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FIELD INVESTIGATION PHOTOGRAPH ALBUM

OPERABLE UNIT NO. 6
(SITES 36, 43, 44, 54 AND 86)

MARINE CORPS AIR STATION, NEW RIVER
JACKSONVILLE, NORTH CAROLINA

CONTRACT TASK ORDER 0303

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LIST OF ACRONYMS AND ABBREVIATIONS

CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
DEHNR	North Carolina Department of Environment, Health, and Natural Resources
DoN	Department of the Navy
EPIC	Environmental Photographic Interpretation Center
FCLDA	French Creek Liquid Disposal Area
FFA	Federal Facilities Agreement
FTSA	Fuel Tank Sludge Area
HPBD	Hadnot Point Burn Dump
HPIA	Hadnot Point Industrial Area
IAS	Initial Assessment Study
IDW	Investigation Derived Waste
MCAS	Marine Corps Air Station
MCB	Marine Corps Base
NEESA	Naval Energy and Environmental Support Activity
NPL	National Priorities List
OU	Operable Unit
PCB	Polychlorinated Biphenyls
POL	Petroleum, Oil, and Lubricants
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
STP	Sewage Treatment Plant
TAL	Target Analyte List
TCL	Target Compound List
TCLP	Toxicity Characteristic Leaching Procedure
TDS	Total Dissolved Solids
TOC	Total Organic Carbon
TSS	Total Suspended Solids
USEPA	United States Environmental Protection Agency
WAR	Water and Air Research, Inc.

1.0 INTRODUCTION

Marine Corps Base (MCB), Camp Lejeune was placed on the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) National Priorities List (NPL) effective November 4, 1989 (54 Federal Register 41015, 1989). Subsequent to this listing, the United States Environmental Protection Agency (USEPA) Region IV, the North Carolina Department of Environment, Health, and Natural Resources (DEHNR), and the United States Department of the Navy (DoN) entered into a Federal Facilities Agreement (FFA) for MCB Camp Lejeune.

The FFA included the implementation of a remedial investigation/feasibility study (RI/FS) at sites throughout MCB Camp Lejeune and Marine Corps Air Station (MCAS), New River. This Field Investigation Photograph Album describes the RI field activities that have been conducted at five of the sites. These sites include: Site 36 (Camp Geiger Area Dump), Site 43 (Agan Street Dump), Site 44 (Jones Street Dump), Site 54 (Crash Crew Fire Training Burn Pit), and Site 86 (Above Ground Storage Tank Area). The five sites that comprise Operable Unit (OU) No. 6 are depicted on Figure 1-1.

1.1 Purpose and Format of the Field Investigation Photograph Album

The primary purpose of the Field Investigation Photograph Album is to provide the Navy and Marine Corps with an overview of the RI field activities that have been conducted at MCAS New River, OU No. 6 (Sites 36, 43, 44, 54 and 86). The field investigation was conducted by Baker Environmental, Inc. (Baker) for the DoN during February through May of 1995. This album contains photographs of the sites and the various field investigations that were conducted during the RI.

The Field Investigation Photograph Album is formatted to allow ease of review. Section 1.0 provides the introduction, purpose, and format of the photograph album. Section 2.0 provides a brief description of the sites and a summary of the known or suspected waste disposal activities. Photographs have been included within Section 2.0 that illustrate present site conditions. Section 3.0 describes the various field investigations conducted at OU No. 6. Representative photographs of all field investigation activities (e.g., Soil Investigation, Groundwater Investigation) are included in this section. Corresponding 35 millimeter color slides of all photographs contained in this album are provided in Appendix A.

Each field investigation photograph has been designated, with a unique number. The photograph designation format is:

Operable Unit #. Site # or Investigation. Year. Photograph #.

An explanation of each identifier is given below.

Operable Unit #:	The field investigation was conducted at Operable Unit No. 6.
Site #:	The field investigation was conducted at Sites 36, 43, 44, 54, and 86, the five sites that comprise OU No. 6.
Investigation:	SL = Soil Investigation GW = Groundwater Investigation SW = Surface Water Investigation SD = Sediment Investigation DM = Drum Investigation
Year:	The field investigation was conducted during 1995.
Photograph #:	The photograph number indicates the sequential order of photographs.

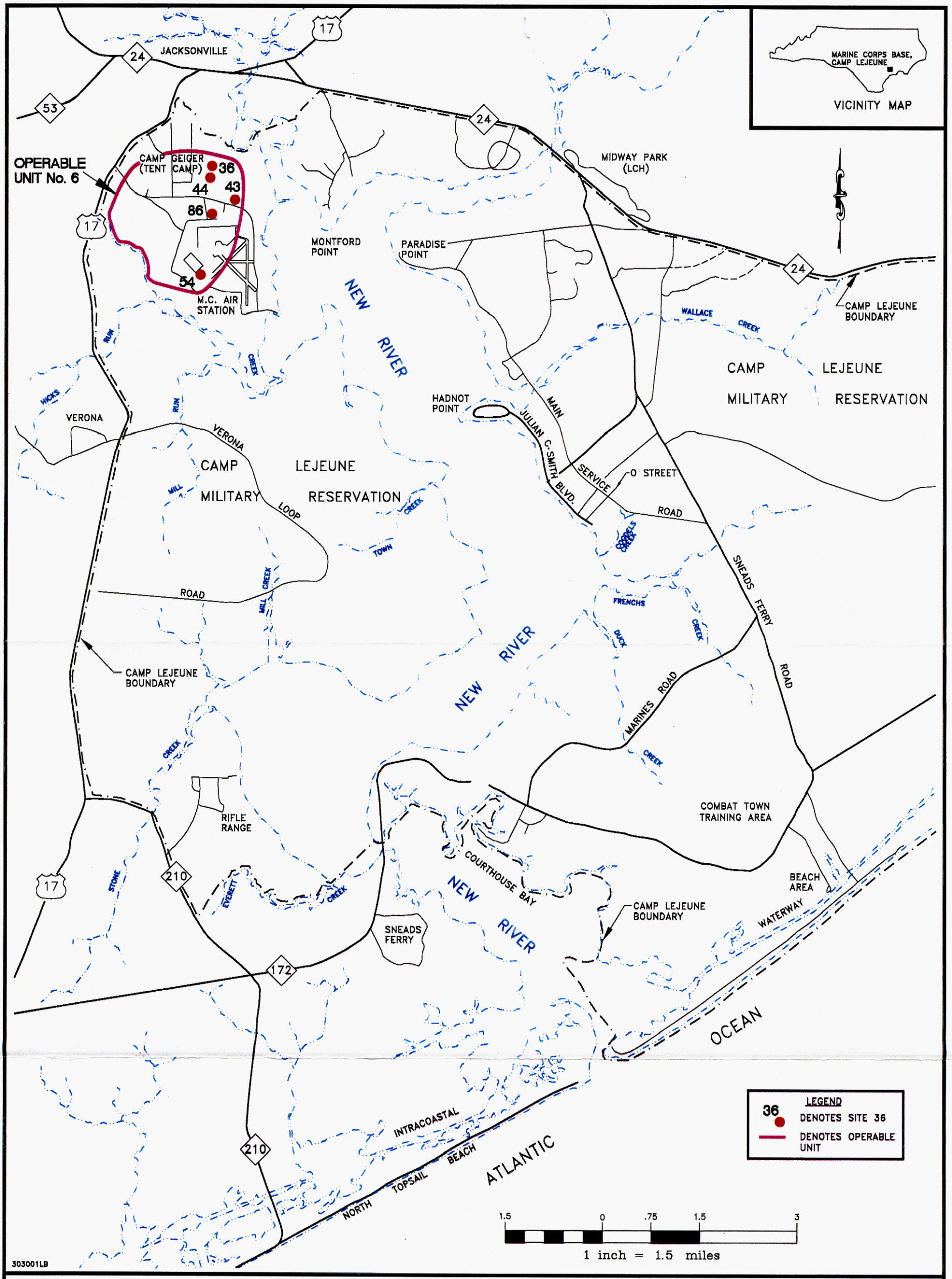


FIGURE 1-1
OPERABLE UNIT No. 6 – SITES 36, 43, 44, 54 AND 86
MARINE CORPS BASE CAMP LEJEUNE

MARINE CORPS BASE, CAMP LEJEUNE
NORTH CAROLINA

2.0 SITE BACKGROUND AND SETTING

The following section provides both the location and setting of the five sites which comprise OU No. 6. Brief summaries of past waste disposal activities at Sites 36, 43, 44, 54, and 86 are also provided within this section.

2.1 Site 36 (Camp Geiger Area Dump)

2.1.1 Site Location and Setting

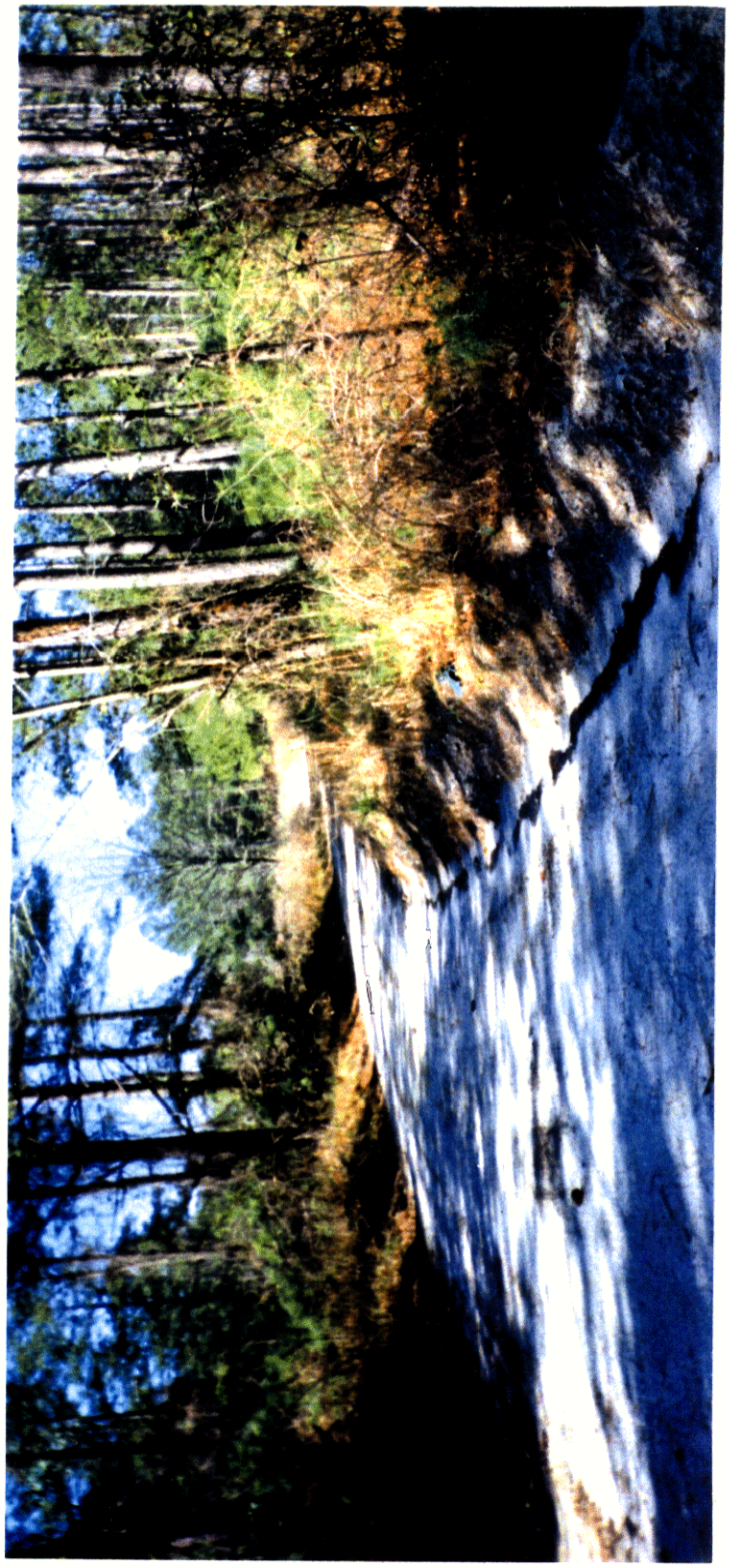
The Camp Geiger Area Dump (Site 36) is located approximately 1,000 feet east of Camp Geiger and 500 feet west of the New River, adjacent to the Camp Geiger Sewage Treatment Plant (STP). Camp Geiger is situated in the northwestern portion of MCB Camp Lejeune, approximately 3 miles southwest of Jacksonville, North Carolina (refer to Figure 1-1).

During an initial assessment of potential hazardous waste sites, Site 36 was estimated to be approximately 1.5 acres in size. Based upon a review of aerial photographs and observations recorded during the RI site scoping visit, however, the size of the site was adjusted to include nearly 20 acres. The site is comprised primarily of open fields and wooded areas with dense understory. A gravel road bisects the site and provides access to Jack's Point Recreation Area, located approximately one-quarter mile east of the study area. The site is bordered to the north by Brinson Creek, to the east by woods, to the south by an unnamed tributary to the New River, and to the west by an improved (i.e., coarse gravel) road. Further to the west of the improved road lies an abandoned railroad right-of-way, once part of the Seaboard Coastline Railroad.

2.1.2 Site History

Site 36 is reported to have been used for the disposal of municipal wastes and mixed industrial wastes including trash, waste oils, solvents, and hydraulic fluids that were generated at MCAS New River. The dump was active from the late 1940s to the late 1950s. Most of the material was first burned and then buried, however, some unburned material was buried. According to interviews conducted by Water and Air Research, Inc. (WAR) during the Initial Assessment Study (IAS), less than five percent of all waste hydrocarbon material generated at the air station was disposed of at Site 36. The remaining waste oil was reportedly used for dust control on roads or went directly into storm drains (WAR, 1983).

Site 36



OU6.Site36.1995.01

This photograph was taken facing northwest from the gravel access road that bisects Site 36. The Former Disposal Area, identified in previous investigation reports, lies on the right side of this road.

Site 36

OU6.Site36.1995.02

The Former Disposal Area, pictured in the foreground, is bordered by a gravel access road to the north and south. The New River is located approximately 200 feet to the east of the Former Disposal Area, beyond the trees pictured here.

Site 36

OU6.Site36.1995.03

This photograph was taken facing southwest at an open field area, adjacent to the Former Disposal Area. The wood debris, pictured here, was shredded and spread over the entire field prior to the commencement of RI field activities.

OU6.Site36.1995.04

This photograph depicts a utility corridor that was cleared during the RI. The proposed sewage transmission line would have traversed the southern portion of the study area. The right-of-way was eventually moved further south to avoid Site 36.

OU6.Site36.1995.05

The clearing, pictured here, constitutes the southwest portion of Site 36. This area was first identified during the RI site scoping visit.

2.2 Site 43 (Agan Street Dump)

2.2.1 Site Location and Setting

The Agan Street Dump (Site 43) extends over approximately 11 acres and is located within the operations area of MCAS New River, 2 miles west of the main entrance (see Figure 1-1). Vehicle access to the site is via Agan Street, from Curtis Road. Site 43 is located at the northern terminus of Agan Street, adjacent to an abandoned sewage disposal facility. The site is bordered to the north by Edwards Creek, to the east and south by Strawhorn Creek, and to the west by Agan Street and the former sewage disposal facility. Strawhorn Creek discharges into Edwards Creek at Site 43. Edwards Creek then discharges into the New River approximately 2,000 feet north of the study area, near Site 36.

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

2.2.2 Site History

Site 43 reportedly received mainly inert material such as construction debris (e.g., fiberglass and lumber) and trash. Sludge from a former sewage disposal facility, located adjacent to the study area, was also dumped onto the ground surface (WAR, 1983). The years during which disposal operations took place at Site 43 are not known.

OU6.Site43.1995.06

This photograph was taken facing east from Agan Street toward the central portion of Site 43. The gravel road pictured here provides access to the main portion of the study area; unimproved paths extend outward from this road.

OU6.Site43.1995.07

Several earthen mounds, like the one pictured here, are located within the southeastern portion of Site 43.

Site 43

OU6.Site43.1995.08

The standing water, pictured here, is part of what appears to be a man-made drainage that serves the southern portion of Site 43. Much of the study area is subject to flooding during precipitation events.

2.3 Site 44 (Jones Street Dump)

2.3.1 Site Location and Setting

The Jones Street Dump (Site 44) encompasses approximately 5 acres and is situated within the operations area of MCAS New River (see Figure 1-1). Vehicle access to the site is via Baxter Street, from Curtis Road. Site 44 is located at the northern terminus of Baxter Street, behind base housing units that line Jones Street. The site is partially surrounded by a six-foot cyclone fence, a portion of the site lies to the east of the fenced compound. The site is bordered to the north and west by Edwards Creek, to the south by base housing units along Jones Street, and to the east by woods and an unnamed tributary to Edwards Creek. Edwards Creek flows east from the study area toward Site 43, which is located about 2,000 feet east of Site 44.

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

2.3.2 Site History

Site 44 was reportedly in operation during the 1950s. Although the quantity of waste is not known, the IAS report stated that debris, cloth, lumber, and paint cans were disposed at the site (WAR, 1983). The IAS report also referred to minor quantities of potentially hazardous waste as having been disposed at Site 44, however, the report made no mention of what type of waste was included.

Site 44

OU6.Site44.1995.09

This picture was taken at the entrance gate of Site 44. Base housing units, located at the end of Baxter Street and along Jones Street, line this portion of the study area.

OU6.Site44.1995.10

This photograph was taken facing northeast along the 6-foot chain link fence that surrounds a majority of Site 44.

OU6.Site44.1995.11

Site 44 is comprised of a gently sloping field. Small pine trees, weeds and tall grass cover the majority of the suspected disposal area.

OU6.Site44.1995.12

This photograph depicts the eastern portion of the study area, not within the fenced portion of Site 44. This area is prone to flooding during heavy precipitation episodes.

2.4 Site 54 (Crash Crew Fire Training Burn Pit)

2.4.1 Site Location and Setting

The Crash Crew Fire Training Burn Pit (Site 54) is located near the southwest end of runway 5-23, within the operations area of MCAS New River (see Figure 1-1). The burn pit is approximately 50 feet in diameter and is situated at the center of the 1.5 acre site. An 8,000-gallon underground storage tank (UST) lies to the northwest of the burn pit. Fire training exercises are conducted within the burn pit using JP-type fuel which is stored in the nearby UST. An oil and water separator, located approximately 100 feet to the southeast of the burn pit, is used for temporary storage and collection of the spent fuel.

An improved gravel surface surrounds the burn pit while the remaining portion of the site is comprised of maintained lawn area. The ground surface slopes away from the central portion of the study area toward the south, southwest, and southeast. Two drainage ditches on either side of an improved road lead away from the burn pit area toward the south. During periods of heavy precipitation, the ditches serve as channels for surface water runoff.

2.4.2 Site History

According to the IAS report, Site 54 has served as a fire training burn pit since the mid-1950s. Waste fuels, oils, and solvents were used to simulate fire conditions that would result from aircraft crashes. Fire training at Site 54 was originally conducted within a bermed area on the ground surface. In 1975 a lined burn pit was constructed (WAR, 1983). The same burn pit remains in operation today, however, only JP-type fuels are currently used during training exercises.

OU6.Site54.1995.13

This photograph depicts the burn pit at Site 54. As shown, the burn pit is surrounded by an improved gravel berm area that permits emergency vehicle access.

OU6.Site54.1995.14

The visible sheen, pictured here, is typical of the product layer that remains after fire training exercises have been conducted. Prior to its removal, excess product is temporarily retained in either the lined burn pit or the oil and water separator.

Site 54

OU6.Site54.1995.15

The oil and water separator, pictured here, receives excess fluid from the burn pit. The separator is routinely maintained by base personnel.

OU6.Site54.1995.16

This photograph was taken facing northeast toward the burn pit. Pictured in the foreground is the concrete protective pad and service ports of a UST. The JP-type fuels used during fire training exercises are stored in this UST.

OU6.Site54.1995.17

This photograph depicts fire training activities at the Site 54 burn pit. JP-type fuels are ignited and then extinguished with high pressure water trucks.

OU6.Site54.1995.18

A lack of vegetative cover at this location was noted during the RI scoping site visit and may suggest the presence of soil contamination. The area is located approximately 150 feet southwest of the burn pit.

Site 54

OU6.Site54.1995.19

The drainage ditch, pictured here, flows southwest from the burn pit area toward Perimeter Road. During periods of high precipitation this ditch fills with runoff water from the study area.

OU6.Site54.1995.20

The low area or drainage, pictured here, lies immediately to the east of the study area beyond the oil and water separator. This area remained saturated during the field investigation.

2.5 Site 86 (Above Ground Storage Tank Area)

2.5.1 Site Location and Setting

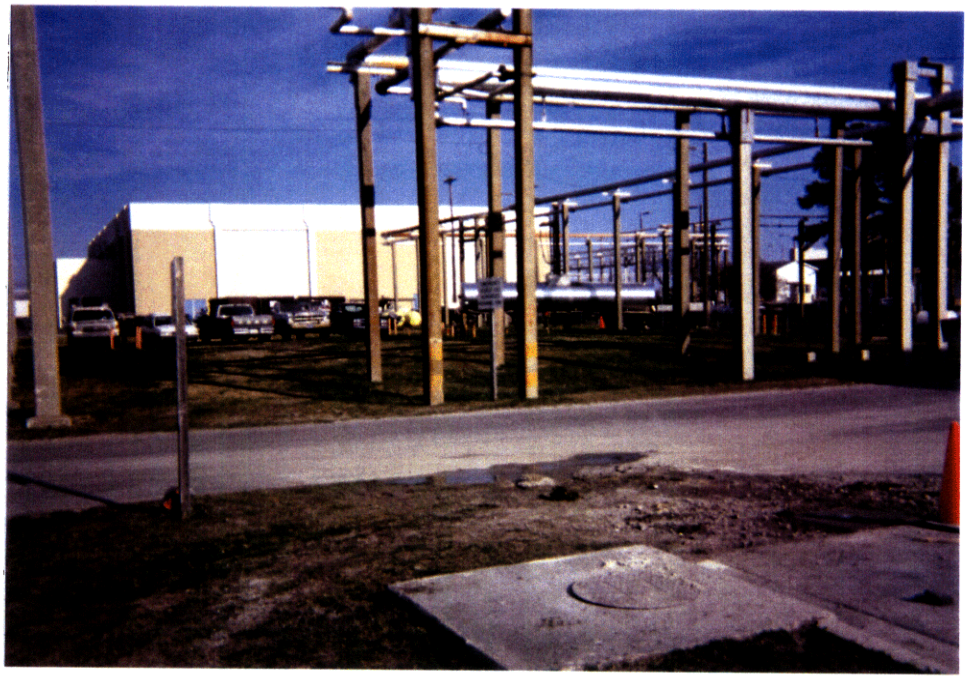
Site 86 is located on the southwest corner of the Foster and Campbell Street intersection, within the operations area of MCAS New River (see Figure 1-1). The site is comprised of a lawn area surrounded by buildings, asphalt roads, and parking lots. Concrete pylons, upon which electric and steam overhead utilities are mounted, line the northern, western, and southern boundaries of the site. Campbell Street borders the site to the north and Foster Street lies adjacent to the east. Immediately to the south of the study area is Building AS-502, the MCAS fire station. The entrance road to the fire station borders the study area to the west.

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

2.5.2 Site History

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

Site 86



OU6.Site86.1995.21

This photograph was taken facing southeast from Campbell Street toward Site 86. As the photograph depicts, overhead steam utility lines are located within the study area boundary.

OU6.Site86.1995.22

This photograph was taken facing northwest from Foster Street toward the study area. A construction contractor used the eastern portion of Site 86 as an equipment staging area during the RI.

3.0 FIELD INVESTIGATIONS

This section provides a summary of both the site-specific investigation activities that were conducted at OU No.6 (Sites 36, 43, 44, 54, and 86) and the general investigative procedures that were employed during the field program.

3.1 Site-Specific Investigations

3.1.1 Site 36 Investigation

The RI investigation program at Site 36 consisted of the following: a soil investigation; a groundwater investigation; a surface water and sediment investigation; an ecological investigation; a drum investigation; and an exploratory test pit investigation. The soil investigation at Site 36 sought to determine if suspected disposal areas exhibited organic or inorganic contamination as a result of past waste management operations. Representative samples from the study areas were collected and submitted for laboratory analysis of target compound list (TCL) organics (i.e., volatiles, semivolatiles, pesticides, and PCBs) and target analyte list (TAL) metals. A total of 62 soil test borings were sampled during the soil investigation.

The groundwater investigation at Site 36 was conducted to assess the presence and extent of contamination that may have resulted from past disposal practices. Groundwater samples were collected from 14 shallow, 3 intermediate, and 4 deep monitoring wells at Site 36. Each of the 21 groundwater samples were analyzed for TCL organics, TAL metals, total suspended solids (TSS), and total dissolved solids (TDS). In addition to these analyses, a select number of samples were also analyzed for TAL dissolved metals. Two temporary wells were also installed and sampled at Site 36 during the groundwater investigation.

The surface water and sediment investigation at Site 36 entailed the collection of environmental samples from a total of seven sampling locations. Four of the seven sample stations were located on an unnamed tributary that borders the southern portion of the site; the remaining three sample stations were situated along Brinson Creek which borders the northern portion of the site. Each of the surface water and sediment samples were submitted for laboratory analysis of TCL organics and TAL metals.

A habitat evaluation was performed as part of the ecological investigation at Site 36. The area within and surrounding the study area was field assessed for species diversity. The findings of the ecological investigation will be presented in the RI report.

An exploratory test pit investigation was conducted in conjunction with the soil investigation at Site 36. A total of seven exploratory test pits were excavated within suspected disposal areas. An excavation log that described the contents of each test pit was maintained during field operations. Soil samples from selected exploratory test pits were submitted for laboratory analysis by toxicity characteristic leaching procedure (TCLP) and Resource Conservation and Recovery Act (RCRA) characteristics (i.e., corrosivity, ignitability, and reactvity). Laboratory confirmation analysis of excavated soil was necessary when staining was evident or when organic contamination was indicated through field screening.

A drum investigation was also conducted at Site 36, following the identification of 10 abandoned containers during the initial site survey. The objective of the drum sampling program was to collect

representative samples from each of the containers and determine appropriate disposal options. During the intervening months between the initial site survey and the drum investigation, however, seven of the containers were removed from the study area by unidentified personnel. As a result, only three five-gallon containers were sampled during the drum investigation. A number of confirmatory soil samples were obtained from the former locations to determine if their contents had leaked onto the ground surface.

3.1.2 Site 43 Investigation

The RI at Site 43 consisted of: a soil investigation; a groundwater investigation; a surface water and sediment investigation; an ecological investigation; and an exploratory test pit investigation. The field investigation program was intended to identify the nature and assess the extent of contamination that may have resulted from past disposal practices. Soil samples were collected and submitted for laboratory analysis of TCL semivolatiles and TAL metals. A portion of the soil samples were also submitted for TCL volatile, TCL pesticide, and TCL PCB analyses. A total of 29 soil test borings were sampled during the soil investigation. At 8 of the 29 soil test borings, only surface samples were retained.

Groundwater samples were collected from four temporary, four shallow, and two deep monitoring wells at Site 43. Each of the ten groundwater samples was analyzed for TCL organics, TAL metals, TSS, and TDS. In addition to those analyses, a select number of samples were also analyzed for TAL dissolved metals.

The surface water and sediment investigation at Site 43 involved the collection of environmental samples from a total of six sampling locations. Four of the six sample stations were located along Strawhorn Creek that borders the southern and eastern portions of the study area; the remaining two sample locations were situated on Edwards Creek, which borders the northern portion of the site. Each of the surface water and sediment samples were submitted for laboratory analysis of TCL organics and TAL metals. In addition to those analyses, a select number of sediment samples were submitted for analysis of total organic carbon (TOC). All surface water samples were submitted for hardness analyses.

A habitat evaluation and bioassay study were performed as part of the ecological investigation at Site 43. During the habitat evaluation, the area within and surrounding the study area was field assessed for species diversity. The bioassay study sought to assess the effects, if any, of potentially contaminated surface water and sediment on aquatic species.

An exploratory test pit investigation was conducted in conjunction with the soil investigation at Site 43. A total of five exploratory test pits were excavated within the suspected disposal area. An excavation log that depicted the contents of each test pit was maintained during field operations. Soil samples from selected exploratory test pits were submitted for laboratory analysis by TCLP and for the other RCRA characteristics.

3.1.3 Site 44 Investigation

The RI at Site 44, like the investigation program at Site 43, consisted of: a soil investigation; a groundwater investigation; a surface water and sediment investigation; an ecological investigation; and an exploratory test pit investigation. The field investigation program was intended to identify the nature and assess the extent of contamination that may have resulted from past disposal

practices. Soil samples were collected and submitted for laboratory analysis of TCL organics and TAL metals. A total of 13 test borings were sampled during the soil investigation.

Groundwater samples were collected from one temporary, six shallow, and two deep monitoring wells at Site 44. Each of the nine groundwater samples was analyzed for TCL organics, TAL metals, TSS, and TDS. In addition to those analyses, a select number of samples were also analyzed for TAL dissolved metals.

The surface water and sediment investigation at Site 44 involved the collection of environmental samples from a total of eight sampling locations. Five of the eight sample stations were located along Edwards Creek which borders the northern portion of the study area; the remaining three sample locations were situated on an unnamed tributary to Edwards Creek which borders the eastern portion of the site. Each of the surface water and sediment samples were submitted for laboratory analysis of TCL organics and TAL metals. In addition to those analyses, a select number of sediment samples were submitted for TOC analysis. All surface water samples were submitted for hardness analyses.

A habitat evaluation and bioassay study were performed as part of the ecological investigation at Site 44. During the habitat evaluation, the area within and surrounding the study area was field assessed for species diversity. The bioassay study sought to assess the effects, if any, of potentially contaminated surface water and sediment on aquatic species.

An exploratory test pit investigation was conducted in conjunction with the soil investigation at Site 44. A total of three exploratory test pits were excavated within suspected disposal area. An excavation log that depicted the contents of each test pit was maintained during field operations. Soil samples from selected exploratory test pits were submitted for laboratory analysis by TCLP and for the other RCRA characteristics.

3.1.4 Site 54 Investigation

The RI activities at Site 54 included both a soil investigation and a groundwater investigation. Immunoassay field sample screening was performed on soils from 18 test borings at Site 54. Based upon findings from the immunoassay screening, four soil samples were submitted for quick-turn (i.e., seven day) laboratory confirmation analysis of TCL volatile, TCL semivolatile, and TCL PCB only. The resulting laboratory data were used to establish an additional 14 test borings in areas surrounding the burn pit that were identified as having organic contamination. The additional samples were submitted for laboratory analysis of TCL volatiles, TCL semivolatiles, TCL PCBs, and TAL metals.

The intent of the Site 54 groundwater investigation was to assess the presence and extent of contamination that may have resulted from burn pit activities. Groundwater samples were collected from 11 shallow and 7 temporary monitoring wells at Site 54. Each of the 18 groundwater samples was analyzed for TCL volatiles, TCL semivolatiles, TCL PCBs, TAL metals, TSS, and TDS. In addition to those analyses, one sample was also analyzed for TAL dissolved metals.

3.1.5 Site 86 Investigation

A soil investigation and groundwater investigation were conducted at Site 86. During the soil investigation, both surface and subsurface samples from 16 test borings were retained for laboratory

analysis. Initially, a sampling grid approach was used to assess the extent of soil contamination. As quick-turn laboratory data was received, seven additional soil borings were added to the nine original soil borings. The majority of soil samples were analyzed for TCL organics and TAL metals. Four of the samples were analyzed for TCL volatiles and TCL semivolatiles only. A total of four sample locations were also analyzed for TPH.

The groundwater investigation at Site 86 sought to assess the presence and extent of contamination that may have resulted from past storage or disposal practices. Groundwater samples were collected from 7 shallow, 14 intermediate, and 5 deep monitoring wells at Site 86. Each of the 26 groundwater samples were analyzed for TCL volatiles, TCL semivolatiles, TAL metals, TSS, and TDS. In addition to those analyses, a select number of samples were also analyzed for TCL pesticides, TCL PCBs, and TAL dissolved metals.

3.2 Investigative Procedures

3.2.1 Soil Investigation

Soil investigations were conducted at Sites 36, 43, 44, 54, and 86 to characterize potential soil contamination that may have resulted from previous disposal practices. Analytical data were compiled during this investigation to assess both the human health and ecological risks associated with soil exposure. The soil data that were generated will also be used to evaluate possible remedial technologies in the event that potential health-based risks are found to exist.

The soil sampling program at each of the five sites focused on known or suspected disposal areas. Historic aerial photographs from the USEPA's Environmental Photographic Interpretation Center (EPIC), previous investigatory data, and background reports were used to locate potential sampling locations. At each of the soil sampling locations a minimum of one surface (i.e., from ground surface to a depth of 12 inches) and one subsurface (i.e., greater than 12 inches below ground surface) sample was retained for laboratory analysis. At locations where overburden (e.g., gravel, asphalt) was present, a sample was collected immediately below this material.

Soil collection was performed using a direct-push (GeoProbe®) sampling system. Soil borings were advanced by either a truck-mounted rig or by a hand sampler unit. The direct-push sampling system employed a stainless steel cutting shoe and collection tube. An acetate liner, inserted into the stainless steel collection tube, was used to collect and then extrude soil samples for field and laboratory analyses. Only a small amount of liquid investigation derived waste (IDW) (i.e., equipment decontamination fluid) was generated during the soil investigation. This waste was containerized and sampled to determine the appropriate disposal option.

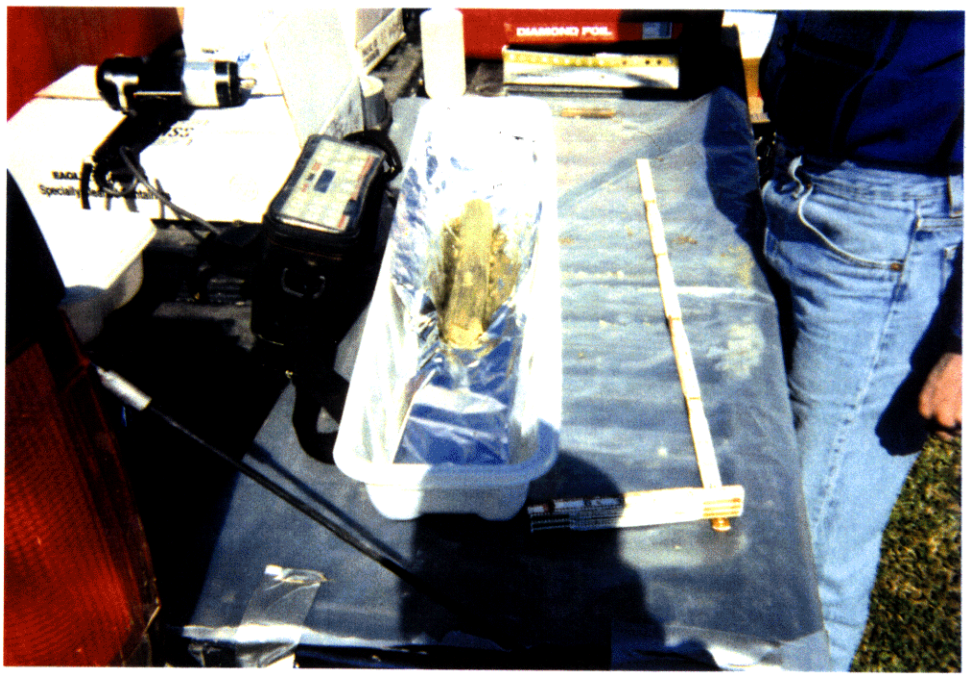
OU6.SL.1995.23

This photograph depicts GeoProbe soil sampling operations at Site 86. This direct push sampling technique generated only a very small amount of waste soils during the RI.

OU6.SL.1995.24

As this photograph depicts, all operations relating to the soil investigation (i.e., sample acquisition, field analysis, and decontamination) were mobilized between boring locations.

Soil



OU6.SL.1995.25

Soil sample cores, like the one depicted here, were extruded from disposable acetate sleeves as part of the direct push sampling technique. Each core was visually described and then selectively retained for laboratory analysis.

OU6.SL.1995.26

The remote GeoProbe sampler, pictured here, was used in areas where vehicle access was not feasible. Core barrels were manually driven into the ground using the weighted drive hammer pictured in the bottom right corner of the photograph.

OU6.SL.1995.27

Soil samples were gathered at known drum or container locations using a hand auger, as depicted here.

OU6.SL.1995.28

Surface soil samples were collected using a stainless steel sampling trowel, as depicted here.

3.2.2 Groundwater Investigation

Groundwater investigations were conducted at Sites 36, 43, 44, 54, and 86 in order to characterize potential groundwater contamination that may have resulted from previous waste disposal practices or activities. The resulting analytical data were compiled to assess both human health and ecological risks associated with exposure to groundwater. Collateral information obtained during the groundwater investigation was gathered to estimate aquifer characteristics such as flow rate and flow direction. Groundwater quality and aquifer characteristics will be used to evaluate appropriate remedial technologies during the FS process, in the event that potential health-based risks are found to exist.

Monitoring wells were constructed of 2-inch PVC casing with 15-feet of 0.01-inch slotted screen. Outer steel casing was employed during deep well installation (i.e., Type III wells) where a confining or semi-confining clay layer was encountered. A medium grained sand pack (No.1 silica sand) was placed between the borehole wall and screen that extended approximately two feet above the top of the screen. A two- to three-foot bentonite pellet seal was then placed over the sand pack. In the case of deep wells, a bentonite slurry was utilized to backfill the borehole annulus to the outer steel casing and then bentonite cement was used to ground surface. The remaining annular space was filled with Portland cement and a surface pad was constructed. Finally, an above ground steel protective casing and a PVC locking cap were installed at the top of each well.

Following construction, each well was developed to remove fine-grained sediments and to establish an hydraulic connection between the well and the formation. Both existing and newly installed monitoring wells were developed using a combination of pumping and surging for shallow wells, or air-compressed evacuation for intermediate and deep wells. After development, a peristaltic pump was used to collect groundwater samples in accordance with USEPA Region IV guidelines. The IDW generated during these investigations was first containerized and then sampled to determine the final disposal alternative.

OU6.GW.1995.29

Well installation was completed using the truck mounted drill rig, as pictured here. The personnel are adding sand pack material to the annulus of the borehole around the well screen.

OU6.GW.1995.30

Steel casing, pictured here, is being installed as part of type-III well installation operations. The sections of casing were welded together and placed into the semi-confining layer.

A 21 26 4 R8 V

OU6.GW.1995.31

Shallow well development was completed using a centrifugal pump. Groundwater parameters such as pH, conductivity, and turbidity were recorded during the well development process.

OU6.GW.1995.32

Each intermediate and deep well was developed using the forced air lift method depicted here. The compressor was fitted with an air-purifying filter.

OU6.GW.1995.33

A low flow purge method was employed to sample all of the existing and newly installed monitoring wells at each of the five RI sites. Indicators of aquifer stabilization such as pH, conductivity, and turbidity were recorded during the purge process.

OU6.GW.1995.34

Additional aquifer data were recorded as part of the groundwater investigation. This photograph depicts operations associated with a falling-head slug test.

3.2.3 Surface Water and Sediment Investigation

Surface water and sediment investigations were conducted at Sites 36, 43, and 44 to characterize any potential contamination which may have migrated from the suspected disposal areas. Analytical data was compiled to assess both human health and ecological risks associated with exposure to surface water and sediment. Additional information was gathered to assess the interconnection of groundwater and surface water media.

One surface water and two sediment samples (surface and subsurface) were collected at each sampling station. Surface water samples were collected by dipping the sample containers directly into the water or using a dedicated transfer container. Sediment samples were collected by driving a sediment corer, equipped with a disposable acetate sleeve, into the sediments. Once extracted, the sediment core was transferred to sample containers using a decontaminated brass extruder.

OU6.SW.1995.35

The personnel here are collecting surface water samples for laboratory analysis. In addition to laboratory tests, measurements of specific conductance, pH, and dissolved oxygen were recorded during the surface water investigation.

OU6.SD.1995.36

Sediment samples were collected with dedicated acetate sleeves, as pictured. The sediment sample was extruded from the sleeves into sample jars.

3.2.4 Ecological Investigation

A two-pronged ecological investigation, consisting of a bioassay study and a habitat evaluation, was conducted at both Sites 43 and 44. Ecological investigations at Sites 36, 54, and 86 consisted only of habitat evaluations. As part of the habitat evaluation, dominant vegetation types and species were identified in the field; the representative portions of those plants that could not be readily identified were collected for further examination in the office. Amphibians, reptiles, birds, and mammals were also field identified. In many cases, the animals themselves were not seen, but scat, tracks, feeding areas, or remains were identified.

The bioassay study was conducted in a laboratory environment using surface water and sediment samples that were retained from Sites 43 and 44. A seven-day survival and growth study of fathead minnows was performed with each of the surface water samples. The tests were conducted with sample dilutions of 100 percent, 50 percent, 25 percent, 12.5 percent, and 6.25 percent. A control sample that consisted of 100 percent dilution water was also tested. Survival of the minnows was recorded daily and growth of the minnows (i.e., weight gain or loss) was recorded at the end of seven days.

In addition to the surface water test, a ten-day survival and growth bioassay study was conducted using the sediments obtained from Sites 43 and 44. During the sediment bioassay tests, the overlying water was replaced twice daily. The sediment was not replaced or diluted during the tests. A control sediment sample was also tested in order to statistically correlate sediment findings with the presence or absence of contamination. The control sample was obtained from an area within MCB Camp Lejeune that is not known or suspected to have received contamination. The survival and growth of the introduced amphipods were recorded at the end of the ten days.

3.2.5 Exploratory Test Pit Investigation

Exploratory test pit investigations were conducted at Sites 36, 43, and 44 to determine the presence and nature of buried material. Potential test pit locations were identified through visual site inspection and use of a hand-held magnetometer. The visual site inspection sought to identify signs of contamination or waste disposal such as soil staining, debris, fill areas, or depressions. In conjunction with the visual site inspection, a magnetometer was employed during the test pit investigation to identify buried metallic objects. Due to the presence and wide distribution of metallic debris throughout each of the three sites, only locations with magnetic detections indicating objects with an apparent length greater than three feet were selected for excavation activities.

The exploratory test pit investigations employed the use of a backhoe and Level-B personal protective equipment (e.g., supplied air). In general, test pit dimensions measured 10 to 15 feet in length and 2 to 3 feet in width. The depth of each test pit varied according to the depth of the encountered water table and the total depth of fill material.

OU6.SW.1995.35

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OU6.TP.1995.37

The magnetometer, pictured here, was used to the locate buried metallic objects and debris. Test pit locations were based upon both visual observations of partially buried debris and magnetometer readings.

OU6.TP.1995.38

This photograph depicts test pit operations at Site 36.

Test Pit

OU6.TP.1995.39

A John Deere model 310D backhoe was used during test pit investigations at Sites 36, 43, and 44.

OU6.TP.1995.40

Soil was screened as it was removed from the test pit with both photo and flame ionization detectors.

3.2.7 Drum Investigation

A drum investigation was conducted at Site 36 as part of the RI at OU No.6. Drum investigation operations were performed using Level B health and safety protection. Pertinent information regarding the location and condition of each container were recorded on a drum log. Each container was given a unique identification number. Content samples were obtained using disposable sampling equipment. Samples were then shipped to a Naval Energy and Environmental Support Activity (NEESA) certified laboratory for characterization.

Drum

OU6.DM.1995.41

This photograph depicts 5-gallon containers that were sampled as part of the drum investigation at Site 36. One of the containers was partially buried at this location.

OU6.DM.1995.42

Drum samples were collected in Level B health and safety protective clothing, as pictured here. The samples were sent for analysis, to determine possible disposal options.

4.0 REFERENCES

Baker Environmental, Inc. (Baker). December 1994. Remedial Investigation/Feasibility Study Work Plan for Operable Unit No. 6 (Sites 36, 43, 44, 54, and 86), Marine Corps Base Camp Lejeune, North Carolina. Final. Prepared for the Department of the Navy, Naval Facilities Engineering Command, Atlantic Division, Norfolk, Virginia.

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APPENDIX A
SLIDES

SLIDES NOT PROVIDED WITH THIS PHOTOGRAPH ALBUM