine Corps Base Camp Lejeune  
North Carolina



**Legend**

-  RI/FS Site
-  Operable Unit 21

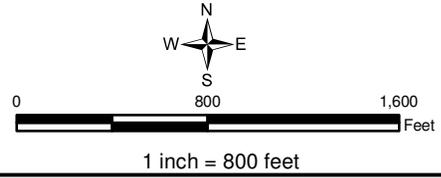


Figure 3-54  
IR Site 73 (OU21)  
Site Management Plan  
Marine Corps Base Camp Lejeune  
North Carolina





**Legend**

 PA/SI Sites

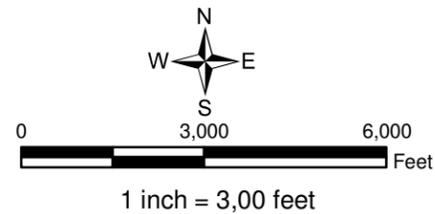


Figure 3-55  
IR Site 95 (OU22)  
Site Management Plan  
Marine Corps Base Camp Lejeune  
North Carolina



UXO-01

HOLCOMB BOULEVARD

NC ROUTE 24

**Legend**

 PA/SI Sites



0 400 800  
Feet

1 inch = 400 feet

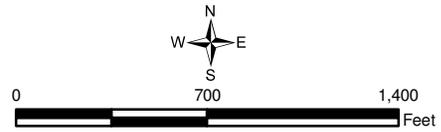
Figure 3-56  
MRP Site UXO-01  
Site Management Plan  
Marine Corps Base Camp Lejeune  
North Carolina

**CH2MHILL**



**Legend**

 PA/SI Sites



1 inch = 700 feet

Figure 3-57  
MRP Site UXO-02  
Site Management Plan  
Marine Corps Base Camp Lejeune  
North Carolina

**CH2MHILL**



**Legend**

 PA/SI Sites



1 inch = 200 feet

Figure 3-58  
MRP Site UXO-03  
Site Management Plan  
Marine Corps Base Lejeune  
North Carolina



**Legend**

 PA/SI Sites

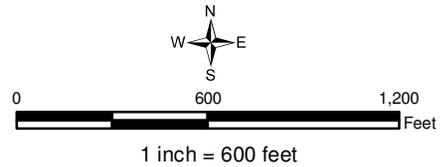
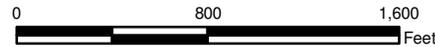


Figure 3-59  
MRP Site UXO-04  
Site Management Plan  
Marine Corps Base Camp Lejeune  
North Carolina



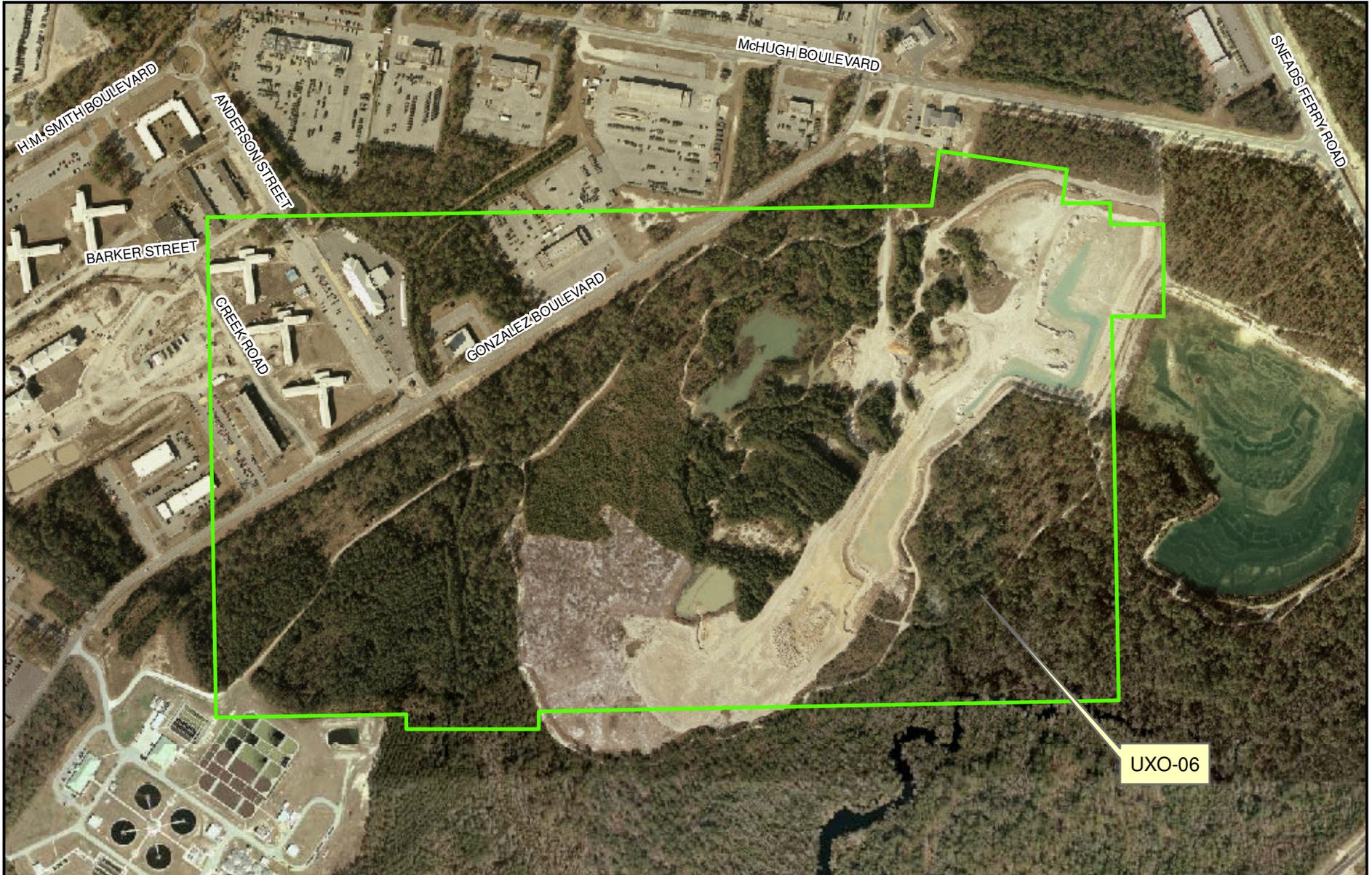
**Legend**

 PA/SI Sites



1 inch = 800 feet

Figure 3-60  
MRP Site UXO-05  
Site Management Plan  
Marine Corps Base Camp Lejeune  
North Carolina



**Legend**

 PA/SI Sites

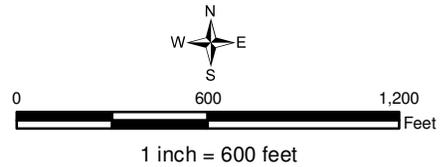
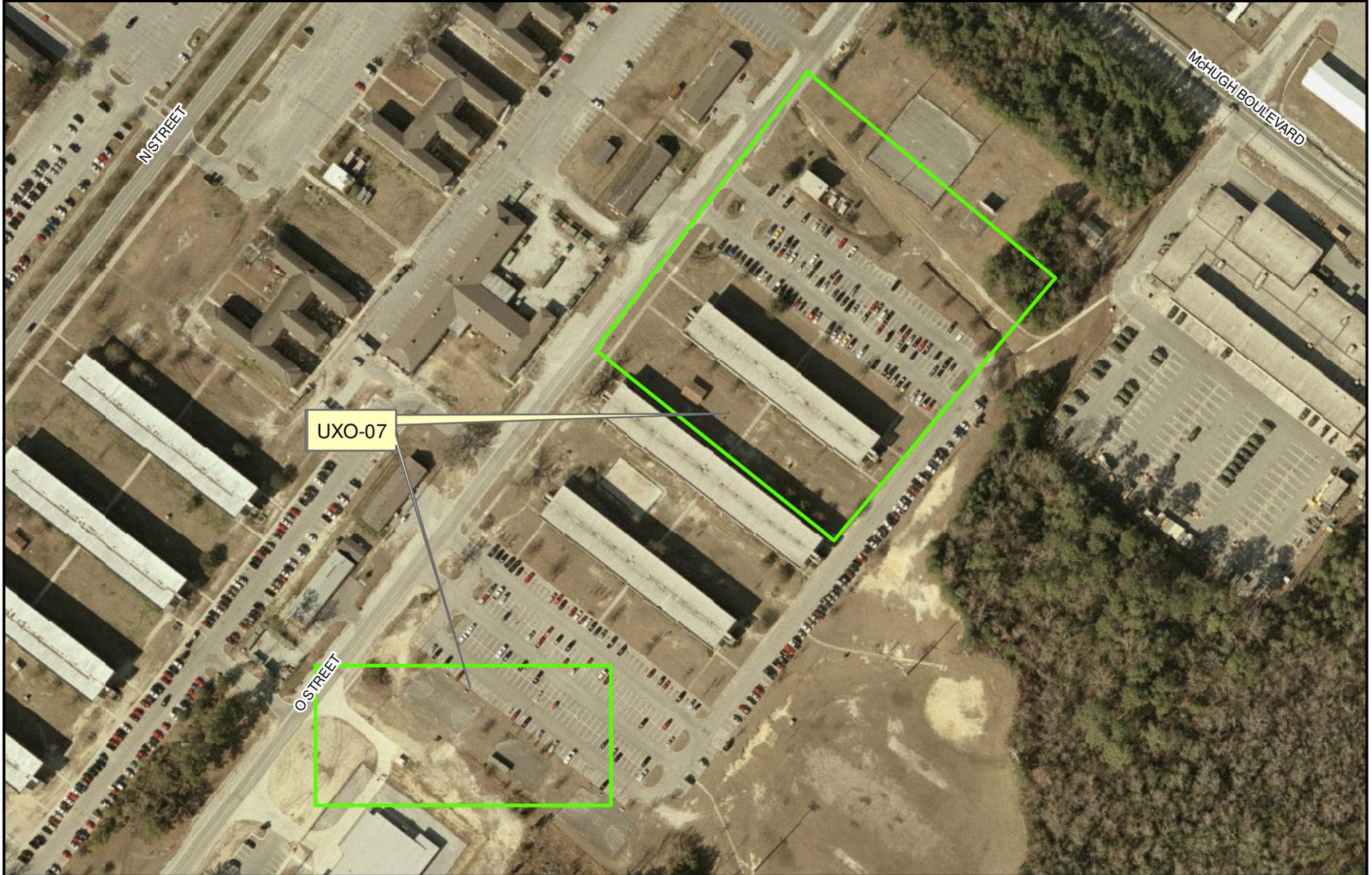


Figure 3-61  
MRP Site UXO-06  
Site Management Plan  
Marine Corps Base Camp Lejeune  
North Carolina



**Legend**

 PA/SI Sites



0 200 400  
Feet

1 inch = 200 feet

Figure 3-62  
MRP Site UXO-07  
Site Management Plan  
Marine Corps Base Camp Lejeune  
North Carolina

**CH2MHILL**



**Legend**  
PA/SI Sites

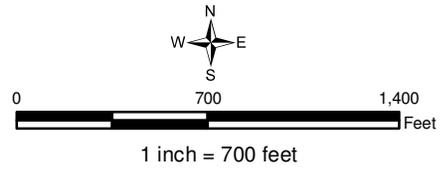


Figure 3-63  
MRP Site UXO-08  
Site Management Plan  
Marine Corps Base Camp Lejeune  
North Carolina



UXO-09

**Legend**

 PA/SI Sites



1 inch = 200 feet

Figure 3-64  
MRP Site UXO-09  
Site Management Plan  
Marine Corps Base Camp Lejeune  
North Carolina



UXO-10

**Legend**

 PA/SI Sites



0 300 600  
Feet

1 inch = 300 feet

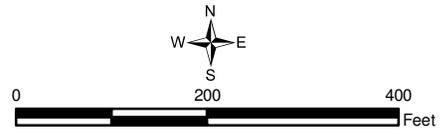
Figure 3-65  
MRP Site UXO-10  
Site Management Plan  
Marine Corps Base Camp Lejeune  
North Carolina

**CH2MHILL**



**Legend**

 PA/SI Sites



1 inch = 200 feet

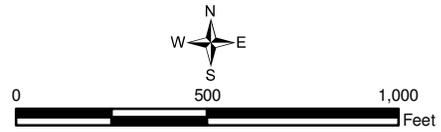
Figure 3-66  
MRP Site UXO-11  
Site Management Plan  
Marine Corps Base Camp Lejeune  
North Carolina

**CH2MHILL**



**Legend**

 PA/SI Sites



1 inch = 500 feet

Figure 3-67  
MRP Site UXO-12  
Site Management Plan  
Marine Corps Base Camp Lejeune  
North Carolina

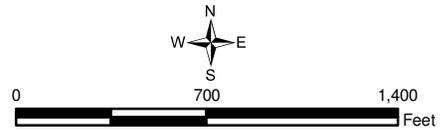
**CH2MHILL**



Approximate location  
of UXO-13

**Legend**

 NFA Sites



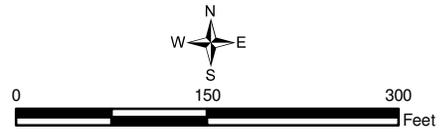
1 inch = 700 feet

Figure 3-68  
MRP Site UXO-13  
Site Management Plan  
Marine Corps Base Camp Lejeune  
North Carolina



**Legend**

 PA/SI Sites



1 inch = 150 feet

Figure 3-69  
MRP Site UXO-14  
Site Management Plan  
Marine Corps Base Camp Lejeune  
North Carolina

**CH2MHILL**