

Final
Confirmatory Sampling Report
Site 67 Engineer's TNT Burn Site
Marine Corps Base Camp Lejeune
Jacksonville, North Carolina



Prepared for
Department of the Navy
Naval Facilities Engineering Command
Mid-Atlantic

Contract No.
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November 2010

Prepared by
CH2MHILL

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Under the

**NAVFAC CLEAN 1000 Program
Contract N62470-08-D-1000**

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Executive Summary

Confirmatory sampling was conducted at Site 67 Engineer's TNT (2,4,6-Trinitrotoluene) Burn Site (Site 67) at Marine Corps Base Camp Lejeune (MCB CamLej), North Carolina in order to evaluate the potential presence and nature of environmental contamination that may have resulted from historical site activities, and to determine if additional investigation or remediation is warranted.

Site 67 is comprised of approximately 4 acres immediately north of Traps Bay on MCB CamLej (**Figure 1-1**). The area is heavily vegetated, with approximately 2.5 acres of the site classified as jurisdictional wetland. Site 67 was identified in the *Basewide Initial Assessment Study* (IAS) (Water and Air Research, 1983) as the Engineer's TNT Burn Site. The site was reportedly used for TNT disposal in 1951. The IAS states that "2- to 3-foot pits were dug and unwanted TNT was opened and burned. Complete consumption of all TNT was reported during these procedures."

The Site 67 confirmatory sampling field effort was conducted on February 23 and 24, 2010. No evidence of TNT burn pits or other hazards was observed during this effort. Soil samples collected from Site 67 were screened for TNT and Dinitrotoluene (DNT) compounds using the Expray™ colorimetric field method. Soil and groundwater samples were analyzed for 2,4,6-TNT and daughter products, 4-Amino-2,6- DNT and 2-Amino-4,6-DNT. The analytical results from Site 67 were compared to human health and ecological screening values to evaluate soil and groundwater impacts.

No explosives residue constituents were detected in surface or subsurface soil, and the single detection of 2-Amino-4,6-DNT reported in a groundwater sample was less than human health and ecological screening values. Therefore, it appears that historical activities have had no residual impact on the environment. For this reason, no further environmental investigation of Site 67 is recommended.

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Acronyms and Abbreviations

amsl	above mean sea level
ARSR	Archival Records Search Report
ASTM	American Society for Testing and Materials
bgs	below ground surface
CLEAN	Comprehensive Long-term Environmental Action—Navy
°F	degrees Fahrenheit
DNT	dinitrotoluene
ETA	Engineers Training Area
GPS	global positioning system
IAS	Initial Assessment Study
IDW	investigation-derived waste
L/min	liters per minute
µg/L	micrograms per liter
MCB CamLej	Marine Corps Base Camp Lejeune
MS/MSD	matrix spike/matrix spike duplicate
NAVFAC	Naval Facilities Engineering Command
NC HWS SSL	North Carolina Hazardous Waste Site Soil Screening Level
NCDENR	North Carolina Department of Environment and Natural Resources
NCGWQS	North Carolina Groundwater Quality Standards
NIRIS	Naval Installation Restoration Information Solution
NOAA	National Oceanic and Atmospheric Administration
QA	quality assurance
QC	quality control
RSL	Regional Screening Level
SOP	standard operating procedure
TCLP	Toxicity Characteristic Leaching Procedure
TNT	2,4,6-trinitrotoluene
USACE	United States Army Corps of Engineers
USCS	Unified Soil Classification System
USEPA	United States Environmental Protection Agency
UXO	unexploded ordnance

Introduction

This report documents the confirmatory sampling activities conducted at the Site 67 Engineer's TNT Burn Site, located at the Marine Corps Base Camp Lejeune (MCB CamLej), North Carolina (**Figure 1-1**).

1.1 Objectives and Approach

The objectives of the confirmatory sampling activities were to evaluate the potential presence and nature of environmental contamination that may have resulted from historical 2,4,6-Trinitrotoluene (TNT) burn site activities, and to determine if additional investigation or remediation is warranted. Field screening was performed at all sample locations to ensure that explosive soil was not present in off-site laboratory samples. This investigation does not address the potential impacts of any other ranges that encompass portions of Site 67. Confirmatory sampling activities were conducted in accordance with the *Confirmatory Sampling Plan Site 67 Engineer's TNT Burn Site* (CH2M HILL, 2010), hereinafter referred to as the Work Plan. Soil and groundwater samples were analyzed for explosives residue constituents and evaluated against human health and ecological screening criteria.

1.2 Report Organization

This Confirmatory Sampling Report includes the following sections:

- Section 1 – Introduction
- Section 2 – Site Description and Background
- Section 3 – Field Investigation Activities
- Section 4 – Confirmatory Sampling Results
- Section 5 – Conclusions and Recommendations
- Section 6 – References

Tables and figures are referenced within the text and are provided at the end of each section. Appendices are provided at the end of this report.



- Legend**
- Highways
 - Site 67
 - Installation Boundary

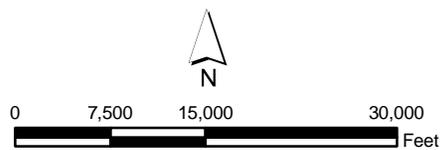


Figure 1-1
Base Location Map
Site 67 Confirmatory Sampling Report
MCB CamLej
North Carolina



Site Description and Background

MCB CamLej was commissioned in 1942 as a training area to prepare Marines for combat. The MCB CamLej complex consists of six geographic locations under the jurisdiction of the Base command. These areas include Camp Geiger, Montford Point, Courthouse Bay, Mainside, the Greater Sandy Run Area, and the Rifle Range Area. MCB CamLej is home to an active duty, dependent, retiree, and civilian population of approximately 150,000 personnel, and provides housing, training facilities, logistical support, and administrative supplies for Fleet Marine Force units and other assigned units.

MCB CamLej is located on 236 square miles of land in Onslow County, North Carolina, adjacent to the southern site of the City of Jacksonville. Jacksonville is the largest city near MCB CamLej and contains approximately half of the county's total population. Since 1990, much of the MCB CamLej complex has been part of Jacksonville. The Base is bisected by the New River, which flows into the Atlantic Ocean in a southeasterly direction. The Base is bordered by the Atlantic Ocean to the east, U.S. Route 18 to the west and State Route 24 to the north.

2.1 Site 67 Description

Site 67 is located near the Courthouse Bay area of MCB CamLej, on the northern shore of Traps Bay (**Figure 2-1**). The site consists of approximately 4 acres of undeveloped wooded land, approximately 2.5 acres of which is jurisdictional wetland. The wetland borders a north-south trending unnamed stream that discharges to Traps Bay. Site-wide topographic relief is estimated to be approximately 7 feet. Storm water runoff is anticipated to flow towards the wetland area and unnamed stream.

2.2 Site 67 History

Site 67 was identified in the *Basewide Initial Assessment Study* (IAS) (Water and Air Research, 1983) as the Engineer's TNT Burn Site. The site was reportedly used for TNT disposal in 1951. The IAS states that "2- to 3-foot pits were dug and unwanted TNT was opened and burned. Complete consumption of all TNT was reported during these procedures." The IAS concluded that the quantity of waste disposed at Site 67 was insignificant and did not warrant further investigation.

In May 2009, CH2M HILL completed a detailed investigative review of information relating to Site 67 to identify historical activities that may have resulted in environmental impacts. The information obtained during this effort, including the aerial photographs discussed below, is presented in the Archival Records Search Report (ARSR) provided in **Appendix A**.

Based on the historical records review, three historical ranges, one historical firing position, and one operational range are located within the vicinity of Site 67 (**Figure 2-2**). While these sites are not the focus of the Site 67 confirmatory sampling investigation, potential

munitions hazards associated with these sites were taken into consideration during the Site 67 field effort. The ranges located within the vicinity of Site 67 include:

- Engineer Firing Range (historical)
- Engineer Demolition Area I-1 (historical)
- Engineer Demolition Area I-2 (historical)
- Firing Position 24 (historical)
- Engineers Training Area (ETA)-1 (currently in operation).

The Engineer Firing Range was used in 1947 by the Engineer School for combat engineer training. Munitions authorized for use at this range included anti-tank rockets, rifle grenades, demolitions, and flame throwers. The area used as the Engineering Firing Range was also in the same location as the Engineer Demolition Area I-1 which appears on a 1947 map of MCB CamLej. Records indicate that a demolitions course was taught at the Engineer School through the 1950s, however there are no maps available from the 1950s showing a demolition area. Based on historical records review, it appears that the Engineer Firing Range and Engineer Demolition Area I-1 were in use from 1947 through approximately 1960. According to a letter to Headquarters Marine Corp, the items were authorized for use at Engineer Demolition Area I-1 included demolitions and Bangalore torpedoes (USMC, 1949). The boundary of both of these ranges/areas fully encompasses Site 67 (USACE, 2001).

According to the *Range Identification Preliminary Range Assessment 67* (USACE, 2001), the Engineer Demolition Area I-2 was in use from 1960 to 1988. According Base records, items were authorized for use at Engineer Demolition Area I-2 included demolitions, land mines, and tank cannons (USACE, 2001). A 1962 aerial photograph shows a cleared area within the western portion of Site 67, which may have been part of the Engineer Demolition Area I-2. Aerial imagery from 1989 shows significant vegetative growth at Site 67, indicating the area may not have been in use as a demolition area at that time.

According to the *Range Identification Preliminary Range Assessment* report, Firing Position 24 was an artillery firing position located in the vicinity of Site 67. Firing Position 24 was reportedly in use in 1976 (USACE, 2001).

Engineers Training Area (ETA) - 1 appears on the 1993 range map, and does not appear to overlap Site 67. However, a 2005 base map showing existing conditions identifies ETA-1D (a portion of the ETA-1 range) encompassing Site 67. According to the *Camp Lejeune Standard Operating Procedures for Range Control*, the ammunition authorized for use at ETA-1 included demolitions, claymore mines, antitank mines, Bangalore torpedoes, and pyrotechnics (USMC, 2006).

2.3 Regional Climate

Mild winters and hot, humid summers generally characterize climatic conditions within southeastern North Carolina and at MCB CamLej. Winters are usually short and mild with occasional short, cold periods. Summers are long, hot, and humid, with an average humidity of 75 percent. Average annual net precipitation is approximately 54 inches. Ambient air temperatures generally range from 37 to 60 degrees

Fahrenheit (°F) in the winter months and 71°F to 88 °F during the summer months. Winds are generally south-southwesterly in the summer, and north-northwesterly in the winter (NOAA, 2002).

2.4 Regional Geology and Hydrogeology

Southeastern North Carolina and MCB CamLej are within the Tidewater region of the Atlantic Coastal Plain Physiographic Province. The Tidewater region is of low relief, with elevations averaging about 20 feet amsl and is generally swampy. The MCB CamLej area is underlain by an eastward-thickening wedge of marine and non-marine sediments ranging in age from early Cretaceous to Holocene. The eastward-thickening wedge of sediment begins at the fall line (western boundary of the Atlantic Coastal Plain physiographic province) and dips southeastward towards the coast. Along the coastline, several thousand feet of interlayered, unconsolidated sediment is present, consisting of gravel, sand, silt, clay deposits, calcareous clays, shell beds, sandstone, and limestone, that was deposited over pre-Cretaceous crystalline basement rock. Minor amounts of detrital carbonate shells and secondary minerals, such as glauconite, siderite, and chlorite, often distinguish these sedimentary units.

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

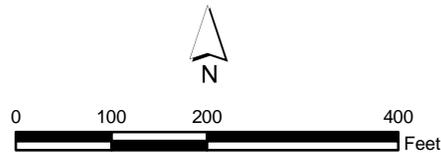
Recharge of aquifers within the Coastal Plain region generally occurs within interstream areas. Annual recharge to the aquifers has been estimated in the range of 5 to 20 inches of rainfall (Heath, 1989). Natural discharge of groundwater from the Coastal Plain aquifer system is generally into streams, swamps, and lakes. Evapotranspiration from the soil zone and upward leakage through confining units into streams, estuaries, swamps, and even the ocean also contribute to groundwater discharge. The New River estuary serves as the principal discharge area for groundwater from the Castle Hayne aquifer within the vicinity of MC CamLej (Harned, Lloyd, and Treece, 1989)

2.5 Site Geology and Hydrogeology

The soil types encountered at Site 67 are predominantly grey and tan fine- to medium-grained sands with traces of silts. Hand augered borings were installed throughout the western portion of Site 67 with a maximum borehole depth of 8 feet below ground surface (bgs). Saturated soils were encountered at depths ranging from 1.5 to 7 feet bgs. Based on site topography, shallow groundwater flow is likely to the southeast towards the unnamed stream that discharges to Traps Bay



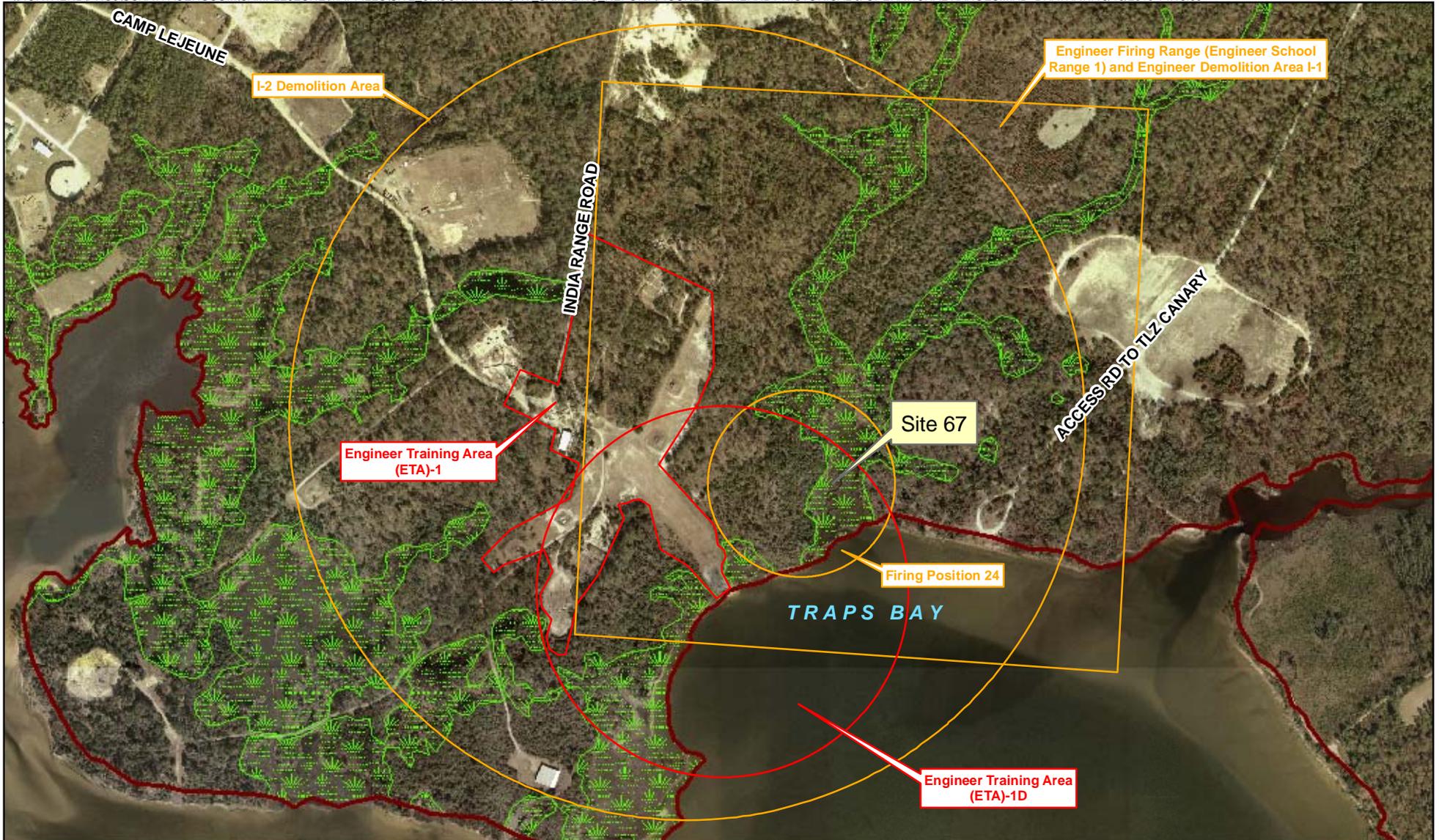
- Legend**
- Creek
 - Site 67
 - Installation Boundary
 - Jurisdictional Wetlands



1 inch = 200 feet

Figure 2-1
Site Location Map
Site 67 Confirmatory Sampling Report
MCB CamLej
North Carolina





Legend

- Site 67
- Operational Ranges
- Historical Ranges
- Installation Boundary
- Jurisdictional Wetlands

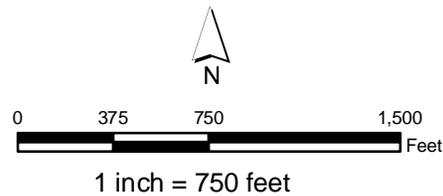


Figure 2-2
Nearby Historical and Operational Ranges
Site 67 Confirmatory Sampling Report
MCB CamLej
North Carolina



Field Investigation Activities

Field sampling activities were conducted on February 23 and February 24, 2010 in accordance with the Work Plan (CH2M HILL, 2010) and the Base Master Project Plans (CH2M HILL, 2008). The focus of sampling activities was biased towards the western portion of Site 67 based on site historical information.

The field investigation activities consisted of the following:

- Identification of the sampling locations using a handheld global positioning system (GPS) unit
- Subsurface utility locating of all sample locations
- Field screening of surface and subsurface soils for explosive soils with an Expray™ colorimetric field kit
- Collection of surface and subsurface soil samples from 8 locations
- Collection of 3 shallow groundwater samples from hand augered soil borings.

3.1 Environmental Sample Collection

This section summarizes the Site 67 environmental sampling effort including sampling rationale and methods. Surface soil, subsurface soil, and groundwater samples were collected during the February 2010 sampling effort.

3.1.1 Explosive Soil Field Screening

Given the reported disposal of TNT by burning in pits, soil samples were screened in the field as a cautionary measure to evaluate the presence of explosive soils prior to sampling and transport of material offsite. Following clearance of each sample location by an Unexploded Ordnance (UXO) Technician, an aluminum, non-sparking hand auger was used to sample soils from 1 to 4 feet bgs or to the water table, at the eight soil sampling locations (designated IR67-SS/IS01 through IR67-SS/IS08). The 1–4 foot depth interval is the interval that would have likely been impacted by the 2–3 foot deep TNT burn pits reported at Site 67. Sample locations were focused in the western portion of Site 67 based on the IAS site description and the ARSR findings. A review of historical aerial photographs revealed that cleared areas were present in the western portions of the site. Additionally, it is unlikely that the TNT burn site would have been located in a wetland area, but instead would have been located in an upland area. Sample locations and depth intervals are presented in **Figure 3-1** and **Table 3-1**, respectively.

Soils were visually inspected by the UXO Technician for evidence of unburned explosives and other hazards and then screened using the Expray™ colorimetric field method. Field screening was limited to TNT only. Soil samples were not homogenized prior to testing with the Expray™ kit. Soil to be tested was selected from discrete intervals of hand auger

cuttings. The Expray™ kit contains an alkali reagent that reacts with polynitroaromatics (TNT and DNT compounds) to form highly colored compounds. There was no resulting color change from the Expray™ kit that would indicate TNT or DNT compounds were present in site soils.

3.1.2 Surface and Subsurface Soil

Surface and subsurface soil samples were co-located with the explosive soil field screening samples and collected as described in **Section 3.1.1**. A total of 8 surface soil samples (IR67-SS01 through IR67-SS08) were collected from ground surface to a depth of 1 foot. Seven subsurface soil samples (designated IR67-IS02 through IR67-IS08) were co-located with the surface soil samples and were collected from a depth of 1 foot bgs to the water table, or a maximum depth of 4 feet bgs. A subsurface soil sample was not collected at IR67-IS01, as the water table was encountered at a depth of 1.5 feet bgs. **Table 3-1** provides a summary of the sample intervals for each soil sample.

Soil cuttings collected at each sample interval were homogenized in a stainless steel bowl prior to filling the laboratory sample containers. Soil types encountered were classified according to the Unified Soil Classification System (USCS). Additionally, the headspace of each soil sample was monitored with a MultiRAE® gas detector.

All sample containers were labeled, packed on ice in a cooler, and shipped, under chain-of-custody control, via overnight delivery to Empirical Laboratories in Nashville, Tennessee, a North Carolina-certified, Navy-approved laboratory. The soil samples were analyzed using USEPA Method 8330 for the following explosives residues:

- 2,4,6-TNT
- 4-Amino-2,6-Dinitrotoluene (DNT)
- 2-Amino-4,6-DNT

3.1.3 Groundwater Sampling

Groundwater sample locations were placed throughout the investigation area as the exact location of the former TNT burn pits is unknown. Shallow groundwater samples were co-located with the surface and subsurface soil samples. Each sample location was cleared by a UXO Technician with a downhole magnetometer at 1-foot increments. The UXO Technician observed the cuttings generated from the hand auger for evidence of unburned TNT and other hazards. Due to the shallow depth to groundwater, groundwater samples were collected from new, 1-inch diameter, 0.010-inch slot, PVC well screens that were installed in the hand auger holes. Groundwater samples were collected at depths ranging from 1.5 to 8 feet bgs. **Table 3-1** provides a summary of the sample intervals for each groundwater sample. Groundwater samples were collected at the 3 locations shown on **Figure 3-1**.

Groundwater sampling was conducted in accordance with the Work Plan and Navy CLEAN standard operating procedures (SOPs). Prior to sampling, new polyethylene tubing was advanced down each monitoring well to the middle of the screened zone and groundwater was purged at a low-flow rate (0.3 to 0.5 liters per minute [L/min]) using a peristaltic pump. Groundwater samples were collected from sampling locations after purging approximately three well volumes and turbidity had visually cleared. Following

sample collection the PVC casing and screen were removed and the boreholes were backfilled with soil cuttings.

All groundwater samples were collected in appropriate laboratory-supplied sample containers. All sample containers were labeled, packed on ice in a cooler, and shipped, under chain-of-custody control, via overnight delivery to Empirical Laboratories, Inc. Samples were analyzed by a fixed-base laboratory using USEPA Method 8330 for the following explosives residue compounds:

- 2,4,6-TNT
- 4-Amino-2,6-DNT
- 2-Amino-4,6-DNT

3.2 Data Tracking and Validation

Sample and analytical data were managed and tracked from the time of field collection to receipt of validated electronic analytical results to ensure the quality of the analytical results. Field samples and their corresponding analytical tests were recorded on chain-of-custody forms for submission to the laboratory. Upon receipt of the samples by the laboratory, a chain-of-custody comparison was performed to ensure that each sample was to be analyzed for the correct parameters. In addition, a check was made to ensure that the correct number of quality assurance/control (QA/QC) samples was collected for each medium. QA/QC samples included field blanks, equipment rinsate blanks, field duplicates, matrix spike/matrix spike duplicate (MS/MSD) samples, and laboratory blanks.

Analytical data reports were submitted to CH2M HILL by Empirical Laboratories in hard copy and electronic versions. The electronic data submittals were specifically formatted for uploading into the Naval Installation Restoration Information Solution (NIRIS) database. Data reports were submitted to Environmental Data Quality, Incorporated for third party validation. Validation procedures established by the National Functional Guidelines for Organic and Inorganic Analyses (USEPA, 1999; 2004), as modified by Region III, were adhered to during the validation process. The data validation summary report is provided in **Appendix C**.

3.3 Investigation-derived Waste Management

Investigation-derived waste (IDW) generated during this field event consisted of soil cuttings from hand augering, purge water, decontamination fluids, and disposable equipment. Soil IDW was placed back into the borehole from which it was removed; purge water and decontamination fluids were containerized in a 55-gallon Department of Transportation-approved steel drum and stored at the temporary holding facility on Parachute Tower Road. A representative sample of the liquid IDW was analyzed to evaluate disposal options. The IDW was subsequently disposed of at an approved offsite disposal facility. Disposable equipment items, such as personal protective equipment, poly sheeting, and paper towels were disposed of in a MCB CamLej trash receptacle.

TABLE 3-1

Sample Depth Intervals
Site 67 Confirmatory Sampling Report
MCB CamLej, North Carolina

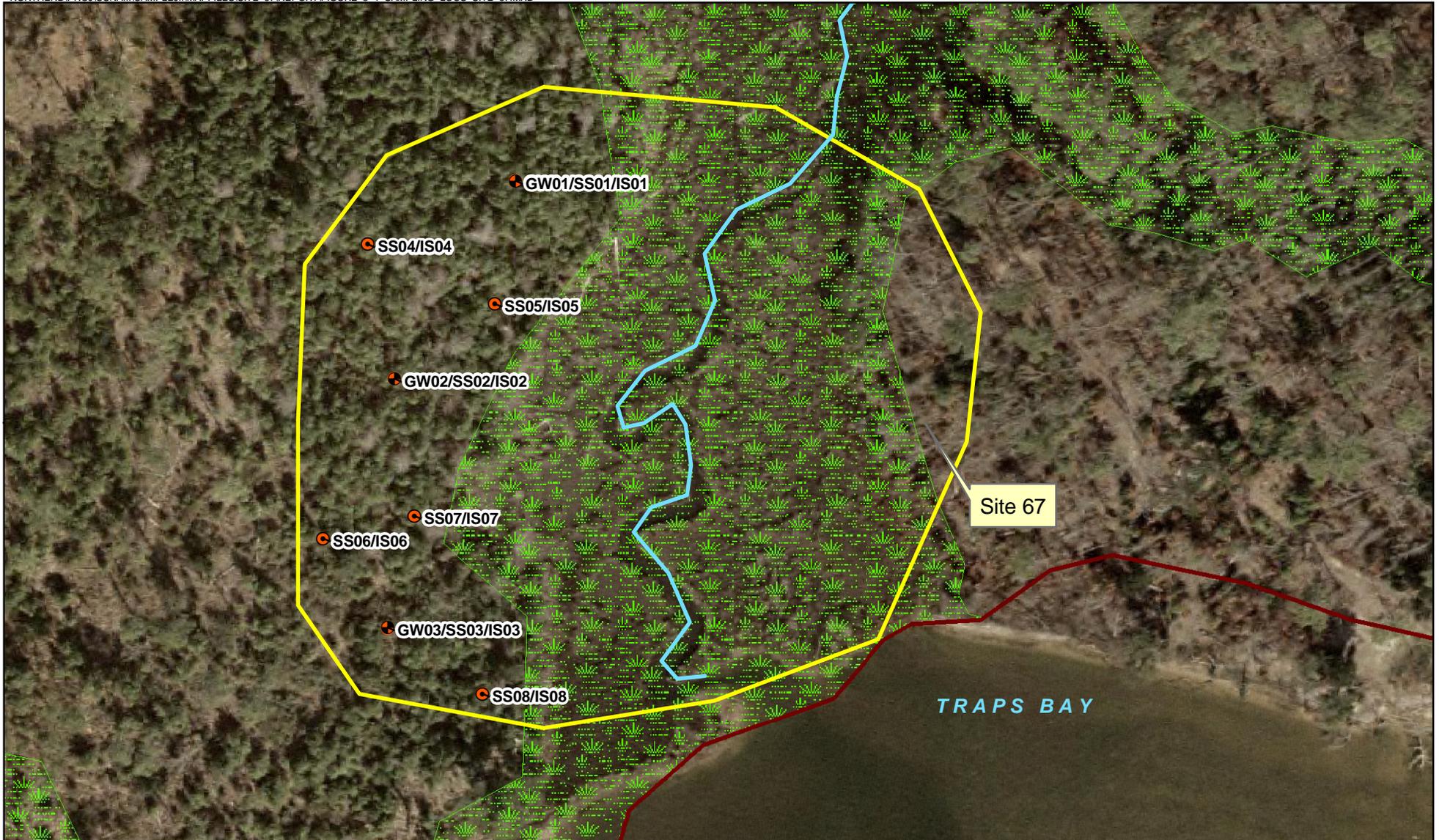
Media	Sample ID	Sample Interval (ft bgs)
Surface Soil	IR67-SS01-0-1.5-10A	0 to 1.5
	IR67-SS02-0-1-10A	0 to 1
	IR67-SS03-0-1-10A	0 to 1
	IR67-SS04-0-1-10A	0 to 1
	IR67-SS05-0-1-10A	0 to 1
	IR67-SS06-0-1-10A	0 to 1
	IR67-SS07-0-1-10A	0 to 1
	IR67-SS08-0-1-10A	0 to 1
Subsurface Soil	IR67-IS02-1-2-10A	1 to 2
	IR67-IS03-1-4-10A	1 to 4
	IR67-IS04-1-3-10A	1 to 3
	IR67-IS05-1-2-10A	1 to 2
	IR67-IS06-1-4-10A	1 to 4
	IR67-IS07-1-4-10A	1 to 4
	IR67-IS08-1-3-10A	1 to 3
Groundwater	IR67-GW01-10A	1.5 to 4
	IR67-GW02-10A	2 to 4.5
	IR67-GW03-10A	7 to 8

Notes:

ft bgs - feet below ground surface

Generated by: *Jeremy Diner*

Checked by: *Renee Clore*



Legend

-  Surface and Subsurface Soil Sampling Location
-  Surface and Subsurface Soil/Groundwater Sampling Location
-  Creek
-  Site 67
-  Installation Boundary
-  Jurisdictional Wetlands

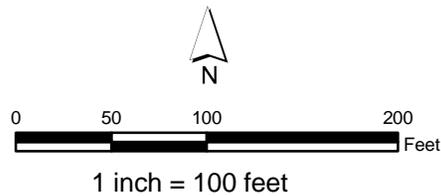


Figure 3-1
Sampling Locations
Site 67 Confirmatory Sampling Report
MCB CamLej
North Carolina



Confirmatory Sampling Results

This section summarizes the analytical results of the Site 67 environmental sampling effort conducted in February 2010. A discussion of analytical results with regard to ecological and human health screening criteria is also presented.

4.1 Surface and Subsurface Soil

The laboratory analysis of the surface and subsurface soil samples collected from Site 67 did not report the presence of the target explosive residues. Since explosives residues were not detected, ecological and human health risk screenings were not performed for these media.

4.2 Groundwater

One target analyte, 2-Amino-4,6-DNT, was detected in one groundwater sample, collected from IR67-GW02 at a concentration of 0.0793 J micrograms per liter ($\mu\text{g}/\text{L}$). No other detections were reported for the other samples collected. This lone detection was compared to North Carolina Groundwater Quality Standards (NCGWQS) (NCDENR, 2010), the USEPA Adjusted Tapwater RSLs (USEPA, 2010), and ecological screening values (TCEQ, 2006). The detected concentration of 2-Amino-4,6-DNT is less than human health and ecological screening criteria. Analytical results are presented in **Table 4-1** and **Figure 4-1**. Since the detection of explosive residue occurred in only one groundwater sample at a concentration less than screening criteria, ecological and human health risk screenings were not performed for this media.

TABLE 4-1

Groundwater Analytical Results
 Site 67 Confirmatory Sampling Report
 MCB CamLej, North Carolina

Station ID	Camp Lejeune Background GW 2X Mean	CLEAN NCGWQS (January, 2010)	Adjusted Tapwater RSLs (May, 2010)	IR67-SO01/GW01		IR67-SO02/GW02	IR67-SO03/GW03
				IR67-GW01-10A	IR67-GW01D-10A	IR67-GW02-10A	IR67-GW03-10A
Sample ID							
Sample Date				02/23/10	02/23/10	02/23/10	02/23/10
Chemical Name							
Explosives (µg/l)							
2-Amino-4,6-dinitrotoluene	--	--	7.3	0.224 U	0.222 U	0.0793 J	0.226 U

Notes:

J - Analyte present. Value may be biased low. Value may be higher

U - The material was analyzed for, but not detected

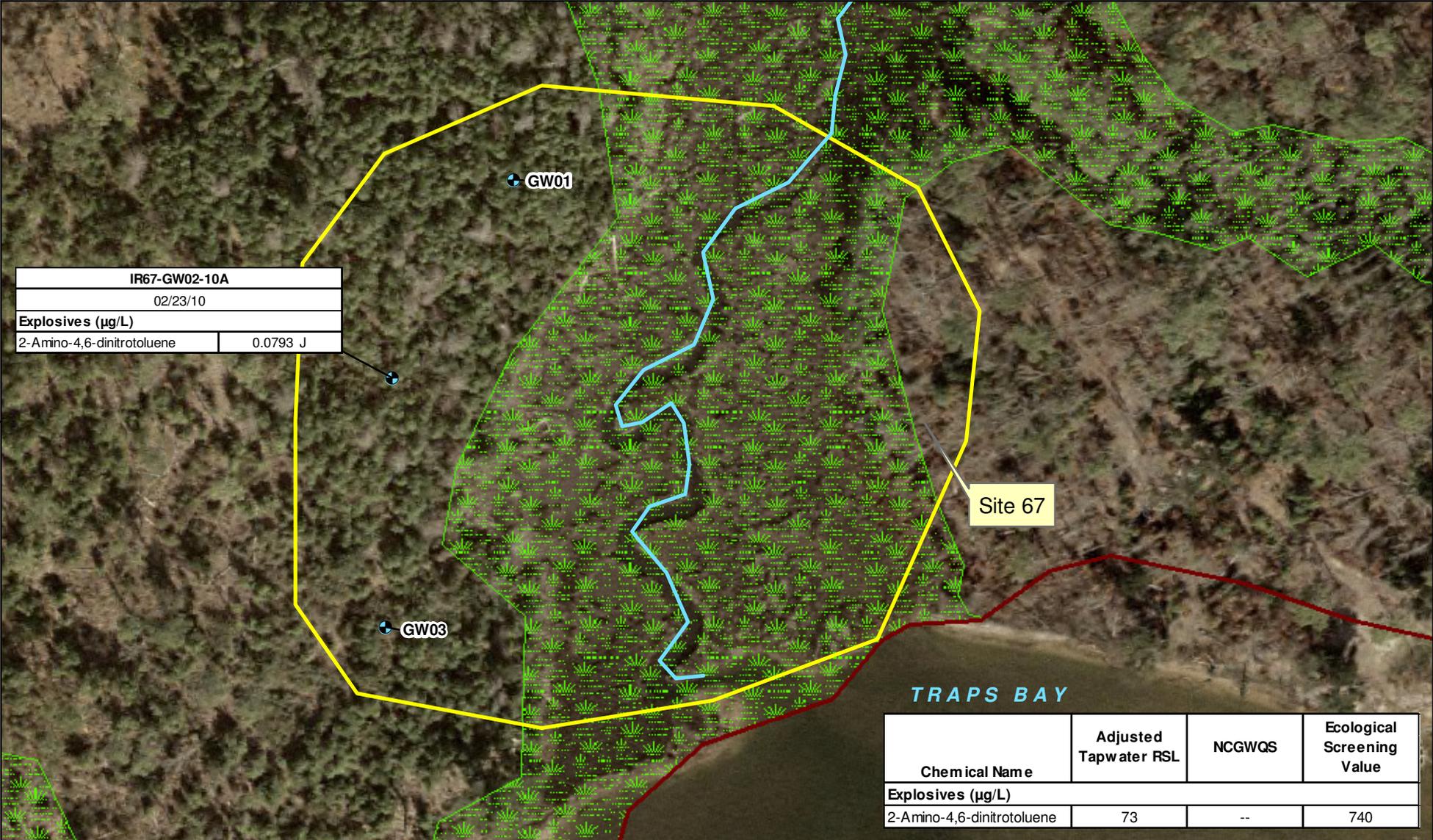
µg/L - Micrograms per liter

NCGWQS - North Carolina Groundwater Quality Standards

RSL - Regional Screening Levels

Generated by: *Jeremy Diner*

Checked by: *Renee Clore*



IR67-GW02-10A	
02/23/10	
Explosives (µg/L)	
2-Amino-4,6-dinitrotoluene	0.0793 J

Chemical Name	Adjusted Tapwater RSL	NCGWQS	Ecological Screening Value
Explosives (µg/L)			
2-Amino-4,6-dinitrotoluene	73	--	740

- Legend**
- Groundwater Sampling Location
 - Creek
 - Site 67
 - Installation Boundary
 - Jurisdictional Wetlands

Notes:
 No analytes were detected in exceedance of screening criteria in groundwater during this investigation
 J - Analyte present. Value may be biased low. Value may be higher
 µg/L - micrograms per liter

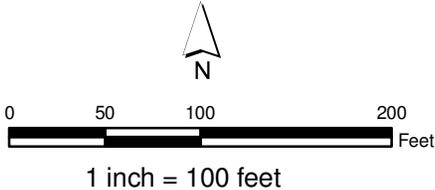


Figure 4-1
 Groundwater Sampling Results
 Site 67 Confirmatory Sampling Report
 MCB CamLej
 North Carolina



Conclusions and Recommendations

Confirmatory sampling was conducted at Site 67 to evaluate the potential presence and nature of environmental contamination that may have resulted from historical TNT burning activities, and to determine if additional investigation or remediation was warranted. The persistence of TNT in the environment depends on a variety of factors including the presence of solid TNT residues, dissolution into the soil/ water matrix, and subsequent degradation in these environmental media.

The IAS at Site 67 indicated that the TNT disposal practices in 1951 included burning of TNT in pits, a process that was reported to result in complete consumption of TNT. The exact location of the TNT burn pits was not identified in historical site documentation; therefore, confirmatory sampling locations were based on site topography and a review of historical aerial photographs. Site conditions and soil cuttings were examined for evidence of unburned TNT and other hazards and none was observed. These observations are consistent both with the initial study reporting complete consumption of TNT and the fact that TNT degrades very rapidly when ignited, i.e. the deflagration from the addition of oxygen in the presence of a heat source. Additionally, reported half-lives of dissolved TNT released to soil range from approximately 12-120 days (Brannon, 1999). Significant attenuation of any trace residual TNT in soils would be expected given that over 50 years have passed since the disposal activities took place.

Considering that none of the target analytes were detected during field screening or fixed-base laboratory analysis of surface and subsurface soil samples and the single detection of 2-Amino-4,6-DNT reported in a groundwater sample was less than human health and ecological screening values, it appears that historical activities have had no significant residual impact on the environment. For these reasons, no further environmental investigation of Site 67 is recommended.

Regulatory concurrence for this document is presented in **Appendix D**.

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Appendix A
Archival Records Search Report

Draft

Archival Records Search Report for Confirmatory Sampling at Site 67 Engineer's TNT Burn Site

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

Contract Task Order 0040

October 2009

Prepared for

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

Under the

**NAVFAC CLEAN 1000 Program
Contract N62470-08-D-1000**

Prepared by



CH2MHILL

Charlotte, North Carolina

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Attachments

A	Resource Review Summary
B	Historical Maps and Photos

Acronyms and Abbreviations

ARSR	Archival Records Search Report
ASCS	Agricultural Stabilization and Conservation Service
ASR	Archive Search Report
ETA	Engineer Training Area
GIS	Geographic Information System
IAS	Initial Assessment Study
MC	Munitions constituents
MCB	Marine Corps Base
MEC	munitions and explosives of concern
TNT	2,4,6-trinitrotoluene
USACE	United States Army Corps of Engineers
USMC	United States Marine Corps
WWII	World War II

Introduction

This archive records review was completed in support of confirmatory sampling at Site 67, the Engineer's 2,4,6-trinitrotoluene (TNT) Burn Site, first identified in the 1983 base wide Initial Assessment Study (IAS) and hereafter referred to as Site 67. Site 67 is comprised of approximately 4 acres of land located immediately north of Traps Bay near the southern boundary of Marine Corps Base (MCB) Camp Lejeune (**Figure 1-1**). The purpose of confirmatory sampling at Site 67 is to verify the presence of hazardous wastes, munitions constituents (MC), and munitions and explosives of concern (MEC) and assess the potential for impacts to human health and the environment.

1.1 Objective

This Archival Records Search Report (ARSR) is an investigative review of existing information about the site and its surrounding area, with an emphasis on obtaining information from personnel and historical resources that might indicate the potential presence of hazards to human health or the environment.

1.2 Scope

This ARSR includes a review of existing information relating to the site and the surrounding areas. The scope of the report includes a review of existing historical information (including MCB Camp Lejeune maps, drawings, and reports, and interviews with Base personnel).

A summary of the resources identified and reviewed during the preparation of this ARSR is provided in **Attachment A**, and includes a detailed list of aerial and Base photographs, historical maps and records, and current Base records reviewed at Gray Research Center on MCB Quantico, Virginia, the National Archives at College Park, Maryland, and at MCB Camp Lejeune.

Primary cartographic references used in ARSRs include:

- Existing Conditions Maps, provided by the MCB Camp Lejeune Public Works Office, showing buildings, roads, and some utilities at MCB Camp Lejeune
- Range Overlay Maps, found in the *Range Identification Preliminary Range Assessment* (USACE, 2001), which show historical ranges at MCB Camp Lejeune
- Aerial imagery, provided by the MCB Camp Lejeune Geographic Information System (GIS), showing an aerial view of MCB Camp Lejeune for the years 1938, 1956, 1962, 1989 and 2004.



- Legend**
- Highways
 - Site 67 Boundary
 - Installation Boundary

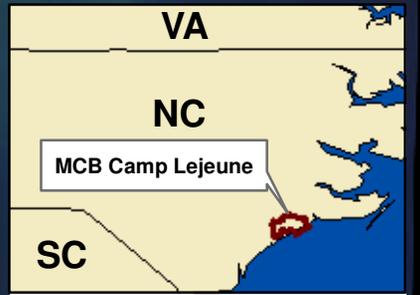
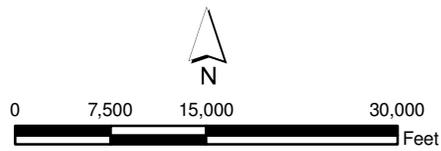


Figure 1-1
Site Location Map
Site 67 Archival Records Search Report
MCB Camp Lejeune
North Carolina



Site Information

2.1 Facility Information

MCB Camp Lejeune is located on the Atlantic coast in Onslow County, North Carolina. The city of Jacksonville, North Carolina, is the principal support community for the Base. MCB Camp Lejeune occupies 153,000 acres including more than 450 miles of roads, approximately 6,800 buildings and facilities, and 14 miles of beach on the Atlantic Ocean. Approximately 14,000 acres of land have been developed for administrative, maintenance, logistics and personnel support facilities. Originally established in 1941, the Base is home to Marine Expeditionary Force units and includes six major Marine Corps commands, two Navy commands, one Coast Guard command, and is home to several Marine Corps Formal schools. MCB Camp Lejeune supports a total population of approximately 150,000 people, including active duty military and dependants, retirees, and civilian employees (Global Security Website, 2008).

2.2 Ownership History

The history of the land now occupied by MCB Camp Lejeune is documented primarily through land records and maps. Following the start of World War II (WWII), the War Department began purchasing tracts of land in 1941 from local residents to meet the need for an East Coast amphibious training facility. Prior to occupation by the Marine Corps, the land had been occupied by white and African-American communities and farms since the Colonial era. The land contained plantation houses, cabins, farm buildings, tobacco barns, stores, and various cemeteries (Global Security Website, 2008).

The initial land transferred to the government was acquired in 14 separate transactions between April and October 1941 and totaled 173.8 square miles or 111,155 acres (85,155 acres of land and 26,000 acres under water) (Loftfield, 1981; Louis Berger Group, 2002). The individual tracts of land were grouped into various “areas” for consolidation. The facility was initially referred to as the Marine Barracks New River, which was changed to MCB Camp Lejeune in 1942 (Global Security Website, 2008).

Site 67 is located within land acquisition Area I, the Traps Bay area, which is bounded to the southeast by the New River, to the southwest by the Atlantic Ocean, to the northeast by Gillette Creek and to the northwest by arbitrary property boundaries. Area I consists of 93 tracts of land acquired by the government in 1941 from area landowners (**Figure 2-1**)

2.3 Operational History

The estimated area of Site 67 is 4 acres located just north of Traps Bay on an unnamed creek to the east of India Range Road as shown on **Figure 2-2**. The site boundary is based on a description provided in the Initial Assessment Study (IAS) of the location of the TNT Burn

Site as being “200 meters southeast of Building SBB-159 and about 50 feet away from the water” (Water and Air Research, 1983). Based on the current aerial imagery, the area is heavily vegetated and a large portion is classified as jurisdictional wetland.

The earliest available historical record of the Traps Bay area is an aerial image from 1938 (**Figure 2-3**), before the land was purchased for MCB Camp Lejeune. The cleared area currently in use by the Engineer School, encroaching on the western portion of Site 67, appears to have been cultivated land prior to Base use (ASCS, 1938).

Based on available information, the Traps Bay area of MCB Camp Lejeune has been in use since the late 1940's by the Engineer School for various training operations including firing ranges and demolitions. Site 67 was identified in a base wide IAS as the Engineer's TNT Burn Site, used for TNT disposal in 1951. The study states that within a one acre area “2- to 3-foot pits were dug and unwanted TNT was opened and burned. Complete consumption of all TNT was reported during these procedures” (Water and Air Research, 1983). During the course of this archival records review, a number of resources were identified discussing range and demolition use in the immediate area of Site 67; however the only direct reference to Site 67 or the Engineer's TNT burn site was found in the IAS. According to a former Range Safety Officer, it is likely that any such TNT burn site would have been located near a road (Redmond, 2009) for easy access.

The primary source of range information for the Site 67 area is the *Range Identification Preliminary Range Assessment* (USACE, 2001). Based on cartographic references, four historic ranges (the Engineer Firing Range (Engineer School Range 1), Engineer Demolition Area I-1, I-2 Demolition Area, and Firing Position 24, **Figure 2-4**) and one active range (Engineer Training Area 1D [ETA-1D]) appear to overlap Site 67 (**Figure 2-5**).

Several sources refer to the Engineer School demolition course area, located in the vicinity of Site 67, being used from approximately 1946 to the present. Although specific locations are not always provided in documents such as training directives and letters to the Commandant, several cartographic references indicate that the Traps Bay area was used primarily for demolitions training during this time. Additional munitions use was also reported in the area which included the following items:

- 2.36-inch anti-tank rockets
- Rifle grenades
- Flamethrowers
- Antitank mines
- Claymore mines
- Mine clearing line charges
- Bangalore torpedoes

2.3.1 Engineer Firing Range (Engineer School Range 1)

The first known use of the Traps Bay area, which includes Site 67, by MCB Camp Lejeune was the Engineer Firing Range as known as Engineer School Range 1 (Archives Search Report Number 2.39 [ASR 2.39]) identified in the *Range Identification Preliminary Range Assessment*. The range appears on the 1946 range overlay map identified as the Engineer Firing Range (**Figure 2-6**). According to the *Range Identification Preliminary Range Assessment*,

the range was used in 1947. Camp General Order Number 5-1946 authorized the use of anti-tank and rocket grenades, demolitions, and flame throwers. The *Range Identification Preliminary Range Assessment* report states that as of February 2000, specific munitions safety issues associated with Engineer Firing Range (Engineer School Range 1) are “anti-tank munitions containing sensitive fuzing and present a significantly increased hazard area forward of the munition” (USACE, 2001). It is assumed that the entire range area shown on **Figure 2-6** is potentially impacted by this former range. The range boundary completely encompasses Site 67.

The *Range Identification Preliminary Range Assessment* identified the following types of munitions and fuzing used on Engineer Firing Range (Engineer School Range 1):

- Rifle grenade (Fuzing: base detonating)
- Rocket, 2.36", anti-tank (Fuzing: base detonating)
- Demolition materials (Fuzing: electric and non-electric firing systems)
- Flame throwers (no fuzing).

2.3.2 Engineer Demolition Area I-1

In a 1947 historical range map, the Engineer Demolition Area I-1 (**Figure 2-7**) appears to correspond with the 1946 Engineer Firing Range (Engineer School Range 1) from **Figure 2-4**. There is no cartographic record indicating the Engineer Demolition Area I-1 was in use after 1947; however several references indicate that a demolitions course was being taught by the Engineer School (which includes the entire area from Courthouse Bay to Traps Bay). Due to the documented continued use of the surrounding areas for demolition (see I-2 Demolition Area discussion below), it is assumed that demolitions activities for the Engineer School occurred in the Engineer Demolition Area I-1 after 1947.

A 1949 aerial photograph (**Figure 2-8**) shows a cleared area west of the Site 67 boundary in the same location as the cultivated areas shown in the 1938 aerial (ASCS, 1949). The total cleared area appears smaller, indicating that vegetation encroachment had occurred. There is a small cleared area in the western portion of Site 67. No buildings are visible on this photo.

A letter to Headquarters Marine Corps, dated December 1, 1949 (MCB Camp Lejeune, 1949a), lists the following proposed explosive allowance for calendar year 1950 for the Engineer School at MCB Camp Lejeune:

- Cap, blasting, special, electric (type 11) - 1,350
- Cap, blasting, special, non-electric (type 1) - 1,350
- Charge, shaped, M-3 - 36
- Cord, detonating, 500' spools - 72
- Dynamite, Nitroglycerine, gelatine dynamite 40% - 270 lb
- Explosive, Composition C-3 - 3,000 lb
- Explosive, TNT, Rectangular, 1-lb block - 3,000 lb
- Fire crackers, Mark 2 Model Q (ordnance item) - 800
- Fuse, blasting, time - 13,500 ft
- Lighter, fuse, friction type M-1 - 500
- Lighter, fuse, weatherproof, M-2 - 2,000

- Torpedo, Bangalore - 36
- Firing device, pull friction type M-2 - 200
- Firing device, pressure type, M1A1 w/extension - 200.

According to a 1949 letter to the Commandant regarding the training syllabi for the Engineer School at MCB Camp Lejeune, the demolitions course was part of the Basic Construction Course. The course description includes “characteristics of explosives; safety precautions; handling and storage; demolition equipment; placement of charges; preparation and firing” (MCB Camp Lejeune, 1949b).

Later, in 1956, a Training Directive from Headquarters Marine Corps indicated that the demolitions course was part of the Construction Foreman Course at the Engineer School at MCB Camp Lejeune (USMC, 1956). In a 1956 aerial photograph the site appears to be wooded (**Figure 2-9**). See Section 2.3.4 for continued use of the area known as Engineer Demolition Area I-1 past 1956.

2.3.3 Firing Position 24

According to the *Range Identification Preliminary Range Assessment* report, Firing Position 24 was an artillery firing position (several firing positions are referenced in the report under ASR #2.212). The report references a September 25, 1976 map (**Figure 2-10**) for the location of Firing Position 24, the type of weapon used and direction of fire was unspecified. The report indicated that “at a firing point, only items like unused propellant charges and supplemental charges will be found” (USACE, 2001).

2.3.4 I-2 Demolition Area

The I-2 Demolition Area (ASR 2.125) is shown on the 1987 Range Overlay Map (**Figure 2-6**). According to the *Range Identification Preliminary Range Assessment*, the range was used from 1960 to approximately 1988. Base Order Number 11102.1B, dated May 5, 1960, identified the I-2 Demolitions Area as being located in the Traps Bay area (USACE, 2001). The I-2 Demolition Area was used to train engineers on assembly and initiating of charges and may also have contained TNT burn sites (Redmond, 2009). Prior to 1960, this area was known as the Engineer Demolition Area I-1, Section 2.3.2.

The 1962 aerial imagery (**Figure 2-11**) shows a road and clearing along the western boundary of Site 67. The cleared area indicates that Site 67 was likely in use during this time period. Several of the cleared areas northeast of the Site 67 correspond with buildings on current aerial imagery (**Figure 2-1**).

Existing conditions maps as early as 1963 (**Figure 2-12**) to the latest available existing conditions map in 2005 (**Figure 2-5**) show a road leading to several buildings within the I-2 Demolitions Area. Most of the buildings are labeled as applied teaching facilities or magazines in the 1963 map. These buildings also appear on aerial imagery for 1989 and 2004. The closest buildings to Site 67 currently, are approximately 750 feet to the west and are associated with the I-2 Demolition Area to the west. The two closest buildings (SBB158 and SBB159) are both used for explosive storage and several other buildings in the area are used as armories and explosive/flammable storage (CH2M HILL, 2009).

In February 1970, Base Order Number P11102.1G authorized the use of demolitions and land mines on the range, not to exceed 50 pounds net TNT equivalent per shot (USACE, 2001). Base Order Number P11102.1K in December 1986 authorized the use of M68A1 (inert) tank cannons (USACE, 2001).

By 1989, the area inside Site 67 appears overgrown and no longer in use (**Figure 2-13**). The cleared area (labeled as ETA-1 in **Figure 2-4**) is in roughly the same location as it appears today.

According to the *Range Identification Preliminary Range Assessment* types of munitions and fuzing used in the I-2 Demolition Area were:

- Demolitions (Fuzing: electric and non-electric firing systems)
- Land Mines (Fuzing: Integral)
- M68A1 (no fuzing).

The I-2 Demolitions Area encompasses the entirety of Site 67.

2.3.5 ETA-1, Engineering Training Area (MCES)

ETA-1, Engineering Training Area (ASR 2.185), hereafter referred to as ETA-1, appears on the 1993 Range Overlay Map (**Figure 2-6**). The training area does not appear to overlap Site 67, however on a later Existing Conditions Map from 2005 (**Figure 2-5**), it appears that ETA-1 was split into ETA-1A, ETA-1B, ETA-1C, and ETA-1D, all of which are classified as military live firing ranges (MCB Camp Lejeune, 2005). ETA-1D is the only range that encompasses a portion of Site 67; it is an active demolitions range (Richardson, 2009c). ETA-1, depicted in the cleared area on **Figure 2-4**, is currently used as a demolitions area by the Engineer School which may restrict access to Site 67 during training exercises (Richardson, 2009a). The Engineer School uses the full range of explosives and demolitions in the ETA-1 area, including ETA-1D, with a limited net explosive weight (Richardson, 2009b). According to Base Order P3570.1B, dated October 17, 2006, the primary function of ETA-1 is demolitions training for the Marine Corps Engineering School (MCES) (MCB Camp Lejeune, 2006).

There are reports that, starting around 1973, the cleared land near Site 67 was used for line charge training using a live rocket motor and an inert line charge (Redmond, 2009). This system consisted of an M353 three and half ton or M200A1 two and half ton trailer (or M200 tracked trailer) chassis, a launcher assembly, M147 firing kit M58A3 line charge and a 5-inch MK22 Mod 4 rocket. The line charge was 350 feet long and contains 5 pounds per linear foot of composition C-4 explosive. Engineer units employ the mine clearing line charge (MICLIC) in response to minefield breaching requirements identified by the maneuver forces. The MICLIC's trailers are then towed to the selected area where an engineer prepares the line for firing. Once it is detonated, it clears a lane measuring 8 meters by 100 meters (Redmond, 2009).

According to the *Range Identification Preliminary Range Assessment*, ETA-1 has been in use from 1994 to present. Base Order P3570.1 in June 1994 authorized the following: "Charges are not to exceed 50 lbs net TNT equivalency per shot. Live land mines authorized for demonstration purposes. Must be controlled fired. Bangalore Torpedoes require 500M safety for personnel in the open."

Base Order P3570-1B authorizes the following ammunitions for use at ETA-1 (MCB Camp Lejeune, 2006):

- Dynamite
- C-4 Demolition Charges
- TNT Demolition Charges
- Shaped Charges
- Detonation Cord
- Claymore Mine
- Bangalore Torpedo
- Antitank Mines
- Cratering Charge
- Flex Linear
- Deta sheets
- RDX Boosters
- Blasting Caps
- Pyrotechnics
- 12 Gauge Lock Buster Round

Field Expedient Charges: not to exceed 50lbs TNT equivalency, special range request required for use.

- Claymore
- Bangalore Torpedo
- Shaped Charge
- Cratering Charge
- Urban Charge
- Soap Dish/Omni Charge
- Water Charge
- Breaching Charges (as required)

2.4 Previous Site Investigations

The only known environmental study at Site 67 was the 1983 IAS completed by Water and Air Research, Inc. for the Naval Energy and Environmental Support Activity. The purpose of the IAS was to identify and assess sites at MCB Camp Lejeune posing a potential threat to human health and the environment due to contamination from past hazardous materials operations. The study involved historical records and aerial photograph review, field inspections, and personnel interviews. Based on these reviews, Site 67 was not considered an environmental threat and was not recommended for further investigations. No environmental sampling was conducted during this study (Water and Air Research, 1983).

SECTION 3

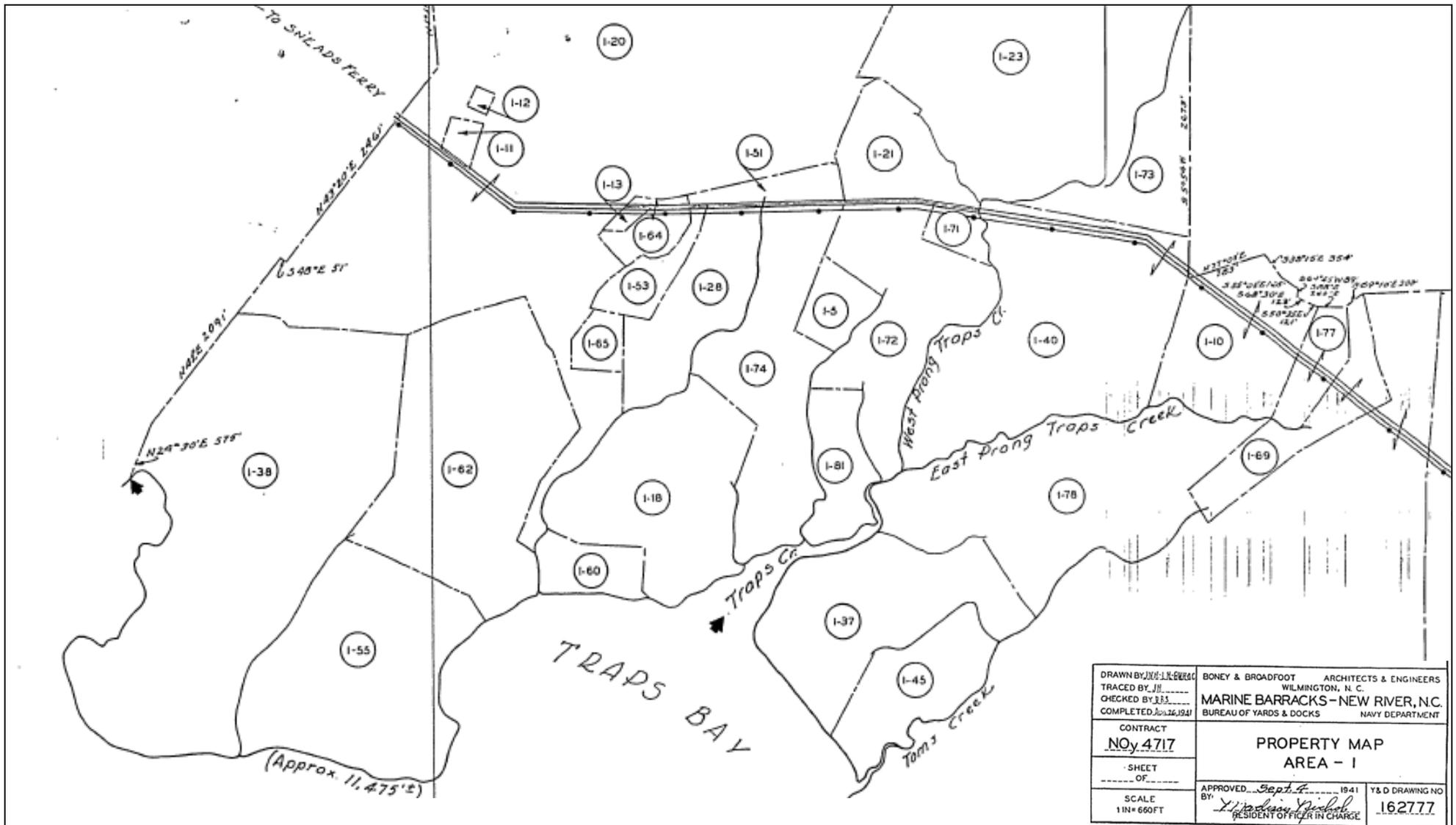
Findings

No historic information was found during this archival records review that specifically references the Site 67 Engineer's TNT Burn Site. However, site documentation indicates that four historic ranges (the Engineer Firing Range, Engineer Demolition Area I-1, I-2 Demolition Area, and Firing Position 24) and one operational range (Engineer Training Area 1D [ETA-1D]) overlap Site 67. The Site 67 area appears to have been in use from 1946 to the present as part of the Engineer training school. Munitions reportedly used at this site between 1946 and the present include:

- Demolitions
- 2.36-inch anti-tank rockets
- Rifle grenades
- Flamethrowers
- Antitank mines
- Claymore mines
- Mine clearing line charges
- Bangalore torpedoes
- Charges (soap dish/omni, flex, shaped, cratering, and urban)
- Deta sheets
- RDX boosters
- Pyrotechnics

Historical maps and aerial photographs dating from 1938 to 2005 were reviewed during the archive search activities. Aerial photographs indicate that Site 67 appears to be heavily wooded with an unnamed creek and wetland areas present in the center of the site. Historical aerials show that the western portion of Site 67 was cleared of vegetation in the late 1940s and early 1960s.

Based on historic site uses, it is assumed that Site 67 may be impacted with MC and MEC. According to the Base Range Control Officer, evidence of demolition activities that may be encountered during site investigation activities include the presence of: Hawks (old steel vehicles), trees with explosive damage, craters, evidence of destroyed bridges over the creek, and small pieces of metal which are electric blasting caps (Richardson, 2009a).



- LEGEND**
- PROPERTY LINES 
 - TRACT NUMBERS 
 - ROADS 
 - POWER LINES 
 - STREAMS 
 - TERMINAL POINTS 
 - BOUNDARY DISTANCES 
 - TRIANGULATION STATIONS 

0 1250 2500

Approximate Scale in Feet



Figure 2-1
 Property Map - Area I (Portion)
 Site 67 Archival Records Search Report
 MCB Camp Lejeune
 North Carolina

Source: Bureau of Yards and Docks, 1941





Legend

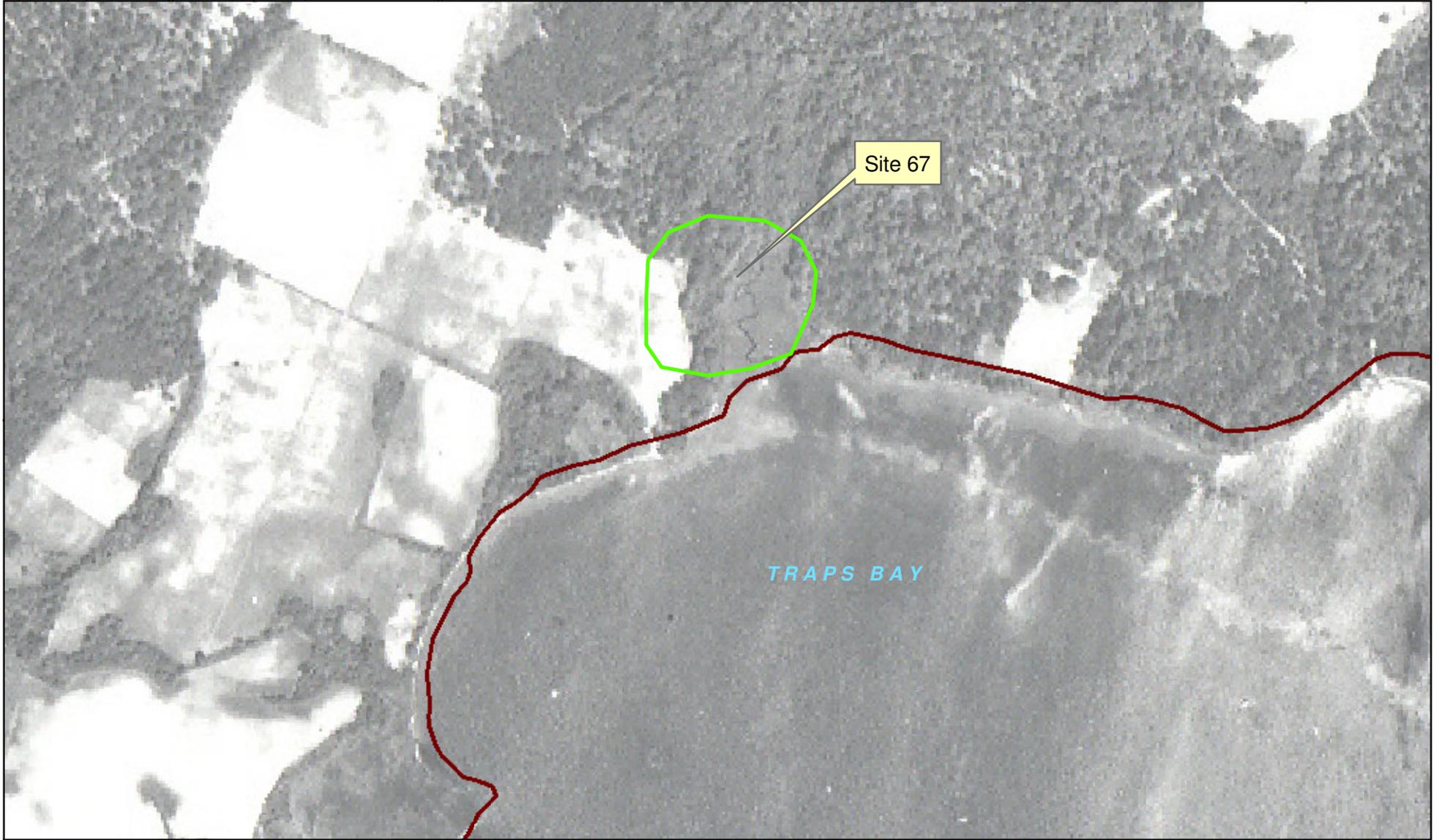
-  Creek
-  Site 67
-  Buildings
-  Installation Boundary
-  Jurisdictional Wetlands



1 inch = 400 feet

Figure 2-2
Site Map
Site 67 Archival Records Search Report
MCB Camp Lejeune
North Carolina





Legend
Site 67
Installation Boundary

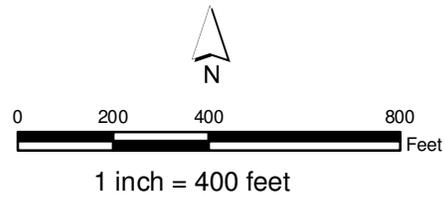
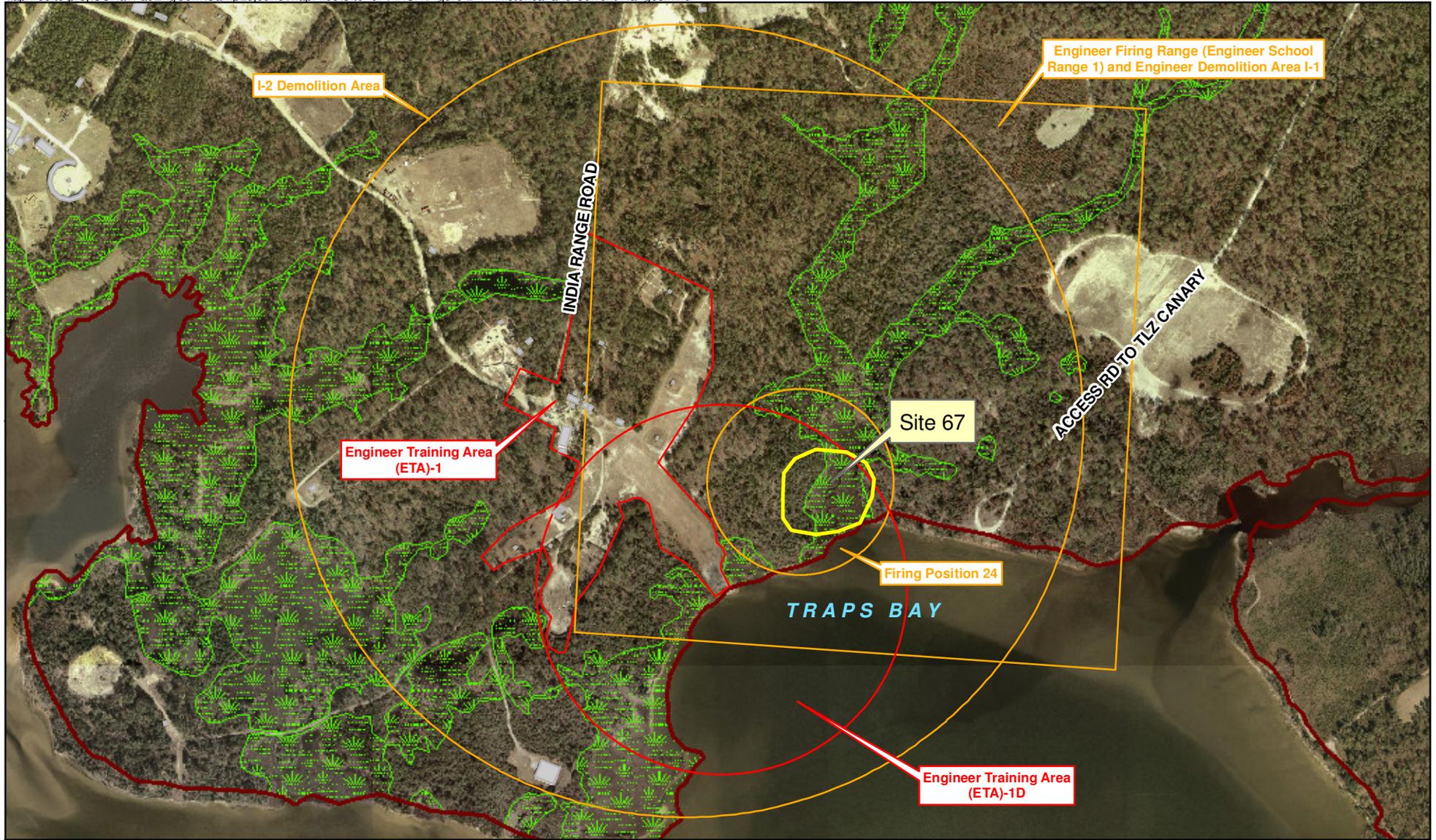


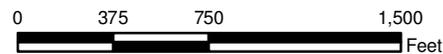
Figure 2-3
Historical Aerial - 1938
Site 67 Archival Records Search Report
MCB Camp Lejeune
North Carolina





Legend

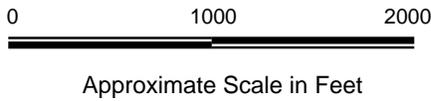
-  Site 67
-  Buildings
-  Operational Ranges
-  Historical Ranges
-  Installation Boundary
-  Jurisdictional Wetlands



1 inch = 750 feet

Figure 2-4
Historical and Current Ranges
Site 67 Archival Records Search Report
MCB Camp Lejeune
North Carolina

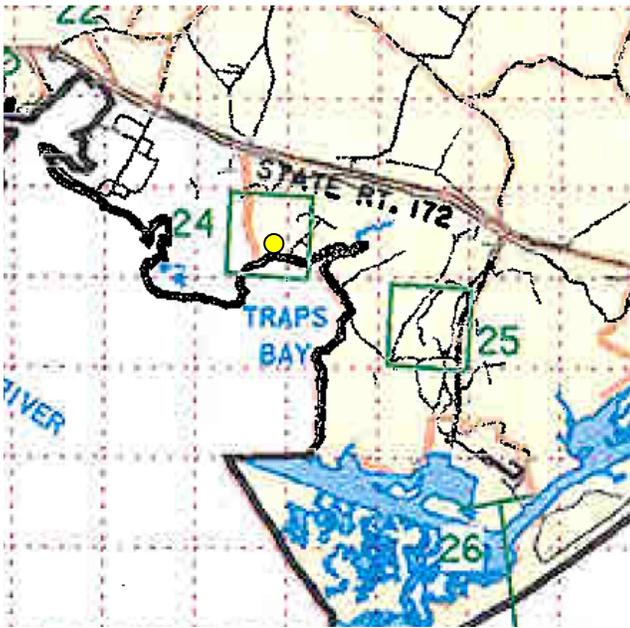




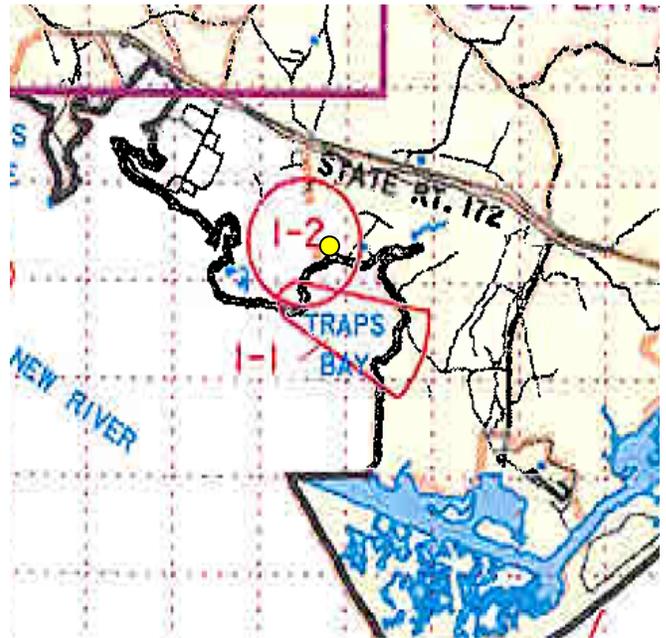
Notes:
Site 67 is not shown because Existing Conditions Maps for the Engineers Area and Courthouse Bay do not extend to Traps Bay

ETA-1A, -1B, -1C, -1D are Military Live Fire Ranges

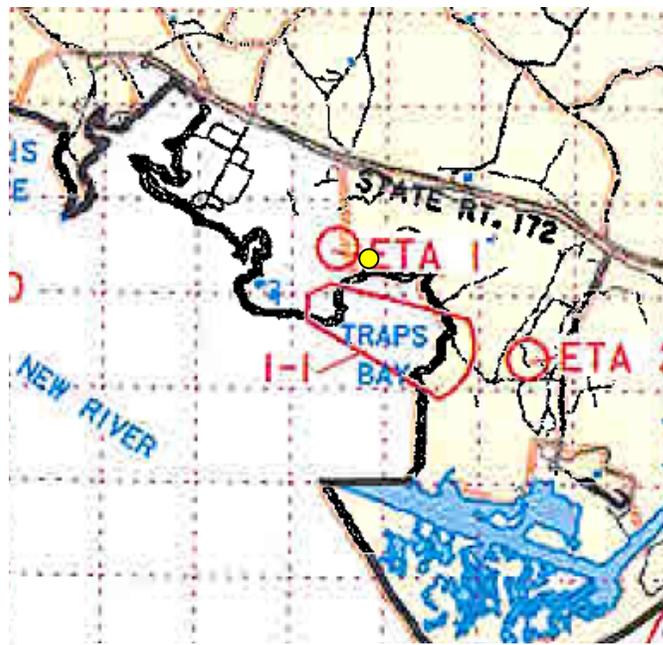
Figure 2-5
Existing Conditions Map – 2005
Site 67 Archival Records Search Report
MCB Camp Lejeune
North Carolina



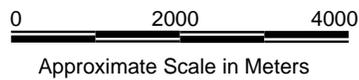
Range Overlay Map – 1946
24 Engineer Firing Area



Range Overlay Map – 1987
I-2 Demolition Area



Range Overlay Map – 1993
ETA 1 Engineer Training Area



● Approximate Location of Site 67

Figure 2-6
Range Overlay Maps
Site 67 Archival Records Search Report
MCB Camp Lejeune
North Carolina



0 1000 2000

Approximate Scale in Feet



Legend

- Engineer Demolition Area I-1
- Approximate Base Boundary
- Approximate Location of Site 67

Figure 2-7
 Historical Map - 1947
 Site 67 Archival Records Search Report
 MCB Camp Lejeune
 North Carolina



0 600 1200

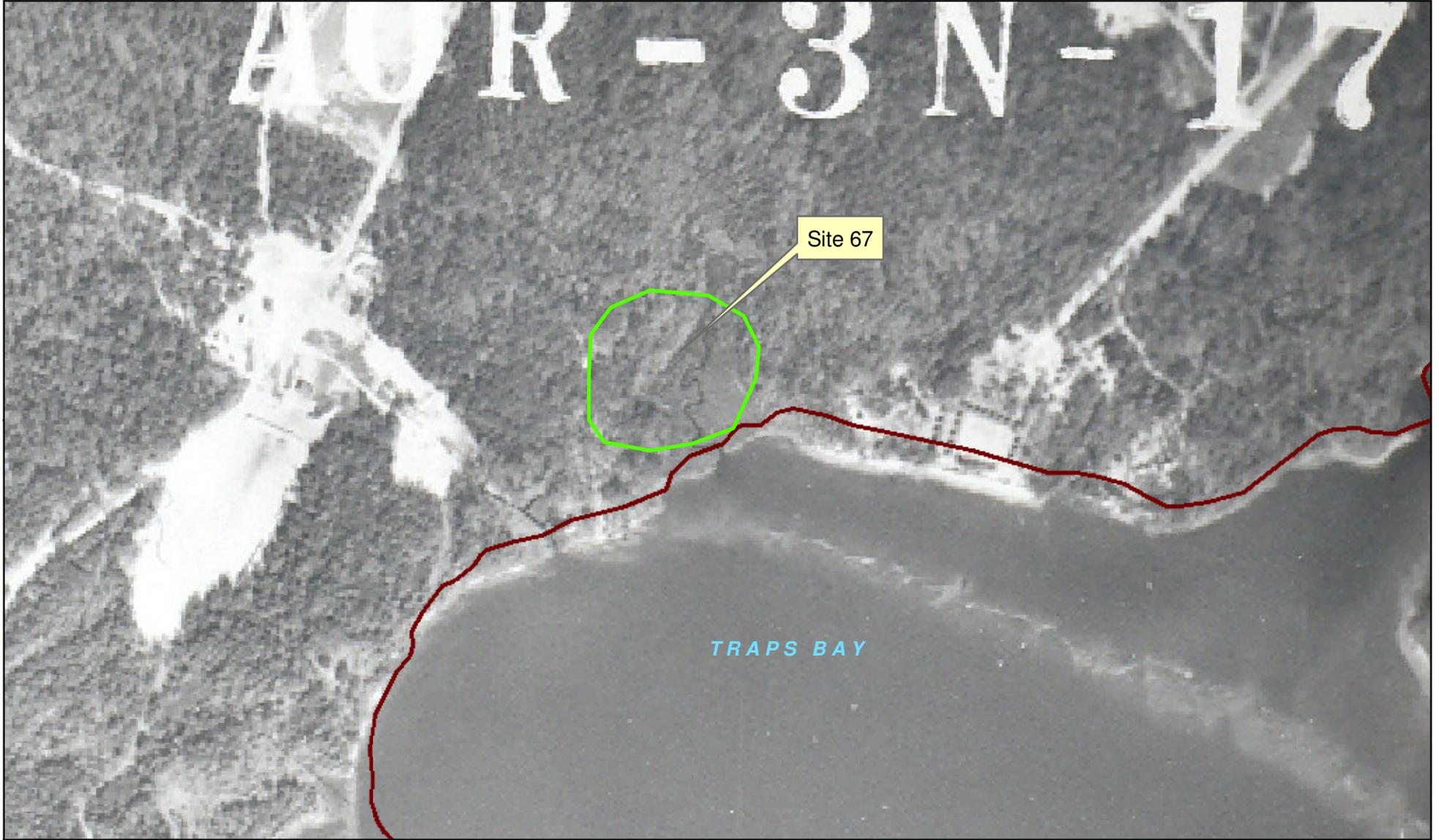


Approximate Scale in Feet



N

Figure 2-8
Historical Aerial - 1949
Site 67 Archival Records Search Report
MCB Camp Lejeune
North Carolina



- Legend**
-  Site 67
 -  Installation Boundary

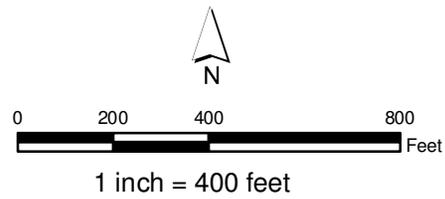
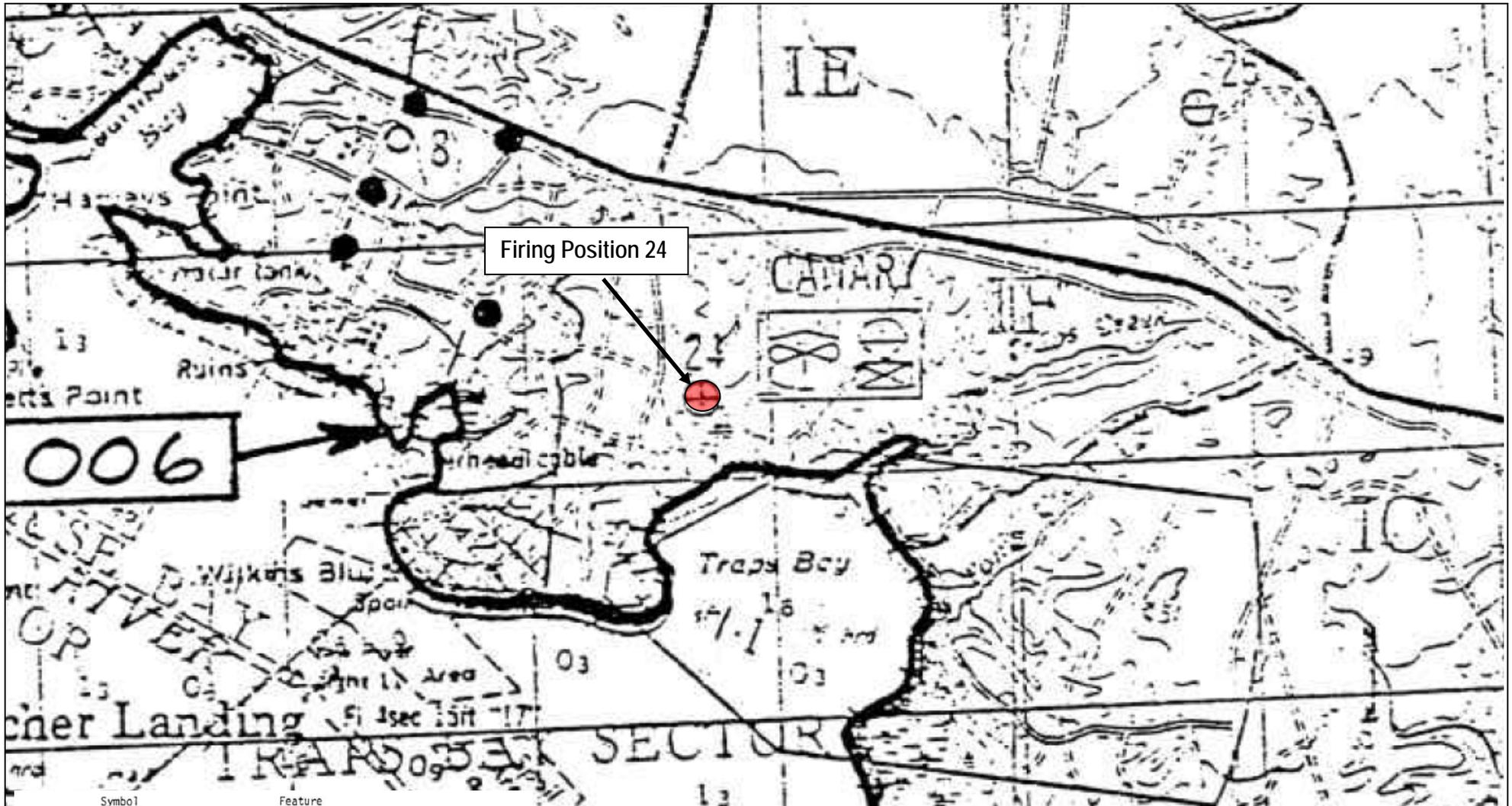


Figure 2-9
Historical Aerial - 1956
Site 67 Archival Records Search Report
MCB Camp Lejeune
North Carolina





Firing Position 24

006

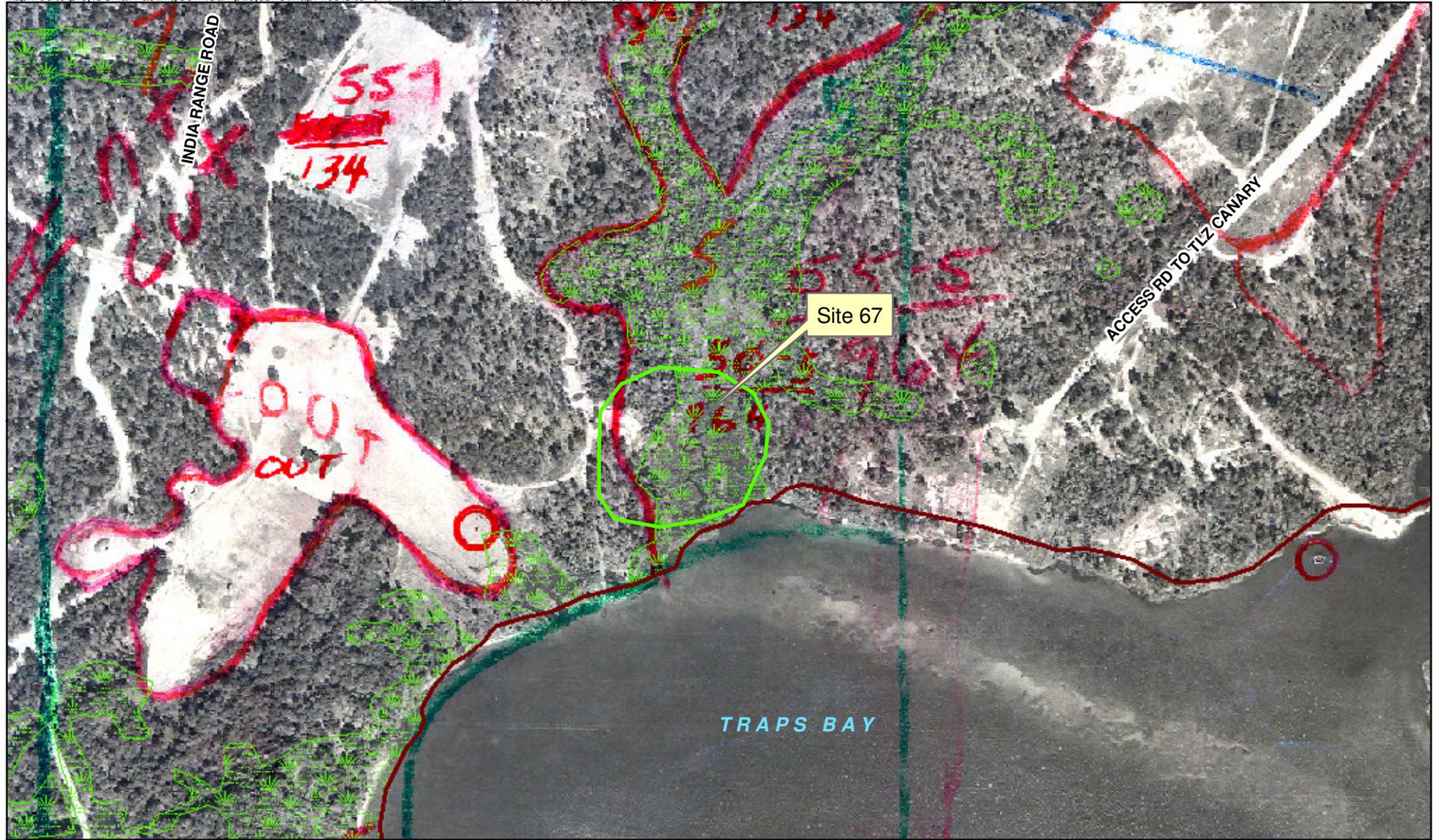
Symbol	Feature
	Facility Boundary
	Public Drinking Water Well
	Sewage Treatment Plant Location and NPDES ID Number
	Facility Used to Store Hazardous Waste Awaiting Transfer to Approved Off Base Disposal Facilities

0 2500 5000

Approximate Scale in Feet



Figure 2-10
 Historical Map - 1976
 Site 67 Archival Records Search Report
 MCB Camp Lejeune
 North Carolina



Legend

-  Site 67
-  Installation Boundary
-  Jurisdictional Wetlands

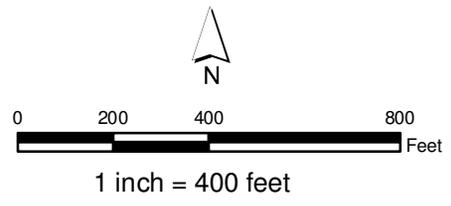


Figure 2-11
Historical Aerial - 1962
Site 67 Archival Records Search Report
MCB Camp Lejeune
North Carolina





Note:
 Site 67 is not shown because Existing Conditions
 Maps for the Engineers Area and Courthouse
 Bay do not extend to Traps Bay

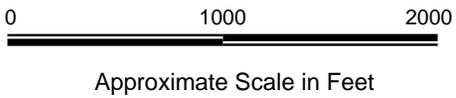


Figure 2-12
 Existing Conditions Map - 1963
 Site 67 Archival Records Search Report
 MCB Camp Lejeune
 North Carolina

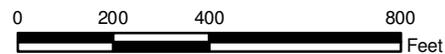
Source: MCB Camp Lejeune, 1963





Legend

-  Site 67
-  Installation Boundary
-  Jurisdictional Wetlands



1 inch = 400 feet

Figure 2-13
Historical Aerial - 1989
Site 67 Archival Records Search Report
MCB Camp Lejeune
North Carolina



SECTION 4

References

Agricultural Stabilization and Conservation Service (ASCS), 1938. *Aerial Photograph of Onslow County North Carolina*. Obtained from National Archives College Park..

ASCS, 1949. *Aerial Photograph of Onslow County North Carolina*. Obtained from National Archives College Park.

Baker Environmental, 1992, Administrative Record (CTO-0021) *Section 1: Site Identification-Correspondence*. "Doc. No: CLEJ-00253-1.02-10/31/80" (Map from Part XI EPA Form 3510-1 (6-80) copied from the Camp Lejeune Special Map, 5th edition, September 25, 1976, published by the Defense Mapping Agency Hydrographic Center, Washington, D.C.). May.

Bureau of Yards and Docks, 1941. *Marine Barracks, New River North Carolina, Property Map Area I*. September 4, 1941.

CH2M HILL, 2009. *Summary of Buildings*, (originally obtained from: *Installation Geospatial Information Services Office, GEOFIEAST, Base S-4/S-6/BPO, MCB Camp Lejeune NC*). May.

Global Security Website, *MCB Camp Lejeune Facility*.

<http://www.globalsecurity.org/military/facility/camp-lejeune.htm>. Accessed: August 2008.

Loftfield, Thomas C., Principal Investigator, 1981. *Archeological and Historical Survey of USMC Base, MCB Camp Lejeune; Naval Facilities Engineering Command Norfolk, Coastal Zone Resources Corp., Volumes I and II, Contract No. N62470-79-C-4273*. August.

Louis Berger Group Inc, 2002. *Semper Fidelis: A Brief History of Onslow County, North Carolina and MCB, Camp Lejeune, 2002*, U.S.M.C. LtCol Lynn J. Kimball (USMC, Ret.). United States Army Corps of Engineers, Wilmington District, Contract DACWS4-99-C-0004.

MCB Camp Lejeune, 1949a. *Letter to the Commandant, Subject: Training syllabi, recommendations for revision of*. October 14, 1949.

MCB Camp Lejeune, 1949b. *Letter to the Commandant, Subject: Proposed explosive allowance for calendar year 1950, submission of*. December 1, 1949.

MCB Camp Lejeune, 1963. *Map of Engineer and Amphibian Troops Area, Courthouse Bay. Camp Lejeune, North Carolina*. Showing conditions on June 30, 1963.

MCB Camp Lejeune, 2006. *Range and Training Regulations Base Order P3570.1B*. Camp Lejeune, North Carolina. October 17.

MCB Camp Lejeune, 2005. *Courthouse Bay. MCB Camp Lejeune, North Carolina*. July 14, 2005.

Redmond, Benjamin, former MCB Camp Lejeune Range Safety Officer, 2009. Personal Communication. April 20.

Richardson, Duane, MCB Camp Lejeune Range Safety Officer, 2009a. Personal communication. April 21.

Richardson, Duane, MCB Camp Lejeune Range Safety Officer, 2009b. Personal communication. June 11.

Richardson, Duane, MCB Camp Lejeune Range Safety Officer, 2009c. Personal communication. June 14.

United States Army Corps of Engineers (USACE), 2001. *Final Range Identification and Preliminary Range Assessment, MCB Camp Lejeune, Onslow, North Carolina*. St. Louis District. December.

United States Marine Corps (USMC), 1947. *Topographical Map of Camp Lejeune North Carolina*. Corrected 1947 by USMC Engineer Battalion.

USMC, 1956. *Training Directive, Engineer School Battalion, Fiscal Year 1957*. May 3.

Water and Air Research, Inc. 1983. *Initial Assessment Study of Marine Corps Base, MCB Camp Lejeune, North Carolina*. April.

Attachment A
Resource Review Summary

Resource Review Summary

The following table provides a summary of the specific references identified for review, interview, or contact for the archival report.

Resource	Actions Completed
Quantico, Virginia, Marine Corps Library, Gray Research Center – Archives and Special Collections	Reviewed files related to Camp Lejeune. Made copies of relevant historic maps and text. April 27, 2009.
Quantico, Virginia, Marine Corps Library, Gray Research Center - Histories department	Reviewed text and photographs related to Camp Lejeune. Made copies of relevant text and photos. April 28, 2009.
United States National Archives (NARA II) Historical Files	Reviewed text and aerial photographs from Text and Cartographic Divisions. Made copies of relevant files, maps and photos. April 28 – May 1, 2009.
Onslow County Public Library	Reviewed documents and spoke with personnel in relation to historical land use for site. April 21, 2009.
Swansboro Branch Public Library	Reviewed documents and spoke with personnel in relation to historical land use for site. April 21, 2009.
Camp Lejeune Personnel	
Andrew Smith/Environmental Management Division	Contacted via e-mail and phone. Provided historical aerials from Base GIS. May 6, 2009.
Dennis Dunham/ Public Works Technical Records	Contacted via e-mail and received land acquisition property maps. December 23, 2008.
Julie Rowe/MCB Camp Lejeune Archivist	Phone interview and e-mail conversation. April 27, 2009.
Duane Richardson/ Base Range Safety Officer	Contacted via e-mail and conducted personal interviewed. April 21, 2009.
MCB Camp Lejeune Base Library	Reviewed documents and spoke with personnel in relation to historical land use for site. April 21, 2009.

Marine Corp Library Review

Archives and Special Collections: Text Division

United State Marine Corps Archives & Special Collections
2040 Broadway Street
Quantico, Virginia 22134

Site Visit: April 27, 2009

File review at Marine Corps Base, Quantico, Virginia, Gray Research Center, Marine Corps Archives and Special Collections.

Reviewed command chronologies from 1976-1986.

Box 420: Command Chronologies, MCB Camp Lejeune, 1976-1979

Box 421: Command Chronologies, MCB Camp Lejeune, July - December 1979 to January - June 1982

Box 422: Command Chronologies, MCB Camp Lejeune, July - December 1982 to January - June 1984

Box 423: Command Chronologies, MCB Camp Lejeune, July - December 1984 to July - December 1985

Box 424: Command Chronologies, MCB Camp Lejeune, January - June 1986

Boxes contained general chronological information for various branches at Camp Lejeune. Most relevant sections were in Base Training Facilities Branch.

List of Documents Obtained from Archives and Special Collections

- Excerpt from Command Chronology, MCB Camp Lejeune, Training Facilities Division, July - December 1978
- Excerpt from Command Chronology, MCB Camp Lejeune, Training Facilities Division, July - December 1979
- Excerpt from Command Chronology, MCB Camp Lejeune, Training Facilities Division, January - June 1980
- Excerpt from Command Chronology, MCB Camp Lejeune, Training Facilities Division, July - December 1980
- Excerpt from Command Chronology, MCB Camp Lejeune, Training and Operations, January - June 1983
- Excerpt from Command Chronology, MCB Camp Lejeune, Training and Operations, July - December 1983
- Excerpt from Command Chronology, MCB Camp Lejeune, Training and Operations (Section IV: Annex B) , July - December 1984
- Excerpt from Command Chronology, MCB Camp Lejeune, Training and Operations, January - June 1986

Historical Reference Branch

Photograph Historian: Lena Kaljot

Text Historian: Robert V. Aquilina

3079 Moreell Avenue

Quantico, Virginia 22134

www.history.usmc.mil

Site Visit: April 27, 2009

Reviewed documents, photographs and maps related to Camp Lejeune.

List of Maps Obtained from Historical Reference Branch

- “Artillery Firing Problems Occurring Frequently, Camp G-3 Section”, Camp Lejeune, N.C. undated
- “Camp Lejeune General Area Map” Marine Barracks, New River. Feb 19, 1942
- “Long Range Firing, 155 and 90mm Gun BN’s, Camp G-3 Section” Camp Lejeune, N.C. undated
- “Camp Lejeune Ranges and Maneuvering Areas” Reference Map, North Carolina Approaches to New River. August 2, 1952
- “Training Areas and Facilities” February 16, 1953

List of Documents Obtained from Historical Reference Branch

- “Semper Fidelis: A history of Onslow County and Camp Lejeune, N.C.” Louis J. Berger Group, 2006
- “Syllabus for Combat Engineer Course, Fiscal Year 1958” Engineer School Battalion, MCB Camp Lejeune. Dated December 10, 1956 – Specific page refers to Demolitions Course
- “Packard X: Informational Handbook” May 24-29, 1959

List of Aerial Photographs Obtained from Historical Reference Branch

- “Camp Lejeune, NC – Looking East” May 6, 1948
- “Camp Lejeune, NC – Looking South” May 6, 1948
- “Engineer Area, Camp Lejeune, NC – Looking East” September 21, 1948
- “Engineer Area, Camp Lejeune, NC – Looking South” September 21, 1948
- “Engineer Area, Camp Lejeune, NC – Looking West” September 21, 1948

National Archives and Records Administration Review

National Archives at College Park

8601 Adelphi Road

College Park, MD 20740-6001

<http://www.archives.gov/dc-metro/college-park/>

Site visit: April 27 – May 1, 2009

Textual Records

Reviewed records of the Bureau of Yards and Docks relating to Naval property case files and records of the Marine Corps from 1939-1958; details are provided below.

- Record Group 41: Records of the Bureau of Yards and Docks
- Reviewed 8 boxes of files from Entry 1001 – Naval Property Case Files 1941-1958:

- Record Group 41 (Bureau of Yards and Docks), Entry 1001, Naval Property Case Files, North Carolina: New River, 1941 - 1958, Box 933
- Record Group 41 (Bureau of Yards and Docks), Entry 1001, Naval Property Case Files, North Carolina: New River, 1941 - 1958, Box 934
- Record Group 41 (Bureau of Yards and Docks), Entry 1001, Naval Property Case Files, North Carolina: New River, 1941 - 1958, Box 935
- Record Group 41 (Bureau of Yards and Docks), Entry 1001, Naval Property Case Files, North Carolina: New River, 1941 - 1958, Box 936
- Record Group 41 (Bureau of Yards and Docks), Entry 1001, Naval Property Case Files, North Carolina: New River, 1941 - 1958, Box 937
- Record Group 41 (Bureau of Yards and Docks), Entry 1001, Naval Property Case Files, North Carolina: New River, 1941 - 1958, Box 938
- Record Group 41 (Bureau of Yards and Docks), Entry 1001, Naval Property Case Files, North Carolina: New River, 1941 - 1958, Box 940
- Record Group 41 (Bureau of Yards and Docks), Entry 1001, Naval Property Case Files, North Carolina: New River, 1941 - 1958, Box 941
- **General Description:** Documents related to original land acquisition for Camp Lejeune, expansion, easements, railroad, schools, and housing developments on Base etc.

Documents Obtained from Record Group 41:

- Letter to Judge Advocate General of the Navy from Newman A. Townsend Jr., dated February 27, 1942. "Acquisition of land for Marine Corps Training Area, Onslow County, North Carolina: Area N, Tracts #1 and #2", also includes property map of N-2A
- Case Report "Tract G-56" Offer to Settle recommendation, dated 1/21/43, includes enclosed property map
- Case Report "Tract G-63" Offer to Settle recommendation, dated 1/21/43, includes enclosed property map

Record Group 127: Records of the United States Marine Corps (USMC)

Reviewed 7 boxes from Entry 18A: General Correspondence, Office of the Commandant, January 1939-June 1950.

- Record Group 127 (USMC), Entry 18A, Office of the Commandant, General Correspondence, January 1939-June 1950, 1275/70-80: Camp Lejeune, Box 218.
- Record Group 127 (USMC), Entry 18A, Office of the Commandant, General Correspondence, January 1939-June 1950, 1275/70-80: Camp Lejeune, Box 219.
- Record Group 127 (USMC), Entry 18A, Office of the Commandant, General Correspondence, January 1939-June 1950, 1275/70-80: Camp Lejeune, Box 220.

- **General Description:** Correspondence related to Camp Lejeune. Copied correspondence files on Cherry Point bombing targets at Camp Lejeune.
- Record Group 127 (USMC), Entry 18A, Office of the Commandant, General Correspondence, January 1939-June 1950, 1520-30-7: Education- Marine Corps Schools-Engineers School (Quantico), Box 507.
- Record Group 127 (USMC), Entry 18A, Office of the Commandant, General Correspondence, January 1939-June 1950, 1520-30-7: Education- Marine Corps Schools-Engineers School (Quantico), Box 508.
- **General Description:** Correspondence related to Engineers school, primarily at Camp Lejeune. Several references to demolitions courses include: lists of enlisted men who completed courses, course syllabi. By 1949, demolitions course was incorporated in the Basic Construction Course. Copied recommended syllabus for Basic Construction Course.
- Record Group 127 (USMC), Entry 18A, Office of the Commandant, General Correspondence, January 1939-June 1950, Education- Naval Engineers School, Box 545.
- Record Group 127 (USMC), Entry 18A, Office of the Commandant, General Correspondence, January 1939-June 1950, 2000-20-2: Ordnance – explosives, dynamite, TNT, Box 1205.
- **General Description:** Correspondence related to supply of ordnance for various bases. Copied ordnance disposal and handling document.

Reviewed 2 boxes from Entry 24: Correspondence Files of the Office of the Commandant and Headquarters Support Division

- Record Group 127 (USMC), Entry 24, Correspondence Files of the Office of the Commandant and Headquarters Support Division, Box 9.
- Record Group 127 (USMC), Entry 24, Correspondence Files of the Office of the Commandant and Headquarters Support Division, Box 10.
- **General Description:** Education files – primarily related to curriculum for several bases. No copies made from this entry.

Reviewed 2 boxes from Entry 50: Real Estate

- Record Group 127 (USMC), Entry 50: Real Estate, Box 2.
- Record Group 127 (USMC), Entry 50: Real Estate, Box 3.
- **General Description:** Real estate files associated with Camp Lejeune, similar to Bureau of Yards and Docks, no copies made from this entry.

Reviewed 10 boxes from Entry 59: Correspondence files of the Office of the Commandant and Headquarters Support Division, January 1939 – June 1950

- Record Group 127 (USMC), Entry 59, Correspondence Files of the Office of the Commandant and Headquarters Support Division, January 1939-June 1950, Box 1.

- Record Group 127 (USMC), Entry 59, Correspondence Files of the Office of the Commandant and Headquarters Support Division, January 1939-June 1950, Box 2.
- Record Group 127 (USMC), Entry 59, Correspondence Files of the Office of the Commandant and Headquarters Support Division, January 1939-June 1950, Box 3.
- Record Group 127 (USMC), Entry 59, Correspondence Files of the Office of the Commandant and Headquarters Support Division, January 1939-June 1950, Box 4.
- Record Group 127 (USMC), Entry 59, Correspondence Files of the Office of the Commandant and Headquarters Support Division, January 1939-June 1950, Box 5.
- Record Group 127 (USMC), Entry 59, Correspondence Files of the Office of the Commandant and Headquarters Support Division, January 1939-June 1950, Box 6.
- Record Group 127 (USMC), Entry 59, Correspondence Files of the Office of the Commandant and Headquarters Support Division, January 1939-June 1950, Box 7.
- Record Group 127 (USMC), Entry 59, Correspondence Files of the Office of the Commandant and Headquarters Support Division, January 1939-June 1950, Box 8.
- Record Group 127 (USMC), Entry 59, Correspondence Files of the Office of the Commandant and Headquarters Support Division, January 1939-June 1950, Box 9.
- Record Group 127 (USMC), Entry 59, Correspondence Files of the Office of the Commandant and Headquarters Support Division, January 1939-June 1950, Box 10.
- **General Description:** “Unclassified” correspondence from 1939-1950, incorporates information for several bases, research reports on flame throwers. Primarily regarding administrative issues (i.e. personnel, course quotas, supplies for bases/schools etc.) No copies made from this entry.

Reviewed 17 boxes from Entry 102: Correspondence Files of the Office of the Commandant and Headquarters Support Division, January 1950 - June 1958

- Record Group 127 (USMC), Entry 102, Correspondence Files of the Office of the Commandant and Headquarters Support Division, January 1950-June 1958, Box 20.
- Record Group 127 (USMC), Entry 102, Correspondence Files of the Office of the Commandant and Headquarters Support Division, January 1950-June 1958, Box 21.
- Record Group 127 (USMC), Entry 102, Correspondence Files of the Office of the Commandant and Headquarters Support Division, January 1950-June 1958, Box 71.
- Record Group 127 (USMC), Entry 102, Correspondence Files of the Office of the Commandant and Headquarters Support Division, January 1950-June 1958, Box 72.
- Record Group 127 (USMC), Entry 102, Correspondence Files of the Office of the Commandant and Headquarters Support Division, January 1950-June 1958, Box 73.
- Record Group 127 (USMC), Entry 102, Correspondence Files of the Office of the Commandant and Headquarters Support Division, January 1950-June 1958, Box 320.

- Record Group 127 (USMC), Entry 102, Correspondence Files of the Office of the Commandant and Headquarters Support Division, January 1950-June 1958, Box 321.
- Record Group 127 (USMC), Entry 102, Correspondence Files of the Office of the Commandant and Headquarters Support Division, January 1950-June 1958, Box 328.
- Record Group 127 (USMC), Entry 102, Correspondence Files of the Office of the Commandant and Headquarters Support Division, January 1950-June 1958, Box 329.
- Record Group 127 (USMC), Entry 102, Correspondence Files of the Office of the Commandant and Headquarters Support Division, January 1950-June 1958, Box 330.
- Record Group 127 (USMC), Entry 102, Correspondence Files of the Office of the Commandant and Headquarters Support Division, January 1950-June 1958, Box 331.
- Record Group 127 (USMC), Entry 102, Correspondence Files of the Office of the Commandant and Headquarters Support Division, January 1950-June 1958, Box 332.
- Record Group 127 (USMC), Entry 102, Correspondence Files of the Office of the Commandant and Headquarters Support Division, January 1950-June 1958, Box 333.
- Record Group 127 (USMC), Entry 102, Correspondence Files of the Office of the Commandant and Headquarters Support Division, January 1950-June 1958, Box 334.
- Record Group 127 (USMC), Entry 102, Correspondence Files of the Office of the Commandant and Headquarters Support Division, January 1950-June 1958, Box 400.
- Record Group 127 (USMC), Entry 102, Correspondence Files of the Office of the Commandant and Headquarters Support Division, January 1950-June 1958, Box 401.
- Record Group 127 (USMC), Entry 102, Correspondence Files of the Office of the Commandant and Headquarters Support Division, January 1950-June 1958, Box 402.
- **General Description:** Administrative correspondence for several Marine Corps bases: rifle/pistol competition awards/results, personnel transfers, establishing/disestablishing various operations, class quotas, curriculum, Advanced Research Group frequently discussed in education files. Boxes 400-402 were related to Camp Lejeune, primarily about personnel transfers and tables of organization.

Documents Obtained from Record Group 127:

- Letter from Commandant of the Marine Corps to Commanding General, Marine Barracks, Camp Lejeune. January 4, 1951. Letter MC-1277568. Regarding Engineer School Battalion quotas and control dates for courses.
- Letter from Commandant of the Marine Corps to Commanding General, Marine Corps Base, Camp Lejeune. May 3, 1956. Subject: Training Directive, Engineer School Battalion, Fiscal Year 1957.
- Letter from Commandant of the Marine Corps to Commanding General, Marine Corps Air Station, Cherry Point, North Carolina. October 28, 1947. Subject: Assignment of Space in Camp Lejeune Area to be Utilized for the Construction of Bombing and Strafing

Targets for use of Air, Fleet Marine Force, Atlantic Units attached to Marine Corps Air Station, Cherry Point, N.C.

- Conference Report. May 24, 1946. Subject: Inter Air Traffic Control Board Cast 593 (review) (Camp Davis) Camp Lejeune, N.C. and Marine Corps Air Base, Cherry Point, N.C. Air Space Danger Area.
- Letter from the Chief of the Bureau of Ordnance to the Commandant of the Marine Corps. March 6, 1948. Subject: Proposed Letter of Instruction on Handling, Storage and Destruction of Ammunition and Explosives, Comments Concerning.
- Letter from Headquarters U.S. Marine Corps. Letter of Instruction Number 1567. April 19, 1948. Subject: Handling, Storage, and Destruction of Ammunition and Explosives.
- Letter from the Commanding General, Marine Barracks, Camp Lejeune To Commandant of the Marine Corps. October 14, 1949. Subject: Training syllabi, recommendation for revision of.
- Letter from Colonel Randall M. Victory (via Commanding Officer Marine Barracks Camp Lejeune) to Commandant of the Marine Corps. November 22, 1949. Subject: Authority for the expenditure of ammunition, request for.
- Headquarters U.S. Marine Corps. Memorandum for Director, Division of Plans and Policies (G-4). August 24, 1949. Subject: Authority to expend certain demolition items in training Organized Marine Corps Reserve units at Camp Lejeune, North Carolina.
- Letter from the Commanding Officer MCB Camp Lejeune to Commandant of the Marine Corps. December 1, 1949. Subject: Proposed explosive allowance for calendar year 1950.
- Letter from the Commanding General to the Chief of Naval Operations (via: Commandant of the Marine Corps). June 3, 1947. Subject: Danger Zones in Navigable Waters

Cartographic and Architectural Records

Site Visit: May 1, 2009

Copied aerial photographs of Onslow County, North Carolina for the years 1938 and 1949.
Record Group 145: ASCS – Agricultural Stabilization and Conservation Service

Focus area: Traps Bay area, MCB Camp Lejeune

Onslow County Public Library

Onslow County Public Library
58 Doris Avenue East
Jacksonville, NC 28540
910.455.7350
<http://www.co.onslow.nc.us/library/>

Site visit: April 21, 2009

Documents reviewed:

1. Loftfield, Thomas, C. Principal Investigator. (1981). Archeological and Historical Survey of USMC Base, Camp Lejeune; Naval Facilities Engineering Command Norfolk, Coastal Zone Resources Corp., Volumes I and II, Contract No. N62470-79-C-4273. August.

Discussed one archeological dig in Traps Bay area, appeared to be very close to Site 67 based on map (see photographs). Only cultural artifacts discovered were discussed in report, no evidence of TNT or other explosives.

2. Watson, Alan. (1995). Onslow Country: A Brief History. Division of Archives and History. North Carolina Department of Cultural Resources. Raleigh.

No pertinent information found.

Swansboro Branch Public Library

Swansboro Branch Library
1460 West Corbett Avenue
Swansboro, NC 28584
Phone: 910-326-4888

Site visit: April 21, 2009

Documents Reviewed at Swansboro Public Library:

No pertinent documents found.

MCB Camp Lejeune Base Records Review

Contact: Duane Richardson
Base Range Safety Officer
Marine Corps Base, Camp Lejeune
(910)451-1240
Duane.richardson@usmc.mil

Per personal interview on April 21, 2009, Duane discussed Site 67 as follows:

“Oh yes, the Engineers Training Area. During Phase I of the investigation, look for the following evidence that TNT was blown here:

- Hawks (old steel vehicle)
- Trees with explosive damage
- Craters
- Evidence of destroyed bridges over the creek
- Small pieces of metal which are electric blasting caps

There is a pistol training range just south of this site and an urban breacher training area to the north, probably of little significance. Be very careful as this site is adjacent to an active demolition range. Personnel will have to communicate with Bob Lowder and Range Control about access to the site, which may often be restricted. Access road to the east of the site may be better to minimize interference.”

Contact: Dennis Dunham
Technical Records, Public Works Office
Marine Corps Base, Camp Lejeune
(910) 451-2818 ext 273
Dennis.dunham@usmc.mil

Per e-mail conversations existing conditions maps and land acquisition property maps. All maps have been converted to electronic files and Dennis is happy to look up any information needed on builds and any civil work, sewage, electrical, etc.

Contact: Julie Rowe
Archivist, Combat Camera
Marine Corps Base, Camp Lejeune
Julie.rowe.ctr@usmc.mil
(910) 451-1238

The archivist position at MCB Camp Lejeune was created fairly recently and is still in development. Currently the office holds photos and oral histories of the main area of MCB Camp Lejeune and the collection is growing. Specifically to Site 67, no documents were found.

MCB Camp Lejeune Base Library
1401 West Road
Camp Lejeune, NC 28547-2539
<http://library.usmc-mccs.org/Lejeune/index.htm>

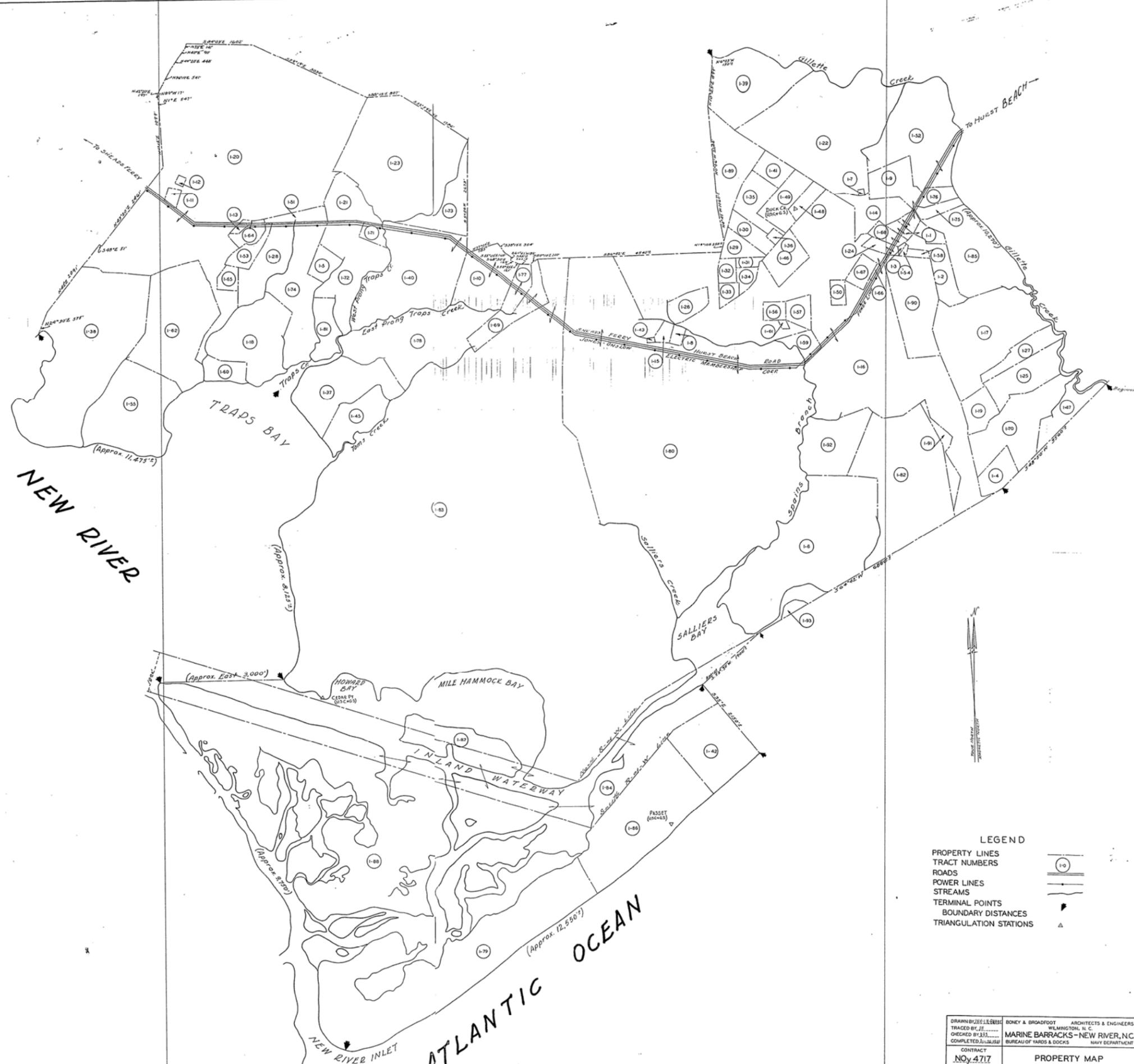
Site visit: April 21, 2009

Documents Reviewed at MCB Camp Lejeune Base Library:

1. Marine Corps Gazette. (1946). Volume 30. United State Marine Corps. Quantico, VA.
No pertinent information found.
2. Marine Corps Gazette. (1947). Volume 31. United State Marine Corps. Quantico, VA.
No pertinent information found.
3. Marine Corps Gazette. (1948). Volume 32. United State Marine Corps. Quantico, VA.
No pertinent information found.

Attachment B
Historical Maps and Photos

No.	RECORD OWNER	AREA
1-1	N. B. Henderson and Wife	8.9
1-2	J. L. Henderson	20.0
1-3	J. Galling Arthur	0.59
1-4	N. B., J. L. and C. B. Henderson	14.9
1-5	Mrs. Mamie Simpson Parker	3.76
1-6	Southern Land Sales Corporation	178.0
1-7	Lewis Hurst Abner Marshall and John White, Trustees of The Baptist Church of Brown Sound	0.52
1-8	E. B. Smith	3.06
1-9	Joseph Graham	25.7
1-10	Clara Ward Heirs	43.6
1-11	The Primitive Baptist Church	2.91
1-12	Benjamin Simmons, Elias Henderson and George Marine, Committee of District No. 3 Colored	1.01
1-13	J. M. Aman, R. E. Herritage, J. B. Coats, D. W. Russell and L. B. Bryan, Constituting the Board of Education	
1-14	Clarence W. Ward	1.43
1-15	Adock Gibbs	22.9
1-16	Leon Henderson	3.72
1-17	J. D. Arthur and Wife, Elizabeth Arthur	422.0
1-18	L. F. Simpson	98.0
1-19	N. B. Henderson	64.0
1-20	Lewis Marine Estate	14.9
1-21	William Bell	50.0
1-22	B. B. Henderson	23.6
1-23	Ochava Bell Heirs	142.0
1-24	Southern Land Sales Corporation	137.0
1-25	N. B. Henderson and Wife	5.02
1-26	Belford Montford	32.9
1-27	Elias Ward Heirs	12.79
1-28	L. Kelly Robinson	23.6
1-29	D. W. Russell	15.02
1-30	R. A. McCabe	39.3
1-31	N. R. Bell and Lucy J. Bell	9.91
1-32	J. D. Hurst	12.13
1-33	Carrie Fonville	3.73
1-34	Belford Montford	5.89
1-35	N. B., J. L. and C. B. Henderson	5.29
1-36	Louis Montford Heirs	575
1-37	Murray Prescott and Bernard Prescott	20.3
1-38	Thomas O. Samworth	2.84
1-39	Mrs. Carrie Gillette Heirs	60.0
1-40	W. F. Mills and L. R. Mills	186.0
1-41	L. L. Cox	59.3
1-42	Disputed Area Between A. J. Hurst Heirs and E. B. Smith	10.00
1-43	Elias Ward, C. W. Ward and Oliver White, Trustees of The Methodist Church, Col. of Onslow County	10.63
1-44	Wynne Mills	59.0
1-45	E. L. Cox	0.5
1-46	C. B. Henderson, J. L. Henderson and N. B. Henderson	38.6
1-47	E. B. Smith	18.9
1-48	Isaiah Hill (Herbert Hurst Heirs, Claimant)	19.8
1-49	George F. Gray Heirs	7.55
1-50	John Bell Mills	13.58
1-51	Miss Sallie Fonville	306
1-52	Warren W. Jones and Aaa T. Jones, Jr.	2.59
1-53	White Citizens of Brown Sound	84.0
1-54	Katie Malone	0.69
1-55	Carrie H. Merritt	5.36
1-56	L. H. Hill (Bebecca Jones Heirs, Claimant)	9.10
1-57	N. B., J. L. and C. B. Henderson	2.5
1-58	Haywood Lee Craft	0.88
1-59	Katie Garrie	9.28
1-60	Walter Marshall	0.89
1-61	Kay Marine	97.0
1-62	John D. Warlick, Trustee	7.83
1-63	Haywood Whiffield	6.2
1-64	Leon Henderson (Ephraim F. Arthur Heirs, Claimant)	0.83
1-65	N. B. Henderson	0.89
1-66	B. B. McCabe	6.15
1-67	Isaiah Hill	23.9
1-68	Elias Ward Heirs	62.0
1-69	Eula Jones	5.8
1-70	L. H. Hill Heirs	53.4
1-71	Annie Mills	27.0
1-72	G. M. Simpson	39.6
1-73	Katie L. (Pattie) Fonville	6.5
1-74	James M. Fonville	8.3
1-75	Nora Hill Heirs	11.6
1-76	Annie Mills	91.0
1-77	Lewis O. Fonville, Sr. Heirs	234.0
1-78	Mary Moore Pearsall	731.0
1-79	J. B. Mills	17.9
1-80	Mrs. Carrie Gillette Heirs	138.0
1-81	E. B. Smith	1447.0
1-82	State of North Carolina	1060
1-83	Miss Sallie Fonville	67.0
1-84	A. J. Hurst Heirs	123.0
1-85	North Carolina State Board of Education	25.3
1-86	North Carolina State Board of Education	510.0
1-87	Leon Henderson	40.4
1-88	Barkley Burgess Henderson	57.0
1-89	Barkley Burgess Henderson	10.4
1-90	Barkley Burgess Henderson	45.2
1-91	Thomas Henderson Estate	3.3



LEGEND

PROPERTY LINES	—
TRACT NUMBERS	(1-0)
ROADS	—
POWER LINES	—
STREAMS	—
TERMINAL POINTS	▲
BOUNDARY DISTANCES	▲
TRIANGULATION STATIONS	▲

DRAWN BY: J. L. GIBBS	BONEY & BROADFOOT ARCHITECTS & ENGINEERS
TRACED BY: J. L. GIBBS	WILMINGTON, N. C.
CHECKED BY: J. L. GIBBS	MARINE BARRACKS - NEW RIVER, N. C.
COMPLETED: 12/15/50	BUREAU OF YARDS & DOCKS
CONTRACT NO. 4717	PROPERTY MAP AREA - I
SHEET OF	
APPROVED: 12/15/50	BY: J. L. GIBBS
REVISION	DATE
DATE	BRIEF
BY	REVISION
DATE	BY

REVISION	DATE	BRIEF	BY

Appendix B

Raw Analytical Data

CTO-40
 Camp Lejeune - Site 67
 Validated Subsurface Soil Raw Analytical Results
 February 2010

Sample ID	IR67-IS02-1-2-10A	IR67-IS03-1-4-10A	IR67-IS04-1-3-10A	IR67-IS05-1-2-10A	IR67-IS06-1-4-10A	IR67-IS06D-1-4-10A	IR67-IS07-1-4-10A	IR67-IS08-1-3-10A
Sample Date	2/23/10	2/23/10	2/23/10	2/24/10	2/24/10	2/24/10	2/24/10	2/24/10
Chemical Name								
Explosives (MG/KG)								
2,4,6-Trinitrotoluene	0.3 U	0.3 U	0.3 U					
2-Amino-4,6-dinitrotoluene	0.3 U	0.3 U	0.3 U					
4-Amino-2,6-dinitrotoluene	0.3 U	0.3 U	0.3 U					

Notes:

MG/KG - Milligrams per kilogram

U - The material was analyzed for, but not detected

CTO-40
 Camp Lejeune - Site 67
 Validated Groundwater Raw Analytical Results
 February 2010

Sample ID	IR67-GW01-10A	IR67-GW01D-10A	IR67-GW02-10A	IR67-GW03-10A
Sample Date	2/23/10	2/23/10	2/23/10	2/23/10
Chemical Name				
Explosives (UG/L)				
2,4,6-Trinitrotoluene	0.224 U	0.222 U	0.224 U	0.226 U
2-Amino-4,6-dinitrotoluene	0.224 U	0.222 U	0.0793 J	0.226 U
4-Amino-2,6-dinitrotoluene	0.224 U	0.222 U	0.224 U	0.226 U

Notes:

J - Analyte present. Value may be biased low. Value may be higher

U - The material was analyzed for, but not detected

UG/L - Micrograms per liter

CTO-40
 Camp Lejeune - Site 67
 Validated Surface Soil Raw Analytical Results
 February 2010

Sample ID	IR67-SS01-0-1.5-10A	IR67-SS01D-0-1.5-10A	IR67-SS02-0-1-10A	IR67-SS03-0-1-10A	IR67-SS04-0-1-10A	IR67-SS05-0-1-10A	IR67-SS06-0-1-10A	IR67-SS07-0-1-10A	IR67-SS08-0-1-10A
Sample Date	2/23/10	2/23/10	2/23/10	2/23/10	2/23/10	2/24/10	2/24/10	2/24/10	2/24/10
Chemical Name									
Explosives (MG/KG)									
2,4,6-Trinitrotoluene	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
2-Amino-4,6-dinitrotoluene	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
4-Amino-2,6-dinitrotoluene	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U

Notes:

MG/KG - Milligrams per kilogram
 U - The material was analyzed for, but not detected

Appendix C
Data Validation Summary Report

EXPLOSIVES
USEPA Region IV - Level IV Review

Site: MCB Camp Lejeune, CTO-040, Site 67 SDG #: 1002209

Client: CH2M HILL, Inc., Virginia Beach, Virginia Date: April 26, 2010

Laboratory: Empirical Laboratories, Nashville, Tennessee Reviewer: Nancy Weaver

EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	IR67-SS03-0-1-10A	1002209-01	Soil
2	IR67-IS03-1-4-10A	1002209-02	Soil
3	IR67-SS02-0-1-10A	1002209-03	Soil
4	IR67-IS02-1-2-10A	1002209-04	Soil
5	IR67-SS01-0-1.5-10A	1002209-05	Soil
6	IR67-SS01D-0-1.5-10A	1002209-06	Soil
7	IR67-SS04-0-1-10A	1002209-07	Soil
7MS	IR67-SS04-0-1-10AMS	1002209-07MS	Soil
7MSD	IR67-SS04-0-1-10AMSD	1002209-07MSD	Soil
8	IR67-IS04-1-3-10A	1002209-08	Soil
9	IR67-SS05-0-1-10A	1002209-09	Soil
10	IR67-IS05-1-2-10A	1002209-10	Soil
11	IR67-SS06-0-1-10A	1002209-11	Soil
12	IR67-IS06-1-4-10A	1002209-12	Soil
13	IR67-IS06D-1-4-10A	1002209-13	Soil
14	IR67-SS07-0-1-10A	1002209-14	Soil
15	IR67-SS08-0-1-10A	1002209-15	Soil
16	IR67-IS07-1-4-10A	1002209-16	Soil
17	IR67-IS08-1-3-10A	1002209-17	Soil
18	IR67-GW03-10A	1002209-18	Water
19	IR67-GW02-10A	1002209-19	Water
19MS	IR67-GW02-10AMS	1002209-19MS	Water
19MSD	IR67-GW02-10AMSD	1002209-19MSD	Water
20	IR67-GW01-10A	1002209-20	Water
21	IR67-GW01D-10A	1002209-21	Water
22	IR67-EB01-022310-GW	1002209-22	Water
23	IR67-EB02-022310-IS	1002209-23	Water
24	IR67-FB-022310	1002209-24	Water
25	IR67-EB01-022410-IS	1002209-25	Water

The USEPA "Contract Laboratory Program National Functional Guidelines for Organic Data Review," October 1999, and professional judgement were used in evaluating the data in this summary report.

Holding Times - All samples were extracted within 7 days for water samples and 14 days for soil samples and analyzed within 40 days for all samples.

Initial Calibration - The initial calibrations exhibited acceptable %RSD and/or correlation coefficient values.

Calibration Verification - The continuing calibrations exhibited acceptable %D values.

Surrogates - All samples exhibited acceptable surrogate recoveries.

MS/MSD - The MS/MSD samples exhibited acceptable %R and RPD values.

Laboratory Control Sample - The LCS samples exhibited acceptable %R values.

Method Blank - The method blanks were free of contamination.

Field and Equipment Blank - Field QC results are summarized below.

Blank ID	Compound	Conc. ug/L	Action Level ug/L	Qualifier	Affected Samples
IR67-EB01-022310-GW	ND	-	-	-	-
IR67-EB02-022310-IS	ND	-	-	-	-
IR67-FB-022310	ND	-	-	-	-
IR67-EB01-022410-IS	ND	-	-	-	-

Field Duplicates - Field duplicate results are summarized below.

Compound	IR67-SS01-0-1.5-10A mg/kg	IR67-SS01D-0-1.5-10A mg/kg	RPD	Qualifier
None	ND	ND	-	-

Compound	IR67-IS06-1-4-10A mg/kg	IR67-IS06D-1-4-10A mg/kg	RPD	Qualifier
None	ND	ND	-	-

Compound	IR67-GW01-10A mg/L	IR67-GW01D-10A mg/L	RPD	Qualifier
None	ND	ND	-	-

Compound Identification - Retention times were acceptable and no further action was taken.

Compound Quantitation - The following sample exhibited a result with a high %D value between columns that was flagged (P) by the laboratory and further qualified as estimated (J).

Sample ID	Compound	%D	Qualifier
19	2-Amino-4,6-dinitrotoluene	164%	J

Appendix D
Regulatory Concurrence

August 2, 2010

NAVFAC Atlantic
Attn: Bryan Beck NAVFAC Mid-Atlantic Marine Corps
6506 Hampton Blvd
Norfolk, VA 23508

RE: Draft Confirmatory Sampling Report for
Site 67 Engineer's TNT Burn Site
Marine Corps Base Camp Lejeune
Jacksonville, North Carolina

Dear Mr. Beck:

The Superfund Section of the Division of Waste Management has completed its review of the Draft Confirmatory Sampling Report for Site 67 Engineers TNT Burn Site and concurs with the recommendations. Specifically, Section 5, Conclusions and Recommendations, states that no further environmental investigation of Site 67 is recommended.

If you have any questions, please contact me at (919) 508-8447.

Sincerely,

Marti Morgan
Environmental Engineer
NCDENR Superfund Section

Cc: Robert Lowder, MCB Camp Lejeune
Gena Townsend, US EPA
Randy McElveen



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

**REGION 4
SAM NUNN ATLANTA FEDERAL CENTER
61 FORSYTH STREET, S.W.
ATLANTA, GEORGIA 30303**

November 15, 2010

NAVFAC Mid-Atlantic
Attn: Bryan Beck NAVFAC Midlant Environmental RPM,
Camp Lejeune Marine Corps North Carolina IPT
6506 Hampton Blvd
Norfolk, VA 23508-1273

SUBJ: MCB Camp Lejeune
Draft Confirmatory Sampling Report
Site 67 Engineer's TNT Burn Site

Dear Mr. Beck:

The Environmental Protection Agency (EPA) has completed its review of the above subject document, dated July 2010 and agrees with the conclusions and recommendations as presented. The sampling investigation did not identify explosive constituents in the surface or subsurface soils and there was only a single detection in a groundwater sample. This detection was below the human health and ecological screening values. Therefore, no further environmental investigation is warranted.

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

Sincerely,

Gena D. Townsend
Senior Project Manager

cc: Marti Morgan, NCDENR
Charity Rychak, MCB Camp Lejeune