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Final

No Action Decision Document Site 76 MCB, Camp Lejeune, North Carolina

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ATTACHMENTS

A State of North Carolina Approval Letter
B USEPA Region IV Approval Letter

ACRONYMS AND ABBREVIATIONS

ARAR	Applicable or Relevant and Appropriate Requirements
Baker	Baker Environmental, Inc.
BEHP	bis(2-ethylhexyl)phthalate
bgs	Below Ground Surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
CLP	Contract Laboratory Program
COC	Contaminant of Concern
DD	Decision Document
DON	Department of the Navy
EM	Electromagnetic
ESE	Environmental Science and Engineering, Inc.
FFA	Federal Facilities Agreement
FS	Feasibility Study
HI	Hazard Index
HQ	Hazard Quotient
ILCR	Incremental Lifetime Cancer Risk
LANTDIV	Atlantic Division Naval Facilities Engineering Command
MCAS	Marine Corps Air Station
MCB	Marine Corps Base
MCL	Maximum Contaminant Level
NA	No Action
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NC DENR	North Carolina Department of Environment and Natural Resources
NCWQS	North Carolina Water Quality Standards
NFRAP	No Further Response Action Plan
NPL	National Priorities List
PA	Preliminary Assessment
PCB	Polychlorinated Biphenyls
Pre-RI	Pre-Remedial Investigation
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
RA	Removal Action or Remedial Action
RBC	Risk-Based Concentrations

ACRONYMS AND ABBREVIATIONS

SARA	Superfund Amendments and Reauthorization Act
SI	Site Inspection
SVOC	Semivolatile Organic Compound
TAL	Target Analyte List
TCL	Target Compound List
μg/kg	micrograms per kilogram
μg/L	micrograms per liter
USEPA	United States Environmental Protection Agency
USGS	United States Geologic Society
VOC	Volatile Organic Compound

DECLARATION

SITE NAME AND LOCATION

Site 76
Marine Corps Air Station (MCAS) Curtis Road
Marine Corps Base, Camp Lejeune, North Carolina

STATEMENT OF BASIS

This No Action (NA) decision is based on the results of a Pre-Remedial Investigation (Pre-RI) Screening Study conducted at Site 76 in October 1995. The Pre-RI Screening Study included a review of previous investigations, completion of a geophysical survey, installation of groundwater monitoring wells, and associated soil and groundwater sampling. The Department of the Navy (DON) and the Marine Corps have obtained concurrence from the State of North Carolina Department of Environment and Natural Resources (NC DENR) and from the United States Environmental Protection Agency (USEPA) Region IV on the selected remedy. Copies of the NC DENR and USEPA approval letters are presented in Attachments A and B.

DESCRIPTION OF THE SELECTED REMEDY

Based on the current conditions at Site 76, it has been determined that no threat to public health exists. Therefore, no action under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), is warranted.

DECLARATION STATEMENT

This NA Decision Document (DD) represents the selected action for Site 76, developed in accordance with CERCLA, as amended by SARA, and the National Oil and Hazardous Substances Pollution Contingency Plan. Because contaminant levels at the site have been determined to present no known significant threat to human health, it has been determined that the selected remedy of no action is protective of human health, attains federal and state applicable or relevant and appropriate requirements (ARARs), and is cost-effective. The statutory preference for treatment is not satisfied because treatment was not found to be necessary.

Signature
N. Neal Paul
Head, Installation Restoration Branch
Installation and Environment Division
Marine Corps Base, Camp Lejeune, NC

5.08.01
Date

DECISION SUMMARY

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) on October 4, 1989 (54 Federal Register 41015, October 5, 1989). Subsequent to this listing, the United States Environmental Protection Agency (USEPA) Region IV; the North Carolina Department of Environment and Natural Resources (NC DENR); and the United States Department of the Navy (DON) entered into a Federal Facilities Agreement (FFA) on March 1, 1991 (effective date) for MCB, Camp Lejeune. The objectives of the FFA are:

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

- To establish a procedural framework and schedule for developing, implementing and monitoring appropriate response actions at MCB, Camp Lejeune in accordance with CERCLA, NCP, and USEPA policy relevant to remediation at MCB, Camp Lejeune; and

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

The Fiscal Year 2001 Site Management Plan for MCB, Camp Lejeune, the primary document referenced in the FFA, accounts for each of the sites at the Base and provides detailed strategic planning. Many of the sites listed in the FFA have been investigated through the completion of Remedial Investigation/Feasibility Studies (RI/FS). However, several sites, (Site 76 included) did not warrant a full scale RI/FS. As such, these sites were investigated by completing Pre-Remedial Investigation (Pre-RI) Screening Studies. The goal of these investigations was to determine if a full RI study was necessary or if a decision of no action was appropriate.

This NA Decision Document (DD) supports the no action alternative for Site 76. The purpose of this NA DD is to summarize the existing data for the site and to describe the Marine Corps' rationale for selecting the No Action alternative.

Decision documents of this type can fall into four categories. The category into which a site is placed is determined by the investigation(s) that have been conducted at the site. They are divided as follows: Category I - NA decision is based on the results of a Preliminary Assessment (PA), a PA supplement, or an equivalent effort; Category II - NA decision is based on the results of a Site Inspection (SI), a SI supplement, or an equivalent effort; Category III - NA decision is based on the results of a Remedial Investigation (RI) and, if required, a Feasibility Study (FS), or an equivalent effort; Category IV - NA decision is based on the completion of a removal action or remedial action (RA) (including interim actions), or an equivalent effort.

Site 76 is a Category II designation. The Pre-RI Screening Study was completed to determine if further investigations were warranted. This effort is equivalent to a SI. The Pre-RI Screening Study completed at Site 76 provides sufficient information about the history, nature of the site and subsequently verifies lack of contamination. Therefore, a Category II - NA DD is herein presented in accordance with all Category II requirements.

The objectives of this NA DD for Site 76 are:

- To briefly describe the location, history and environmental setting of Site 76 and its relationship to MCB, Camp Lejeune;
- To describe the current status of the site based on the results of the related investigations; and
- To assess the potential risks to human health at the site.

Data from the Pre-RI Screening Study [Baker Environmental, Inc. (Baker), 1998] were used to derive and support no action alternative for Site 76. The Pre-RI Screening Study was initiated to detect and characterize potential impacts to human health and to determine if the site required further investigative work. The investigation included a review of previous studies, a geophysical survey, soil sampling, permanent monitoring well installation, groundwater sampling, and a site survey.

1.1 Site Location and Description

To provide the reader with the entire framework of Site 76 the following subsections discuss site locations and descriptions for both MCB, Camp Lejeune and Site 76.

1.1.1 MCB, Camp Lejeune

MCB, Camp Lejeune is located on the coastal plain of North Carolina in Onslow County. The facility is bisected by the New River and encompasses approximately 236 square miles (of which approximately 40 square miles is water, made up by the New River and its tributaries). The New River flows in a southeasterly direction and forms a large estuary before entering the Atlantic Ocean. The southeastern border of MCB, Camp Lejeune is the Atlantic Ocean shoreline. The western and northeastern boundaries of the facility are U.S. Route 17 and State Route 24, respectively. The City of Jacksonville borders MCB, Camp Lejeune to the north.

Construction of MCB, Camp Lejeune began in April 1941 at the Hadnot Point Industrial Area, where major functions of the base are centered today. The facility was designed to be the "World's Most Complete Amphibious Training Base." The MCB, Camp Lejeune complex consists of six geographical and operational locations under the jurisdiction of the Base Command. These areas include Camp Geiger, Montford Point (which includes Camp Johnson), Courthouse Bay, Mainside, the Rifle Range Area, and the Greater Sandy Run Area. Marina Corps Air Station (MCAS) New River is operationally under the control of MCAS Cherry Point. However, MCB, Camp Lejeune is responsible for the facilities and environmental management of MCAS New River.

The Air Station and Camp Geiger are considered as a single urban area possessing two separate missions and supported by two unrelated groups of personnel. The MCAS New River encompasses 2,772 acres and is located in the northwestern section of the complex and lies approximately five miles south of Jacksonville. The MCAS includes air support activities, troop housing and personnel support facilities, all of which immediately surround the aircraft operations and maintenance areas. Site 76 is located in the MCAS.

1.1.2 Site 76

Site 76 is located at the MCAS New River in the northwest portion of the MCB, Camp Lejeune. As shown on Figure 1-1, MCAS New River is accessed by U.S. Route 17, which borders the western portion of the base.

Figure 1-2 is a site map which shows the boundary and features of the surrounding area. The site is along the north side of Curtis Road and is bounded by Curtis Road to the south, Compton and Grier Streets to the north, McAvoy Street to the east, and Baxter Street to the west. The study area is a mixture of well maintained grassy areas and sparsely wooded areas. There are several base housing units to the immediate north of the Site 76 study area.

At Site 76, the terrain is relatively flat with a slightly higher surface elevation within the center portion, creating a gentle slope to the north and south. The ground surface is covered by grassy and lightly wooded areas. There is a large drainage ditch approximately 15 feet wide and seven to 10 feet in depth that runs along the southern edge of the site paralleling Curtis Road. This drainage ditch is dry most of the time; however, during periods of rain, water will collect and flow east off the site. Storm sewer covers are also present on the site.

1.2 Site History and Enforcement Activities

Site 76 allegedly was used as a dump site for drums. Although two locations within the study were identified as possible disposal sites based on interviews and review of historical aerial photographs, the exact location of the alleged dump was not specifically identified. The alleged dump site was reportedly used as a drum disposal area on two occasions in 1949. The estimated area of the disposal pits was 1/4 acre, and approximately twenty-five to seventy-five 55- gallon drums were allegedly involved. It is believed that the drums contained a chloroacetophenone tear gas agent. Additional potential contaminants include: chloroform, carbon tetrachloride, benzene, and chloropicrin [Environmental Science and Engineering, Inc. (ESE), 1990].

Investigative activities at Site 76 have included geophysical surveys (see figure 1-3 for the area of the geophysical survey) in an attempt to locate the buried material and confirm or deny the presence of the alleged dump site. In addition to the geophysical survey, the Pre-RI Screening Study also included sampling of surface soil, subsurface soil, and groundwater, evaluating the resultant analytical data, and the performance of a qualitative and quantitative risk assessment. This study provided the information necessary to determine if any potential previous actions at the site had contributed hazardous substances to the environment.

The NCP states that sites which the USEPA determines to need no additional evaluation are given a "No Further Response Action Plan (NFRAP)" designation within the CERCLA Information System (CERCLIS). Through this designation, no supplemental investigation or remediation work will be performed at the site unless new information is presented indicating that the initial decision was not appropriate. This NA DD presents the pertinent information that supports the conclusion that Site 76 poses little or no potential threat to human health.

There are currently no enforcement activities in place at the site.

1.2.1 Investigative Activities

As mentioned above, the conditions at Site 76 have been evaluated through several separate investigative activities. The following subsections provide a summary of the previous studies completed at the site along with the results of the Pre-RI Screening Study.

1.2.1.1 Previous Investigations

In 1984, shallow monitoring wells 76-GW01 and 76-GW02 were installed for the purpose of groundwater sampling (Figure 1-2) as part of the Site Summary Report completed in 1990 by ESE. Both monitoring wells were comprised of 15 feet of screen and set at depths of 22 and 23 feet below ground surface (bgs), respectively. In July 1984 groundwater samples were collected from the two newly installed monitoring wells. The two groundwater samples were analyzed for volatile organic compounds (VOCs) only, but no detections were reported (ESE, 1990). No soil samples were collected during the investigation.

In November 1986, monitoring wells 76-GW01 and 76-GW02 were resampled. The sample analysis included chloropicrin, tetrachlorodioxin, and VOCs. Both of these compounds are associated with the tear gas solution suspected to be present on the site. The laboratory report indicated that no sample had a detection of any of the tested parameters (ESE, 1990).

Prior to installation of the shallow monitoring wells, a geophysical survey consisting of electromagnetic (EM) conductivity and other metal detection techniques was conducted on a grid system through this area. Potential dumping areas, identified from aerial photographs (currently unavailable), were investigated during the survey. No areas representative of buried metallic objects were identified.

1.2.1.2 Pre-RI Screening Study

The field work for a Pre-RI Screening Study was completed by Baker in October 1995 with the final report completed in November 1998. The investigation included researching the previous studies and completing additional investigative tasks. The field activities included an expanded geophysical survey (Figure 1-3), surface and subsurface soil sampling, and groundwater sampling.

The scope of the geophysical survey completed as part of the Pre-RI Screening Study was significantly broader than the initial EM survey. It not only covered the area of the initial EM investigation, but was expanded further to cover additional areas. The survey conducted at Site 76 was designed to explore the possibility that 55-gallon drums may have been buried at the site. Through the geophysical survey, it was determined that Site 76 did not contain buried ferrous material indicative of the suspected disposal area. Based on the data, the suspected buried drums do not appear to be present within the boundaries covered by the survey.

Surface soil, subsurface soil, and groundwater samples were collected at Site 76. The soil samples were analyzed for Target Compound List (TCL) organics and Target Analyte List (TAL) Metals. Groundwater samples were analyzed for the same parameters, but also included specific analyses for tear gas compounds which were expected at the site.

Tables 1-1 to 1-6 contain criteria against which the sample results were compared by media. These criteria included USEPA Risk Based Concentration (RBC) values, USEPA Soil Screening Levels for transfer from soil to groundwater, North Carolina Water Quality Standards (NCWQS), federal Maximum Contaminant Levels (MCLs), and twice the average base-specific background concentrations for inorganic analytes. RBCs are promulgated by the USEPA region III as a tool to determine potential risk to human health from contaminants in soil and groundwater. Region III RBC values were derived using conservative USEPA promulgated default values and the most recent toxicological criteria available. RBCs for potentially carcinogenic and noncarcinogenic chemicals were individually derived based on a target Incremental Lifetime Cancer Risk (ILCR) of 1 x 10-06 and a target Hazard Quotient (HQ) of 1.0, respectively. For inhalation cancer slope factors; for noncarcinogens, they are chronic oral and inhalation reference doses. For noncarcinogens, each RBC value was reduced by a factor of 10 to ensure that chemicals with additive effects are not prematurely eliminated during screening (USEPA, 1993a).

Surface Soil

A total of 16 surface soil samples were collected at Site 76. VOCs and polychlorinated biphenyls (PCBs) were not detected among any of the surface soil samples obtained at Site 76 (Table 1-1). Semivolatile compounds (SVOCs) were detected in 10 of the 16 surface soil samples. The SVOCs that were detected included phenanthrene, chrysene, benzo(a)pyrene, fluoranthene, pyrene, bis(2-ethylhexyl)phthalate (BEHP), and benzo(b)fluoranthene. Concentrations of the SVOCs were relatively low. The highest concentration detected was 490 micrograms per kilogram (µg/kg) of BEHP at boring location 76-SB13. The lowest concentration was found at boring 76-GW04 which detected pyrene at 40 estimate (J) µg/kg. None of the detections of the SVOCs exceeded the established screening standards.

Pesticide compounds were detected in the majority of the surface soil samples (Table 1-1). Overall, the pesticide concentrations were widely scattered at low concentrations across the site. The pesticides 4,4'-DDE and 4,4'-DDT were the most frequently detected compounds. Six other compounds including heptachlor, heptachlor epoxide, 4,4'-DDD, dieldrin, alpha chlordane and gamma chlordane were detected sporadically across the site at low concentrations. Pesticide concentrations ranged from 510J µg/kg of 4,4'-DDE to 1.6J µg/kg of dieldrin. One detection of 4,4'-DDE (510 J µg/kg) was above the soil to groundwater soil screening level.

Nineteen of 23 TAL metals were detected among the 16 surface soil samples obtained from Site 76 (antimony, cadmium, silver, and thallium were not detected) (Table 1-2). Eleven metals including aluminum, barium, beryllium, calcium, chromium, iron, lead, magnesium, manganese, mercury, nickel, potassium, vanadium, and zinc were detected at concentrations greater than twice the average base-specific (i.e., MCB, Camp Lejeune) background levels (refer to Table 1-2 for twice the average base specific background concentrations). Inorganic analytes which exceeded USEPA RBC values included arsenic, beryllium, and iron. Those analytes which exceeded the USEPA soil to groundwater soil screening levels, were iron and selenium.

Subsurface Soil

A total of 16 subsurface (i.e., greater than one-foot bgs) soil samples were obtained at Site 76 and submitted for TCL organic and TAL metal analyses. Each sample was analyzed for specific tear gas compounds. There were no PCBs or tear gas compounds detected among the subsurface samples.

One VOC (acetone) was detected at a concentration of 24 µg/kg at soil boring location 76-SB11 below respective screening standards (Table 1-3).

Two SVOCs, di-n-butylphthalate and BEHP, were detected at concentrations below their corresponding screening standards (Table 1-3).

The only other organic compounds detected in the subsurface soil samples at Site 76 were pesticides. Three pesticide compounds were detected among the 16 subsurface soil samples obtained from Site 76 (Table 1-3). At soil boring location 76-SB09 the compounds 4,4'-DDE and 4,4'-DDT were detected at concentrations of 3.4J µg/kg and 1.7J µg/kg, respectively. At soil boring location 76-SB11, 4,4'-DDE, 4,4'-DDD, and 4,4'-DDT were detected at concentrations of 40J µg/kg, 480 µg/kg, and 5.9J µg/kg, respectively. None of the detected compounds exceeded their respective screening standards.

Nineteen metals were detected among the 16 subsurface soils collected at Site 76 (Table 1-4). Sixteen metals including aluminum, arsenic, barium, beryllium, calcium, chromium, copper, iron, lead, magnesium, manganese, potassium, selenium, sodium, vanadium and zinc were detected at concentrations greater than twice the average base-specific background concentrations. Three metals including aluminum, arsenic, and iron were detected above the Region III residential RBC values. Metals detected in excess of the USEPA Soils Screening Levels were iron, mercury and selenium.

Groundwater

The groundwater investigation at Site 76 entailed the collection of samples from two existing wells (76-GW01, and 76-GW02) and three new wells (76-GW03, 76-GW04, and 76-GW05). Each of the groundwater samples collected at Site 76 were analyzed for full TCL organics, TAL metals and specific analyses for the tear gas compounds chloroacetophenone and chloropicrin. The analyses were completed using contract laboratory program (CLP) protocols. A positive detection summary of organic and inorganic compounds are provided in Table 1-5. VOC, PCB, pesticide, and tear gas compounds were not detected in any of the five groundwater samples collected from Site 76 and, therefore, will not be addressed.

One SVOC, di-n-butylphthalate was detected at a concentration of 3J micrograms per liter micrograms per liter (µg/L) at monitoring well 76-GW02. This concentration is below the respective screening criteria.

Eighteen metals were detected in the monitoring wells at Site 76. Of the positive detections, only iron exceeded its respective NC WQS, Federal MCL, and tapwater RBC value. Other analytes which exceeded Federal MCLs were aluminum (a secondary MCL), and thallium. Other analytes which exceeded RBC values were arsenic, thallium, and vanadium.

In summary, analytical testing of the soil samples at Site 76 detected organic compounds of each fraction except PCBs. Metals were detected in samples from all media. There was one detection of an organic compound in the groundwater samples, while four metals were detected at concentrations exceeding state and/or federal regulatory levels.

1.2.1.3 October 1999 Additional Sampling

Additional sampling was completed by Baker in October 1999 due to the presence of metals detected during the initial field investigation (specifically the five groundwater detections that were above the Pre-RI Screening Study completed by Baker in October 1995). These five metals of concern were aluminum, arsenic, iron, thallium, and vanadium. The additional grounwater samples at IR76-GW01, GW02, GW03, and GW04 were collected to confirm/deny a source location. Results of the investigation are presented in Table 1-6 as follows:

The metals that were detected above state and/or federal regulatory levels are aluminum and iron. Aluminum concentration levels have decreased when compared to the results of the October 1995 sampling event. Iron levels have also significantly decreased in concentration range. A reason for the increase in concentration may be that turbidity was elevated during the October 1995 sampling event and in October 1999 turbidity measurements were lower. Arsenic, thallium, and vanadium have not been detected during this most recent sampling event.

1.2.2 Regulatory Agency/Public Involvement

The USEPA and NC DENR have been actively involved with the investigation of this site through report review and partnering meetings. Based on these results, no further investigative activities are needed at Site 76.

Public involvement is summarized in the following section.

1.3 Community Participation

A public meeting was held at MCAS, New River on August 27, 1996 to discuss the results of the Pre-RI Screening Study. The meeting included members of the local Base community, and representatives from MCB, Camp Lejeune, Naval Facilities Engineering Command (LANTDIV), and Baker Environmental, Inc. The members of the project team presented the findings of the investigation and discussed the results of the risk assessment. Members of the community were given the opportunity to ask questions and comment on the related information. These comments and questions were immediately and informally addressed at the public meeting.

This NA was made available to the public for comment on April 19, 1998. However, there was no formal comment period. No public comments of the draft document were received. Comments were received from the NC DENR and Camp Lejeune. These comments were addressed within the content of this document.

2.0 SUMMARY OF SITE CHARACTERISTICS

This section summarizes information pertaining to MCB, Camp Lejeune existing background information. In addition, specific information relevant to Site 76 is presented.

2.1 Climatology

MCB, Camp Lejeune experience hot and humid summers; however, ocean breezes frequently produce a cooling effect. The winter months tend to be mild, with occasional brief cold spells. Average daily temperatures range from 34° F to 54° F in January, the coldest month, and 72° F to 89° F in July, the hottest month. The average yearly rainfall is 52.4 inches.

2.2 Physiography, Geology and Soils

MCB, Camp Lejeune is located in the Atlantic Coastal Plain physiographic province. The sediments of this province consist primarily of sand, silt, and clay. Other sediments may be present, including shell beds and gravel. Sediments may be of marine or continental origin. United States Geological Survey (USGS) studies at MCB, Camp Lejeuene indicate that the base is underlain by sand, silt, clay, calcareous clay and partially cemented limestone. The combined thickness of these sediments beneath the base is approximately 1,500 feet.

Site 76 underlain by soils that are predominantly sands and silty sands beneath a foot of surface top soil. From ground surface to a depth of three feet, the soil is light brown silty sand with a trace of gray clay. The material is loose to medium dense and ranges from moist to damp. At approximately four feet bgs, the silt content decreases transitioning into a 'cleaner' sand. The sand color also changes as depth increases from a light brown to a dark gray.

2.3 Hydrogeology

The aquifers of primary interest are the surficial aquifer and the underlying Castle Hayne aquifer. The surficial aquifer consists of interfingering beds of sand, clay, sandy clay, and silt that contain some peat and shells. The thickness of the surficial aquifer ranges from 0 to 73 feet and averages nearly 25 feet over MCB, Camp Lejeune. The beds are thin and discontinuous, and have limited lateral continuity. This aquifer is not used for water supply at MCB, Camp Lejeune. The Castle Hayne aquifer lies below the surficial aquifer and consists primarily of unconsolidated sand, shell fragments, and fossiliferous limestone. Between the surficial aquifer and Castle Hayne aquifer lies the Castle Hayne confining unit which consists of clay, silt, and sandy clay beds. The Castle Hayne aquifer is about 150 to 350 feet thick, increasing in thickness to the ocean. The top of the aquifer lies approximately 20 to 73 feet bgs. Onslow County and MCB, Camp Lejeune lie in an area where the Castle Hayne aquifer generally contains freshwater; therefore, the Castle Hayne aquifer is a viable potable water source for the region's population.

2.4 Surface Water

The dominant surface water feature at MCB, Camp Lejeune is the New River. It receives drainage from a majority of the base. At MCB, Camp Lejeune, the New River flows in a southerly direction into the Atlantic Ocean through the New River Inlet.

Aside from the drainage ditch, there are no significant surface water bodies at Site 76. The nearest surface water body is Edwards Creek which is located immediately north, approximately 500 feet from the northern boundary of the site. Edwards Creek flows in an easterly direction and empties into the New River.

2.5 Land Use

Land use within the Base is influenced by topography and ground cover, environment policy, and base operational requirements. Much of the land within MCB, Camp Lejeune consists of freshwater swamps that are wooded and largely unsuitable for development. In addition, 3,000 acres of sensitive estuary and other areas were set aside for the protection of threatened and endangered species and are to remain undeveloped. Operational restrictions and regulations, such as explosive quantity safety distances, impact-weighted noise thresholds, and aircraft landing and clearance zones, may also greatly constrain and influence development (LANTDIV, 1988). The combined military and civilian population of MCB, Camp Lejeune and Jacksonville area is approximately 112,000. Nearly 90 percent of the surrounding population resides within urbanized areas. The presence of MCB, Camp Lejeune has been the single greatest factor contributing to the rapid population growth of Jacksonville and adjacent communities, particularly during the period from 1940 to 1960.

2.6 Receptors

Site 76 is situated in a residential area of New River MCAS. The risk assessment recognizes this fact by preparing conceptual site models that included the following receptors:

- Current military personnel
- Current base residents (young child [ages 1-6 years] and adult)
- Future on-site residents (young child [ages 1-6 years] and adult)

The contaminants detected at the site in surface soils, subsurface soils, and groundwater can migrate from the various media in several ways, including:

- Vertical migration of contaminants from surface soil to subsurface soil.
- Leaching of contaminants from subsurface soil to water-bearing zones.
- Vertical migration from shallow water-bearing zones to deeper flow systems.
- Horizontal migration in groundwater in the direction of groundwater flow.
- Wind erosion and subsequent deposition of windblown dust.

3.0 DATA ANALYSIS/RISK ASSESSMENT

The risk assessment completed for Site 76 examined exposure pathways associated with each environmental medium and each human receptor. Pathways were evaluated both qualitatively and quantitatively, considering site conditions and associated receptors. The exposure to current military personnel, current base residents and future on-site residents from soil and groundwater was considered.

Potential exposure to surface soil may occur by incidental soil ingestion, contaminant absorption through the skin and inhalation of airborne particulates. Surface soil exposure was evaluated for current and future residential children and adults.

Subsurface soil is available for contact only during excavation activities, so potential exposure to subsurface soil is limited to current military personnel involved in training exercises and maneuvers. These activities do not take place at Site 76, therefore exposure to subsurface soils was not considered.

Future residents were evaluated for groundwater exposure at Site 76. At the present time, shallow groundwater in the vicinity of the site is not used as a potable supply for residents or base personnel. Current residents are not evaluated for potential exposure to shallow groundwater since they get their water from supply wells set in a deeper aquifer, the Castle Hayne. However, in the future, (albeit unlikely due to poor transmissivity and insufficient flow) shallow groundwater may be tapped for potable water. Groundwater exposure was evaluated for future residential children and adults. Potential exposure pathways are ingestion, dermal contact, and inhalation of volatile contaminants while showering. However, it should be noted, that there were no VOCs detected in the groundwater samples. Therefore, inhalation of VOCs while showering was not evaluated as an exposure pathway.

Tables 1-1 through 1-6 present a summary of the detected compounds and analytes at the site. The tables present the range of positive detections for each contaminant of concern. These detections were compared to RBCs for residential soils and tapwater as well as values stipulated by the USEPA Soil Screening Guidance. As shown on the tables, none of the detections of VOCs or SVOCs, in the surface or subsurface soil exceed the screening criteria. However, one pesticide detected in surface soil exceeded the soil to groundwater soil screening level. Some metals detected in the surface and subsurface soil samples exceeded their respective USEPA RBC values such as arsenic and iron in surface soil and aluminum, arsenic, and iron in subsurface soil. In groundwater, no organics were detected above screening criteria. However, the metals arsenic, iron, thallium, and vanadium exceeded screening criteria in groundwater. Each of the detections were considered in the risk assessment completed for Site 76.

Tables 3-1 and 3-2 present the calculated carcinogenic and non-carcinogenic human health risks associated with these soil and groundwater contaminants for current and future residential exposure scenarios. Risk calculations were not performed for subsurface soil contaminants because subsurface soil is not considered an exposure pathway for residential receptors. The tables are discussed below.

Those pathways and receptors identified for potential risks include the groundwater ingestion pathway for future residential children and adults. A noncarcinogenic risk is posed for children [hazard index (HI) = 2.1, exceeding the acceptable HI = 1.0)] and a carcinogenic risk is posed for adults (ILCR = 1.4×10^{-4}, exceeding the acceptable ILCR of 1.0×10^{-4}). The noncarcinogenic risk

for children is due primarily to the groundwater ingestion pathway with the primary risk drivers arsenic contributing an HQ = 1.7, and iron contributing an HQ = 0.4. The carcinogenic risk posed for adults resulted from the groundwater ingestion pathway as well, with arsenic as the primary risk driver. Shallow groundwater is not currently used as a potable source at these sites, and future residential development of these sites is unlikely. Based on this information, the future groundwater exposure scenario evaluated in the Risk Assessment, although highly protective of human health, is unlikely to occur.

Table 1-6 presents a summary of the detected compounds and analytes at the site during the second round of sampling in October 1999. The human health risk calculations for groundwater that are presented in Table 3-2 (for the first round of sampling) show that only arsenic and thallium would cause a potential human health risk for future residents. During the second round of sampling, aluminum and iron were detected at concentrations above either state and/or federal regulatory standards, but are lower than the previous sampling event. Arsenic and thallium were not detected. Table 3-3 presents the calculated carcinogenic and non-carcinogenic human health risks associated with these groundwater contaminants found during October 1999.

These calculations show the total adult non-carcinogenic hazard level HI = 0.3, and the total child non-carcinogenic hazard level HI = 1.0. These results do not exceed the USEPA acceptable hazard index of 1.0. There is no carcinogenic risk because these two metals are not classified as carcinogens.

Metals have been found to be high and often exceeding Applicable or Relevant and Appropriate Requirements (ARARs) throughout MCB Camp Lejeune. A wellhead protection Study at MCB, Camp Lejeune (Greenhorne & O'Mara 1992) found levels of iron to exceed its secondary MCL in the Castle Hayne and surficial aquifer. A draft evaluation of metals in groundwater (Baker, 1994) had been prepared by Baker for LANTDIV under Contract N62470-89-D-4814 that discusses the presence of elevated metals that are not always related to past disposal practices.

4.0 DESCRIPTION OF THE NA ALTERNATIVE

No evidence exists to suggest that the soil or groundwater are sufficiently contaminated to pose a threat to human health. Those potential risks noted for future exposure scenarios are unlikely due to the projected groundwater use at the site. Therefore, current site conditions and environmental testing data indicated that no action is warranted at Site 76.

5.0 RESPONSIVENESS SUMMARY

This NA DD was made available to the public for comment on April 19, 1998. However, there was no formal comment period. No public comments of the draft document were received.

6.0 REFERENCES

Baker Environmental, Inc. 1994. Draft Evaluation of Metals In Groundwater. Marine Corps Base, Camp Lejeune, North Carolina.

Baker Environmental, Inc. 1998. Final Pre-Remedial Investigation Screening Study Sites 12, 68, 75, 76, 85, and 87. Marine Corps Base, Camp Lejeune, North Carolina.

Environmental Science and Engineering, Inc. (ESE). 1990. Site Summary Report, Final Marine Corps Base, Camp Lejeune, North Carolina. Prepared for the Department of the Navy, Naval Facilities Engineering Command, Atlantic Division, Norfolk, Virginia. ESE Project No. 49-02036.

Greenhorne and O'Mara. 1992. Preliminary Draft Report Wellhead Monitoring Study. Prepared for the Department of the Navy, Civil Branch.

LANTDIV. Naval Facilities Engineering Command, Atlantic Division. January 1988. Camp Lejeune Complex Master Plan and Capital Improvements Plan Update. Prepared for the Commanding General, Marine Corps Base, Camp Lejeune, North Carolina.

USEPA, 1993. Selecting Exposure Routes and Contaminants of Concern by Risk-Based Screening, Region III Technical Guidance Manual. Region III, Philadelphia, Pennsylvania. January 1993. EPA/903/R-93-001.

TABLES

TABLE 1-1
OCTOBER 1995
SURFACE SOIL ORGANIC DATA
SITE 76, MCAS CURTIS ROAD
MCB, CAMP LEJEUNE, NORTH CAROLINA
NA DECISION DOCUMENT, CTO-0120

Parameter	Contaminant Range/Frequency		Comparison to Criteria			
	Range of Positive Detections (µg/kg)	No. of Positive Detects/ No. of Samples	Region III Residential RBC Value[1] (µg/kg)	Detections Above Region III Residential RBC Value	Soil to Groundwater Soil Screening Levels [4] (µg/kg)	Detections Above Soil to Groundwater Soil Screening Level
Semivolatiles						
Phenanthrene	61J	1/16	230,000[2]	0	59,640	0
Fluoranthene	41J - 100J	2/16	310,000	0	276,080	0
Pyrene	40J - 93J	2/16	230,000	0	286,440	0
Chrysene	71J	1/16	88,000	0	38,150	0
bis(2-Ethylhexyl)phthalate	46J - 490	9/16	46,000	0	6,670	0
Benzo(b)fluoranthene	46J - 86J	2/16	880	0	1,160	0
Benzo(a)pyrene	50J	1/16	88	0	91.1	0
Pesticide/PCBs						
Heptachlor	1.2J	1/16	140	0	2.4	0
Heptachlor epoxide	2.4NJ	1/16	70	0	6.67	0
Dieldrin	1.6J	1/16	40	0	1.13	0
4,4'-DDE	3.7J - 510J	14/16	1,900	0	346	1
4,4'-DDD	1.8J - 8.8	3/16	2,700	0	129	0
4,4'-DDT	1.9J - 120	16/16	1,900	0	136	0
Alpha-Chlordane	20J	1/16	1,800[3]	0	27.7[5]	0
Gamma-Chlordane	9.9J	1/16	1,800[3]	0	27.7[5]	0

Notes:

µg/kg = micrograms per kilogram
J = Estimated value
NJ = Tentative identification. Consider present.
(1) USEPA Region III RBC Table. October 2000.
(2) USEPA Region III RBC value for pyrene used as a surrogate.
(3) USEPA Region III RBC value for Chlordane used as a surrogate.
(4) USEPA Soil Screening Levels for Transfer from Soil to Groundwater (May 1996).
(5) Chlordane used as a surrogate in the soil to groundwater screening level calculation.

TABLE 1-2
OCTOBER 1995
SURFACE SOIL INORGANIC DATA
SITE 76, MCAS CURTIS ROAD
MCB, CAMP LEJEUNE, NORTH CAROLINA
NA DECISION DOCUMENT, CTO-0120

Analyte	Range/Frequency		Comparison to Criteria					
	Range of Positive Detections (mg/kg)	No. of Positive Detects/ No. of Samples	Twice the Average Base Specific Background[1] Concentration (mg/kg)	No. of Times Exceeded Twice the Average Background Concentration	Region III Residential RBC Value[2] (mg/kg)	Detections Above Region III Residential RBC Value	Soil to Groundwater Soil Screening Levels[4] (mg/kg)	Detections Above Soil to Groundwater Soil Screening Level
Aluminum	1,580 - 7,350	16/16	5,856.083	5	7,800	0	--	--
Arsenic	0.44 - 1.1	16/16	1.322	0	0.43	16	26.6	0
Barium	6.7 - 31.2	16/16	17.292	3	550	0	848	0
Beryllium	0.3 - 0.32	2/16	0.205	2	16	2	--	--
Calcium+	533 - 2,860	16/16	1,372.977	8	--	--	--	--
Chromium	2.4 - 8	16/16	6.607	4	39	0	27.2	0
Cobalt	0.67 - 0.7	2/16	2.046	0	470	0	--	0
Copper	1 - 6.7	16/16	7.104	0	310	0	704	0
Iron+	1,190 - 4,680	16/16	3,702.427	5	2,300	10	151.2	16
Lead	9.6 - 46.6J	16/16	23.37	4	400[3]	0	270.06	0
Magnesium+	95.5 - 413	16/16	202.96	2	--	--	--	--
Manganese	5.2 - 22.9	16/16	18.51	1	160	0	65.2	0
Mercury	0.06 - 0.18	3/16	0.094	1	2.3	0	0.0154	0
Nickel	2.5 - 4	2/16	3.455	4	160	0	56.4	0
Potassium+	165 - 302	4/16	200.06	2	--	--	--	--
Selenium	0.28 - 0.37J	3/16	0.753	0	39	0	0.223	3
Sodium+	6.5 - 47.4J	9/16	59.013	0	--	--	--	--
Vanadium	7.3 - 24.6	16/16	11.447	7	55	0	--	--
Zinc	5.5 - 30.7	16/16	13.763	9	2,300	0	1,100.04	0

Notes:
Shaded areas indicate analyte selected as COPC for human health risk assessment.
+ = Essential Nutrient
-- = No criteria published
mg/kg = milligrams per kilogram
J = Estimated Value
(1) Soil background concentrations are based on reference background soil samples collected from MCB Camp Lejeune investigations.
(2) USEPA Region III RBC Table. October 2000.
(3) Action Level for residential soils (USEPA, 1994b)
(4) USEPA Soil Screening Levels for Transfer from Soil to Groundwater (May 1996).

TABLE 1-3
OCTOBER 1995
SUBSURFACE SOIL ORGANIC DATA
SITE 76, MCAS CURTIS ROAD
MCB, CAMP LEJEUNE, NORTH CAROLINA
NA DECISION DOCUMENT, CTO 0120

Parameter	Contaminant Range/Frequency		Comparison to Criteria			
	Range of Positive Detections (µg/kg)	No. of Positive Detects/ No. of Samples	Region III Residential RBC Value[1] (µg/kg)	Detections Above Region III Residential RBC Value	Soil to Groundwater Soil Screening Levels[4] (µg/kg)	Detections Above Soil to Groundwater Soil Screening Level
Volatiles						
Acetone	24	1/16	780,000	0	2,810	0
Semivolatiles						
Di-n-butylphthalate	680	1/16	780,000	0	24,800	0
bis(2-Ethylhexyl)phthalate	49J	1/16	46,000	0	--	--
Pesticide/PCBs						
4,4'-DDE	3.4J - 40J	2/16	1,900	0	346	0
4,4'-DDD	480	1/16	2,700	0	129	1
4,4'-DDT	1.7J - 5.9J	2/16	1,900	0	136	0

Notes:

µg/kg = micrograms per kilogram
J = Estimated value
(1) USEPA Region III RBC Table. October 2000.
(2) USEPA Soil Screening Levels for Transfer from Soil to Groundwater (May 1996).

TABLE 1-4
OCTOBER 1995
SUBSURFACE SOIL INORGANIC DATA
SITE 76, MCAS CURTIS ROAD
MCB, CAMP LEJEUNE, NORTH CAROLINA
NA DECISION DOCUMENT, CTO-0120

Analyte	Range/Frequency		Comparison to Criteria					
	Range of Positive Detections (mg/kg)	No. of Positive Detects/ No. of Samples	Twice the Average Base Specific Background[1] Concentration (mg/kg)	No. of Times Exceeded Twice the Average Background Concentration	Region III Residential RBC Value[2] (mg/kg)	Detections Above Region III Residential RBC Value	Soil to Groundwater Screening Levels[5] (mg/kg)	Detections Above Soil to Groundwater Soil Screening Level
Aluminum	3,950 - 17,800	16/16	7,413.23	11	7,800	11	--	--
Arsenic	0.18 - 13.7J	16/16	1.971	1	0.43	13	26.2	0
Barium	5.5 - 38.9	16/16	14.37	4	550	0	848	0
Beryllium	0.17 - 0.36	4/16	0.191	3	16	0	--	--
Calcium+	63.2 - 2,410	14/16	387.824	3	--	--	--	--
Chromium	4.3 - 26.8	16/16	12.537	2	39	0	27.2	0
Cobalt	0.62 - 0.74	3/16	1.611	0	470	0	--	--
Copper	0.41 - 3	10/16	2.41	1	310	0	704	0
Iron+	1,430 - 12,700	16/16	7,134.639	2	2,300	15	151.2	8
Lead	3.5 - 12.5	16/16	8.264	5	400[3]	0	270.06	0
Magnesium+	107 - 738	16/16	263.398	9	--	--	--	--
Manganese	3.7 - 12.2	15/16	7.99	2	160	0	65.2	0
Mercury	0.07	1/16	0.129	0	2.3[4]	0	0.0154	1
Nickel	2.1 - 2.5	2/16	3.725	0	160	0	56.4	0
Potassium+	184 - 956	11/16	344.252	2	--	--	--	--
Selenium	0.29J - 0.83	3/16	0.806	1	39	0	0.223	3
Sodium+	5.6 - 143	12/16	54.57	2	--	--	--	--
Vanadium	8.1 - 34	16/16	13.34	8	55	0	--	--
Zinc	1.7 - 6.7	15/16	6.668	1	2,300	0	1,100.4	0

Notes:

Shaded areas indicate analyte selected as COPC for human health risk assessment.
+ = Essential Nutrient
-- = No criteria published
mg/kg = milligrams per kilogram
J = Estimated Value
(1) Soil background concentrations are based on reference background soil samples collected from MCB Camp Lejeune investigations.
(2) USEPA Region III RBC Table. October 2000.
(3) Action Level for residential soils (USEPA, 1994b).
(4) Value for mercuric chloride used as a surrogate.
(5) USEPA Soil Screening Levels for Transfer from Soil to Groundwater (May 1996).

TABLE 1-5
OCTOBER 1995
GROUNDWATER ORGANIC AND INORGANIC DATA
SITE 76, MCAS CURTIS ROAD
MCB, CAMP LEJEUNE, NORTH CAROLINA
NA DECISION DOCUMENT, CTO-0120

Parameter	Contaminant Range/Frequency		Comparison to Criteria					
	Concentration Range (µg/L)	No. of Positive Detects/ No. of Samples	NCWQS[1] (µg/L)	Detections Above NCWQS	MCL[2] (µg/L)	Detections Above MCL	Region III Tapwater RBC Value[3] (µg/L)	Detections Above Region III Tapwater RBC Value
Semivolatiles								
Di-n-butylphthalate	3J	1/5	700	0	NE	NA	370	0
Inorganics								
Aluminum	322 - 3,190	5/10	NE	NA	50/200[4]	5/5	3,700	0
Arsenic	3.6J - 151	3/10	50	0	50	0	0.045	3
Barium	5.1J - 168J	8/10	2,000	0	2,000	0	260	0
Calcium+	8,420 - 101,000	10/10	NE	NA	NE	NA	NE	NA
Chromium	5.4J	1/10	50	0	100	0	18	0
Cobalt	6.4J	1/10	NE	NA	NE	NA	220	0
Copper	1.4J - 3.5J	4/10	1,000	0	1,300[5]	0	150	0
Iron	48.8J - 33,100	8/10	300	7	300[4]	7	1,100	5
Lead	1.2 - 4.5	5/10	15	0	15[5]	0	NE	NA
Magnesium+	1,460 - 5,440	10/10	NE	NA	NE	NA	NE	NA
Manganese	2J - 40.3	8/10	50	0	50[4]	0	73	0
Mercury	0.032J - 0.035J	2/10	1.1	0	2	0	1.1[6]	0
Potassium+	824J - 2,980J	5/10	NE	NA	NE	NA	NE	NA
Selenium	1.6 - 4.6J	2/10	50	0	50	0	18	0
Sodium+	6,600 - 39,400	10/10	NE	NA	NE	NA	NE	NA
Thallium	3.5J - 12.8	2/10	NE	NA	2	2	0.26	2
Vanadium	13.6J - 105	5/10	NE	NA	NE	NA	26	1
Zinc	4.1 - 40.6	5/10	2,100	0	5,000[5]	0	1,100	0

Notes:

Shaded areas indicate parameter selected as COPC for human health risk assessment.

(1) NC WQS = North Carolina Water Quality Standards for Groundwater (15 ANCAC 2L 10/25/94)
(2) MCL = Safe Drinking Water Act Maximum Contaminant Level (October 1996).
(3) USEPA Region III RBC Table. October 2000.
(4) SMCL = Secondary Maximum Contaminant Level
(5) Action Level for drinking water.
(6) Value for mercuric chloride used as a surrogate.
+ = Essential Nutrient
NE = No Criteria Established
NA = Not Applicable
µg/L = micrograms per liter
J = Estimated Value

TABLE 1-6
OCTOBER 1999 - ADDITIONAL SAMPLING
GROUNDWATER INORGANIC DATA
SITE 76, MCAS CURTIS ROAD
MCB, CAMP LEJEUNE, NORTH CAROLINA
NA DECISION DOCUMENT, CTO-0120

Parameter	Contaminant Range/Frequency		Comparison to Criteria					
	Concentration Range (µg/L)	No. of Positive Detects/No. of Samples	NCWQS[1] (µg/L)	Detections Above NCWQS	MCL[2] (µg/L)	Detections Above MCL	Region III Tapwater RBC Value[3] (µg/L)	Detections Above Region III Tapwater RBC Values
Inorganic Compounds								
Aluminum	31.3B - 1720	3/4	NE	NA	50 to 200[4]	2[4]	37,000	0
Barium	5.4 - 160	4/4	2,000	0	2,000	0	2,600	0
Calcium +	6180 - 71300	4/4	NE	NA	NE	NA	73	4
Chromium (total)	1.1B	1/4	50	0	100	0	110	0
Cobalt	2.8 B	1/4	NE	NA	NE	NA	2,200	0
Iron	420 - 2780	4/4	300	4	300[4]	4[4]	11,000	0
Lead	1.7 B - 2.0 B	2/4	15	0	15[5]	0	NE	NA
Magnesium +	1390 B - 3880 B	4/4	NE	NA	NE	NA	NE	NA
Manganese (non-food)	2.8 B - 34.8	4/4	50	0	50[4]	0	730	0
Nickel	3.2 B	1/4	100	0	100	0	730	0
Potassium +	863 B - 3260 B	4/4	NE	NA	NE	NA	NE	NA
Sodium +	7430 - 30400	4/4	NE	NA	NE	NA	NE	NA
Vanadium	1.1 B - 2.5 B	3/4	NE	NA	NE	NA	260	NA
Zinc	3.6 B - 25.1	4/4	2,100	0	5000[4]	0	11,000	0

Notes:

Shaded areas indicate parameter selected as COPC for human health risk assessment.

(1) NCWQS = North Carolina Water Quality Standards for Groundwater (15A NCAC 2L 10/25/94)
(2) MCL = Safe Drinking Water Act Maximum Contaminant Level (October 1996).
(3) USEPA Region III RBC Table, October 2000.
(4) Secondary Maximum Cotaminant Level (SMCL)
(5) Treatment Technique Action Level for Drinking Water

µg/L = micrograms per liter
J = Estimated Value
B = analyte found in associated blank
NA = Not Applicable
NE = Not Established

TABLE 3-1
OCTOBER 1995
SURFACE SOIL HUMAN HEALTH RISK CALCULATIONS
SITE 76, MCAS CURTIS ROAD
MCB, CAMP LEJEUNE, NORTH CAROLINA
NA DECISION DOCUMENT, CTO-0120

Receptor	Exposure Pathway	Contaminant	Carcinogenic Risk	Non-Carcinogenic Risk
Current Residential Adult	Ingestion	Arsenic	9.39E - 08	3.7E - 03
		Iron	0.0E + 00	1.6E - 02
	Dermal	Arsenic	2.72E - 08	1.1 E - 03
		Iron	0.0E + 00	4.6 E -03
	Inhalation	Arsenic	1.4E - 10	0.0E + 00
		Iron	0.0 E + 00	0.0E + 00
Current Residential Child	Ingestion	Arsenic	8.77E - 07	3.4E - 02
		Iron	0.0E + 00	1.5E - 01
	Dermal	Arsenic	5.04E - 08	2.0E - 03
		Iron	0.0E + 00	8.6E - 03
	Inhalation	Arsenic	5.0E - 10	0.0E + 00
		Iron	0.0E + 00	0.0E + 00

TABLE 3-1 (Continued)
OCTOBER 1995
SURFACE SOIL HUMAN HEALTH RISK CALCULATIONS
SITE 76, MCAS CURTIS ROAD
MCB, CAMP LEJEUNE, NORTH CAROLINA
NA DECISION DOCUMENT, CTO-0120

Receptor	Exposure Pathway	Contaminant	Carcinogenic Risk	Non-Carcinogenic Risk
Future Residential Adult	Ingestion	Arsenic	7.05E - 07	3.7E - 03
		Iron	0.0E + 00	1.6E - 02
	Dermal	Arsenic	2.04E - 07	1.1E - 03
		Iron	0.0E + 00	4.6E - 03
	Inhalation	Arsenic	1.1E - 09	0.0E + 00
		Iron	0.0E + 00	0.0E + 00
Future Residential Child	Ingestion	Arsenic	1.32E - 06	3.4E - 02
		Iron	0.0E + 00	1.5E - 01
	Dermal	Arsenic	7.56E - 08	2.0 E - 03
		Iron	0.0E + 00	8.6E - 03
	Inhalation	Arsenic	7.5E - 10	0.0E + 00
		Iron	0.0E + 00	0.0E + 00

TABLE 3-2
OCTOBER 1995
GROUNDWATER HUMAN HEALTH RISK CALCULATIONS
SITE 76, MCAS CURTIS ROAD
MCB, CAMP LEJEUNE, NORTH CAROLINA
NA DECISION DOCUMENT, CTO-0120

Receptor	Exposure Pathway	Contaminant	Carcinogenic Risk	Non-Carcinogenic Risk
Future Residential Adult	Ingestion	Arsenic	1.4E -04	7.1E - 01
		Iron	0.0E + 00	1.7E -01
		Thallium	0.0E + 00	5.0E + 00
		Vanadium	0.0E + 00	4.1E - 01
	Dermal	Arsenic	2.0E - 06	1.0E - 02
		Iron	0.0E + 00	2.4E - 03
		Thallium	0.0E + 00	7.2E - 02
		Vanadium	0.0E + 00	5.9E - 03
Future Residential Child	Ingestion	Arsenic	6.4E - 05	1.7E + 00
		Iron	0.0E + 00	4.0E - 01
		Thallium	0.0E + 00	1.2E + 01
		Vanadium	0.0E + 00	9.6E - 01
	Dermal	Arsenic	8.0E - 07	2.1E - 02
		Iron	0.0E + 00	5.0E - 03
		Thallium	0.0E + 00	1.5E - 01
		Vanadium	0.0E + 00	1.2E - 02

TABLE 3-3
OCTOBER, 1999 - ADDITIONAL SAMPLING
GROUNDWATER HUMAN HEALTH RISK CALCULATIONS
SITE 76, MCAS CURTIS ROAD
MCB, CAMP LEJEUNE, NORTH CAROLINA
NA DECISION DOCUMENT, CTO-0120

Receptor	Exposure Pathway	Contaminant	Carcinogenic Risk	Non-Carcinogenic Risk
Future Residential Adult	Ingestion	Aluminum	0	.05
		Iron	0	.25
	Dermal	Aluminum	0	<0.01
		Iron	0	<0.01
Future Residential Child	Ingestion	Aluminum	0	.11
		Iron	0	.59
	Dermal	Aluminum	0	<0.01
		Iron	0	0.01

FIGURES

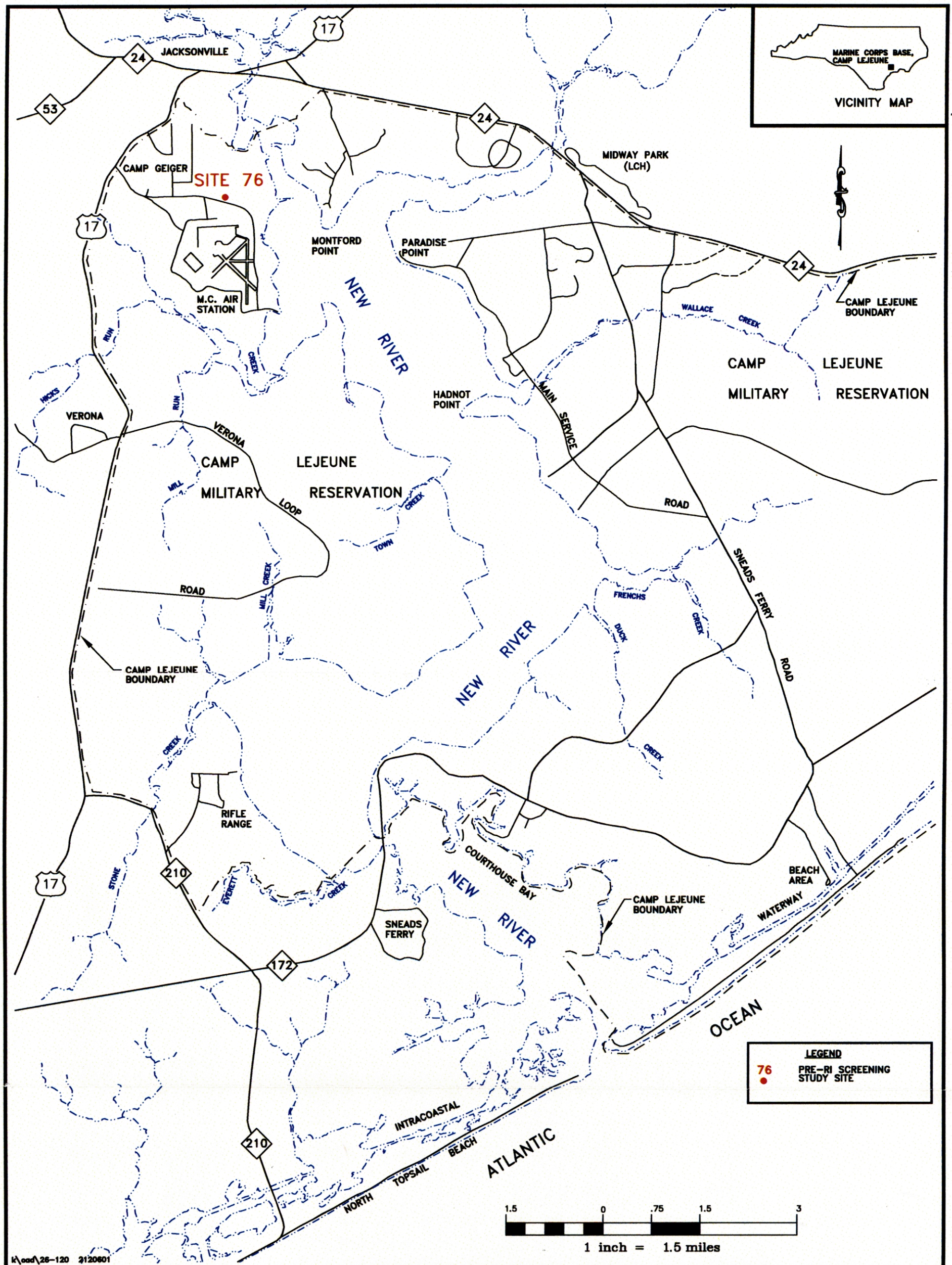
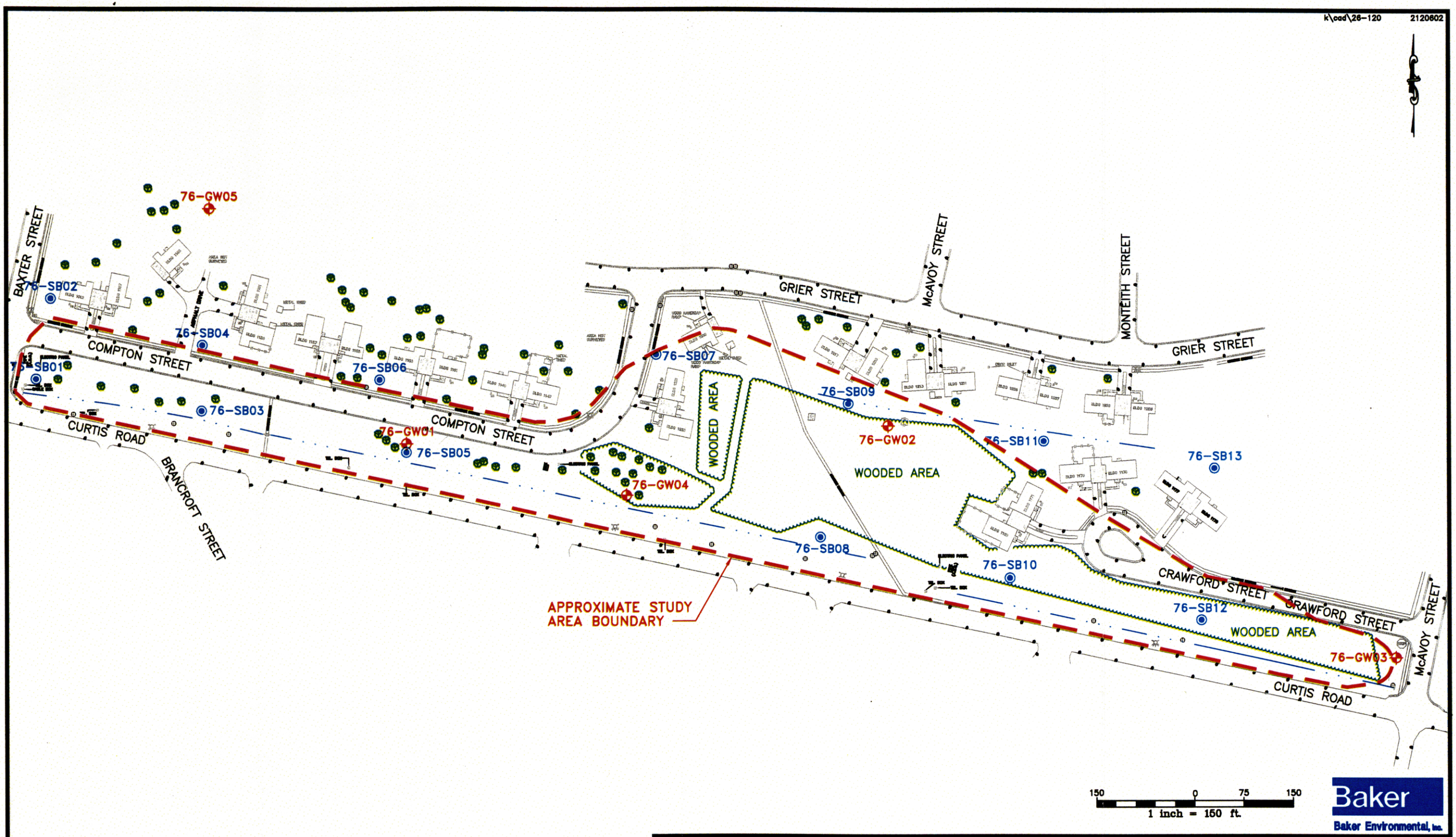


FIGURE 1-1
LOCATION OF SITE 76
MARINE CORPS AIR STATION CURTIS ROAD
NA DECISION DOCUMENT
CTO - 0120
MARINE CORPS BASE, CAMP LEJEUNE
NORTH CAROLINA

k\cad\26-120 2120602



LEGEND

76-GW01 MONITORING WELL LOCATION

76-SB05 SOIL BORING LOCATION

— · · · — INTERMITTENT DRAINAGE SWALE

TREE LINE

TREE

MANHOLE

SOURCE: BRENT A. LANIER R.L.S., MARCH 1996.

FIGURE 1-2
SITE 76
SITE MAP
MARINE CORPS AIR STATION CURTIS ROAD
NA DECISION DOCUMENT
CTO - 0120
MARINE CORPS AIR STATION
NEW RIVER, NORTH CAROLINA

314813R1

Baker
Baker Environmental, Inc.

LEGEND

- SWALE
- TREE LINE
- TREE
- MANHOLE
- AREA OF GEOPHYSICAL SURVEY (1983)
- AREA OF GEOPHYSICAL SURVEY (1996)

SOURCE: BRENT A. LANIER R.L.S., MARCH 1996.

FIGURE 1-3
AREA OF
GEOPHYSICAL SURVEY
SITE 76
NA DECISION DOCUMENT
CTO - 0120
MARINE CORPS AIR STATION
NEW RIVER, NORTH CAROLINA

ATTACHMENT A
STATE OF NORTH CAROLINA APPROVAL LETTER

NORTH CAROLINA
DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES
DIVISION OF WASTE MANAGEMENT

MICHAEL F. EASLEY, GOVERNOR
WILLIAM G. ROSS, JR., SECRETARY
DEXTER R. MATTHEWS, INTERIM DIRECTOR

NCDENR

July 30, 2001

Commanding General
(ATTN: AC/S EMD/IRD)
Marine Corps Base
PSC Box 20004
Camp Lejeune, NC 28542-0004

RE: No Further Action (NFA) Decision Document
Site 76
MCB Camp Lejeune

Dear Sir:

The Superfund Section has completed its review of this document. MCB Camp Lejeune requests that we concur with the NFA designation for Site 76. Based on results presented in the Pre-Remedial Investigation (RI) Screening Study, the Superfund Section concurs with the NFA designation. The Pre-RI Screening Study did not reveal significant contamination. No remediation will be required unless the Superfund Section later determines, based on new information or information not previously provided to the Section, that the site is contaminated above current standards or that the Section was provided with false or incomplete information.

We appreciate the opportunity to review this document. If you have any questions or comments, please contact me at (919) 733-2801, extension 278.

Sincerely,

David J. Lown, LG, PE
Geological Engineer
Superfund Section

1646 MAIL SERVICE CENTER, RALEIGH, NORTH CAROLINA 27699-1646
401 OBERLIN ROAD, SUITE 150, RALEIGH, NC 27605
PHONE: 919-733-4996 \ FAX: 919-715-3605
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ATTACHMENT B
USEPA REGION IV APPROVAL LETTER

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4
SAM NUNN ATLANTA FEDERAL CENTER
61 FORSYTH STREET, S.W.
ATLANTA, GEORGIA 30303

June 26, 2001

4WD-FFB

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Commanding General
Attn.: AC/S, EMD/IRD
Marine Corps Base
PSC Box 20004
Camp Lejeune, NC 28542-0004

SUBJ: MCB Camp Lejeune
Site 76
No Action Decision Document

Dear Sir:

The U.S. Environmental Protection Agency (EPA) Region 4 has reviewed the above subject decision document and concurs with the selected No Action Remedy for Site 76. This remedy is supported by the previously completed Pre-Remedial Investigation Screening Study.

This remedial action is protective of human health and the environment, complies with Federal and State requirements that are legally applicable or relevant and appropriate to the remedial action and is cost effective.

If there are any questions or comments, I can be reached at (404) 562-8538.

Sincerely,

Gena D. Townsend
Senior Project Manager

cc: Thomas Burton, Camp Lejeune
Dave Lown, NCDENR
Kirk Stevens, LANTDIV