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MCB CAMP LEJEUNE
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NO ACTION DECISION DOCUMENT FOR MUNITIONS RESPONSE PROGRAM SITE UXO-25 VERONA LOOP MCB CAMP LEJEUNE NC

1/1/2014

CH2M HILL

1 Declaration

This No Action Decision Document (NADD) presents the No Further Action (NFA) determination for Military Munitions Response Program (MMRP) Site UXO-25 – Verona Loop. Marine Corps Installations East – Marine Corps Base Camp Lejeune (MCIEAST-MCB CAMLEJ) was placed on the United States Environmental Protection Agency (USEPA) National Priorities List (NPL) effective November 4, 1989 (USEPA ID: NC6170022580). As a result of the NPL listing and pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), the USEPA Region 4, North Carolina Department of Environment and Natural Resources (NCDENR), the Navy, and the Marine Corps entered into a Federal Facilities Agreement (FFA) for MCIEAST-MCB CAMLEJ in 1991. The primary purpose of the FFA is to ensure that the environmental impacts associated with past and present activities at the Base are thoroughly investigated and to assess whether additional investigation and/or remediation activities are necessary.

In 2001, the MMRP was established to address military munitions and explosives of concern (MEC) [i.e., unexploded ordnance (UXO) and waste military munitions] and munitions constituents (i.e., chemical residues of munitions) at ranges that are not operational. The current status and schedules for the MMRP sites are provided in the MCIEAST-MCB CAMLEJ Site Management Plan, which is updated annually and available in the Administrative Record.

Site UXO-25 was investigated under the MMRP, and no unacceptable risks to human health or the environment were identified; therefore, NFA was recommended. The NFA determination has been made in accordance with CERCLA, as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and with the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This NFA decision is based on the results of the site investigation and the Administrative Record for MCIEAST-MCB CAMLEJ. The Navy and the Marine Corps issue this NADD and have obtained concurrence from the USEPA Region 4 and NCDENR on the NFA decision. Copies of the USEPA and NCDENR approval letters are presented in **Attachment A**.

1.1 Authorizing Signature

J W Clark

J. W. CLARK, JR.
Colonel, Marine Corps
Deputy Commander
Marine Corps Installations East-Marine Corps Base, Camp Lejeune

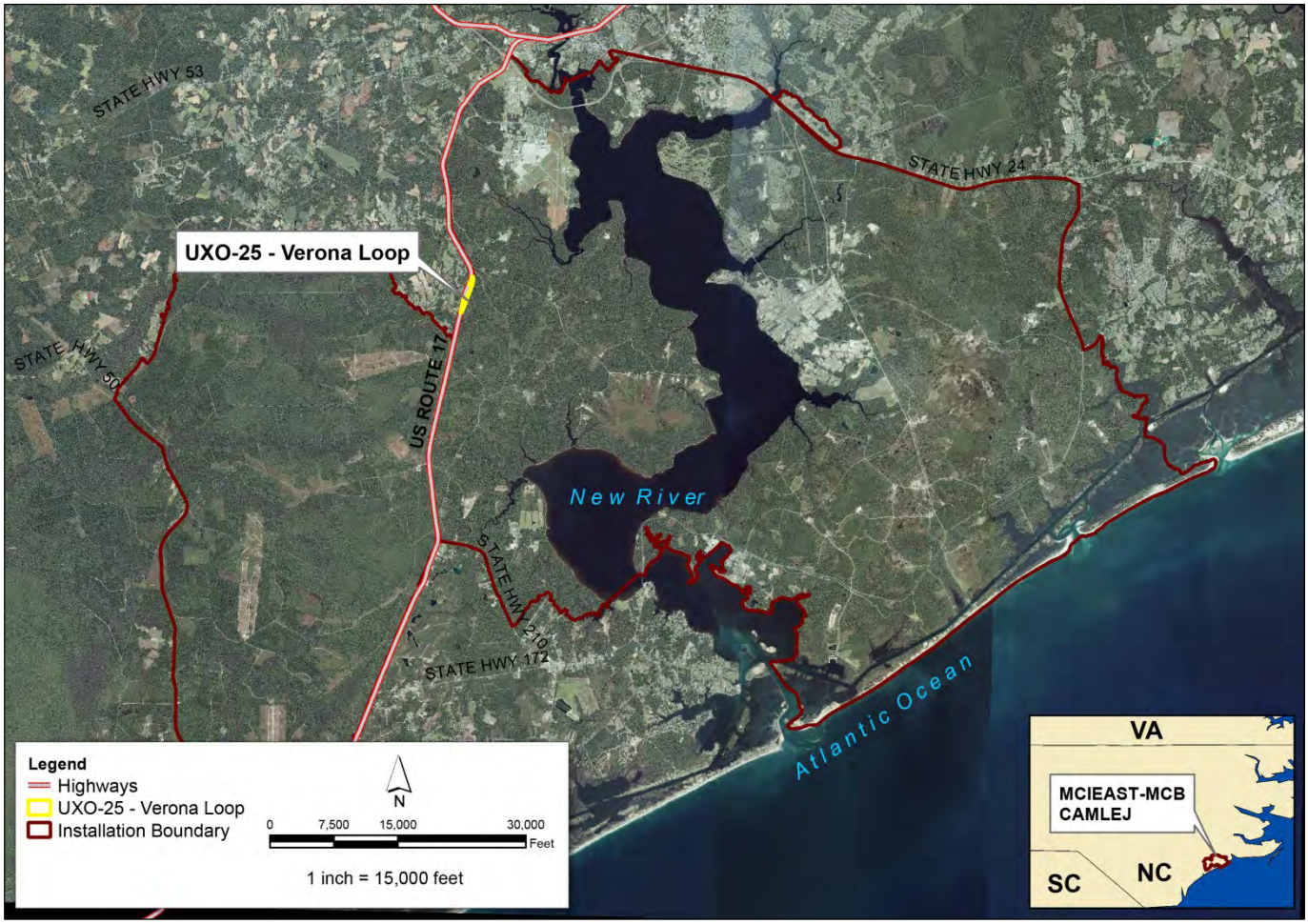
10 Feb 2014
Date

2 Decision Summary

2.1 Base Description and History

MCIEAST-MCB CAMLEJ is a 156,000-acre facility located in Onslow County, North Carolina, adjacent to the southern side of the city of Jacksonville (**Figure 2-1**). The mission of MCIEAST-MCB CAMLEJ is to maintain combat-ready units for expeditionary deployment. The Base provides housing, training facilities, and logistical support for Fleet Marine Force Units and other assigned units.

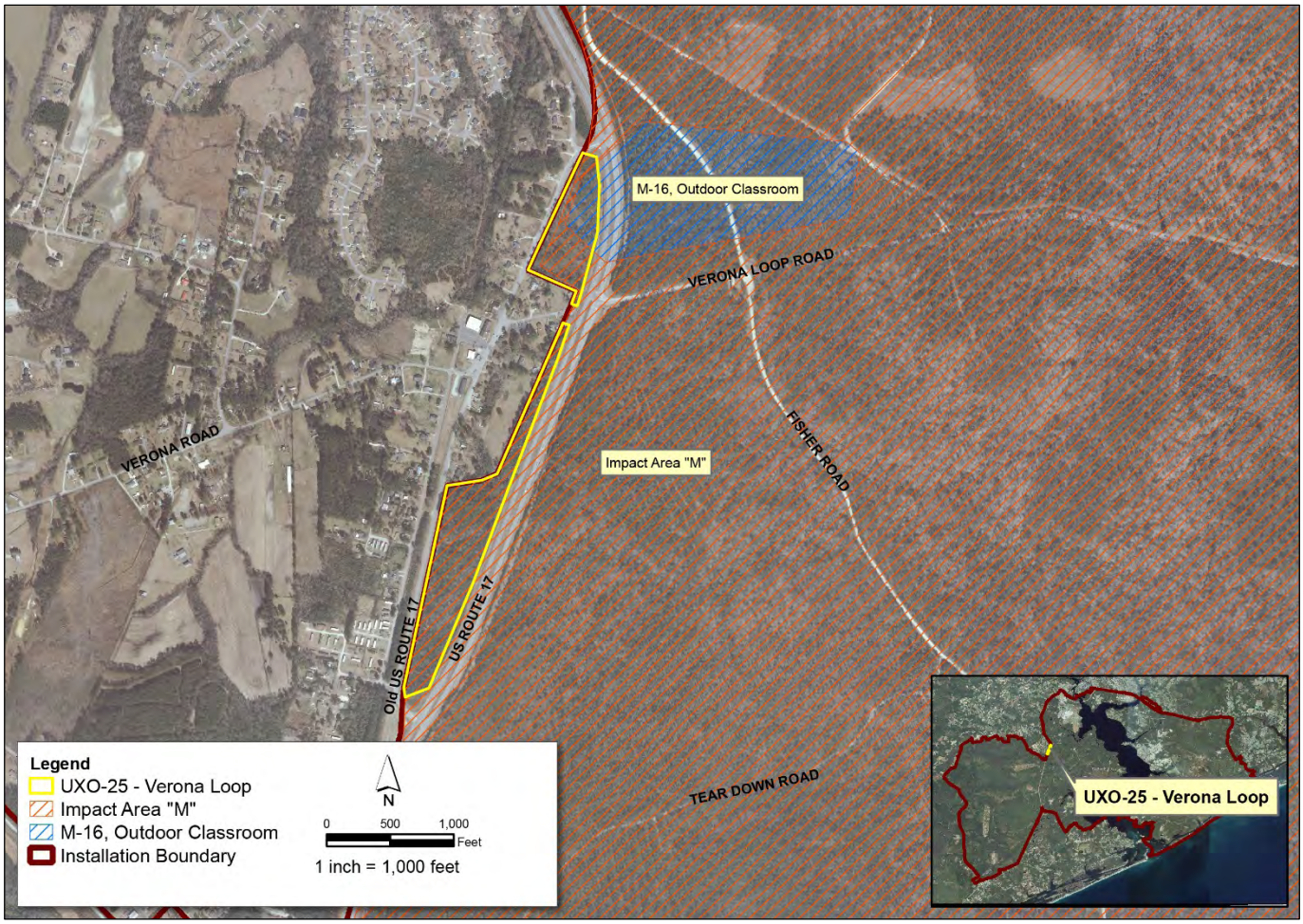
FIGURE 2-1
Base and Site Location Map



2.2 Site Description and Investigation Summary

Site UXO-25 is located on the western side of MCIEAST-MCB CAMLEJ, south of the Marine Corps Air Station New River, along U.S. Route 17 near the township of Verona, North Carolina (**Figure 2-2**). The site encompasses approximately 25 acres of land that was historically a contiguous portion of two former ranges, the Impact Area "M" range (Archives Search Record [ASR] #2.211) and the M-16, Outdoor Classroom range (ASR #2.120) aboard MCIEAST-MCB CAMLEJ. Relocation of U.S. Route 17 in 1999 left the 25-acre site west of U.S. Route 17 separated from MCIEAST-MCB CAMLEJ. The site is bounded by Old U.S. Route 17, which borders residential areas of Verona Township.

FIGURE 2-2
Site Map



2.2.1.1 Site Characteristics

The topography of UXO-25 is relatively flat and heavily vegetated with trees and dense undergrowth. The topography is characterized by low elevations and relatively low relief. Surface elevations range from approximately 50 to 60 feet above mean sea level. The area within UXO-25 is undeveloped, with a small residential area and church located adjacent to the central portion of the site where it is bisected by Verona Loop Road.

2.2.1.2 Range History

The Impact Area “M” range (ASR #2.211) is described as being bounded by U.S. Route 17, Stone Creek, New River, Mill Creek, Verona Loop Road, Lewis Creek, New River, and Southwest Creek (USACE, 2001a). Historical information indicates that from 1941 to approximately 1945, the area was possibly used for live fire and maneuver exercises with the use of mortars, recoilless rifles, 2.36-inch rockets, and hand and rifle grenades (USACE, 2001b). Camp Training Order 5-1946, dated March 19, 1946, states that the former Impact Area “M” range has been disestablished and is no longer used for the firing of live ammunition (USACE, 2001a).

The only reference to the M-16, Outdoor Classroom range (ASR #2.120) is a range map dated 1958. Historical range information indicates that 0.30-caliber blanks may have been used, along with pyrotechnics. This area is no longer used for the firing of live ammunition. Mr. Ben Redmond, a former range control officer at MCIEAST-MCB CAMLEJ, indicated that M-16, Outdoor Classroom was an assembly area consisting of a set of bleachers used for teaching purposes. Mr. Redmond also stated that “the impact area for mortars and artillery was well to the east

(of the subject site), and a lot of the munitions listed [on the Preliminary Range Assessment (PRA)] were not used" (Redmond, 2011).

2.2.1.3 Preliminary Assessment/Site Inspection

In 2012, a Preliminary Assessment/Site Inspection (PA/SI) was conducted at UXO-25 to evaluate the presence and nature of impacts to environmental media resulting from historical munitions use at the site and to evaluate whether additional investigation or remediation activities were necessary. Surface soil, subsurface soil, and groundwater samples were collected and analyzed for explosives residues, perchlorate, and metals (CH2M HILL, 2013).

The concentrations of explosives residues and perchlorate were below regulatory criteria in all media. There were no metals detected in exceedance of background or regulatory standards in groundwater samples. The concentrations of seven metals (aluminum, arsenic, cobalt, hexavalent chromium, iron, manganese, and vanadium) in soil samples exceeded regulatory standards and the MCIEAST-MCB CAMLEJ background threshold value (BTV) (**Tables 2-1 and 2-2**). Based on the results of the human health risk screening and ecological risk screening, which is discussed in detail in the PA/SI report, exposure to surface soil, subsurface soil, and groundwater do not pose unacceptable risks to human health or the environment (**Tables 2-3 and 2-4**) (CH2M HILL, 2013). The methodology for the risk screenings is provided in **Attachment B.**

A digital geophysical mapping (DGM) survey was also conducted over roughly 2.5 acres (10 percent of UXO-25) in both the north and south areas of Site UXO-25, along approximately 34,074 linear feet of transects. The DGM survey identified 361 targets with the characteristics of potential MEC. The intrusive investigation of these 361 targets did not recover any MEC, material potentially presenting an explosive hazard (MPPEH), or munitions related debris (CH2M HILL, 2013).

FIGURE 2-3
UXO-25 Sample Locations - North

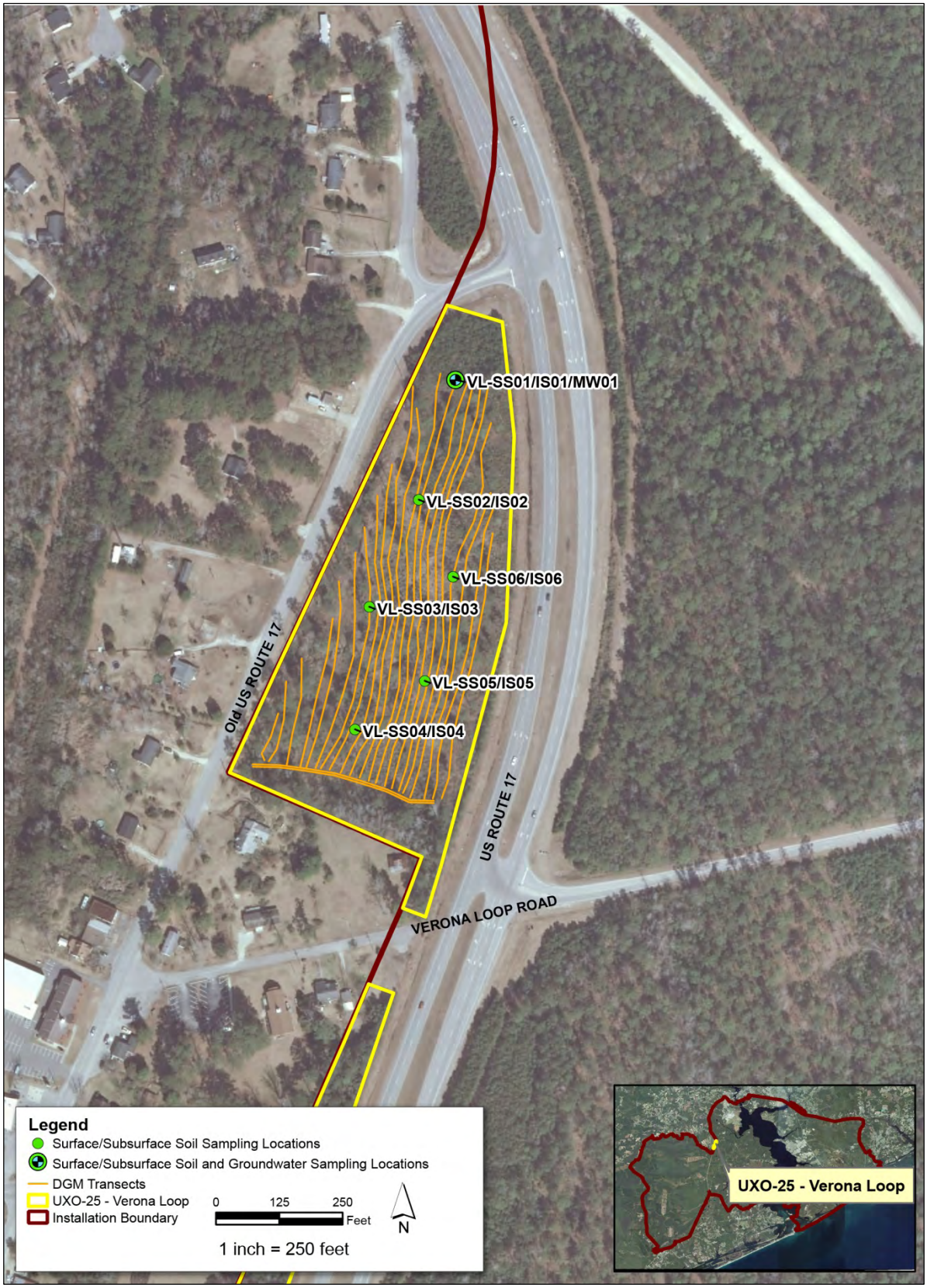


FIGURE 2-4
UXO-25 Sample Locations – South

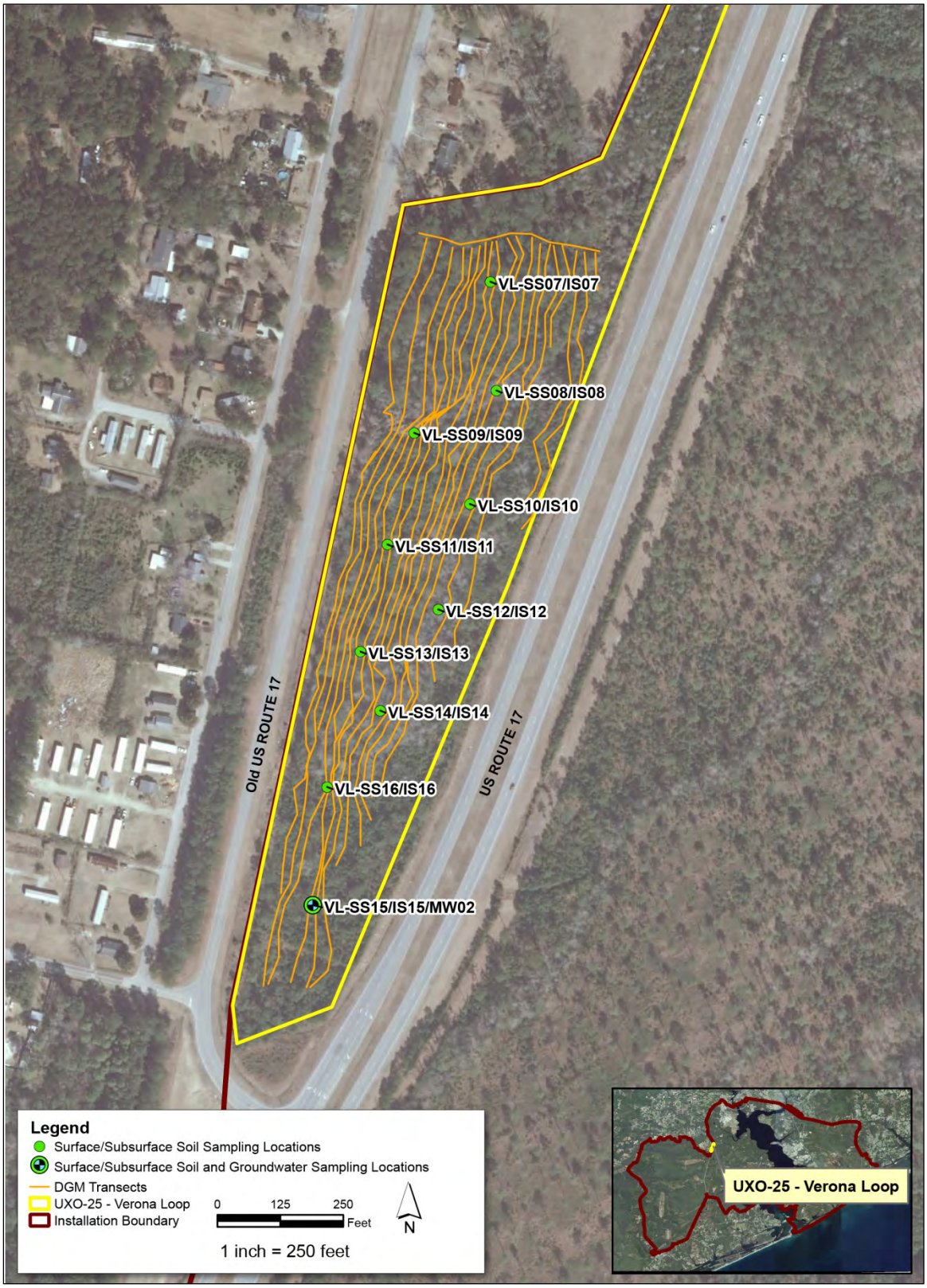


TABLE 2-1
Summary of PA/SI Surface Soil Exceedances - UXO-25

Analyte	Max Concentration (mg/kg)	Location of Max Concentration	BTV Undeveloped Combined Surface Soil (Aug 2011) (mg/kg)	Adjusted Residential RSL (May 2012) (mg/kg)	Adjusted Industrial RSL (May 2012) (mg/kg)	North Carolina Soil Screening Level (Feb 2012) (mg/kg)
Aluminum	18,000	VL-SS14	12,800	7,700	99,000	--
Arsenic	6.9	VL-SS08	1.17	0.39	1.6	5.8
Cobalt	1.6	VL-SS08	0.414	2.3	30	0.9
Iron	9,000	VL-SS08	7,210	5,500	72,000	150
Manganese	79	VL-SS08	37	180	2,300	65
Vanadium	29	VL-SS08	17.6	39	520	6

Notes:

Screening criteria reflect values that were current at the time that the PA/SI report (CH2M HILL, 2013) was submitted.
RSL = regional screening level
mg/kg = milligrams per kilogram

TABLE 2-2
Summary of PA/SI Subsurface Soil Exceedances - UXO-25

Analyte	Max Concentration (mg/kg)	Location of Max Concentration	BTV Undeveloped Combined Subsurface Soil (Aug 2011) (mg/kg)	Adjusted Residential RSL (May 2012) (mg/kg)	Adjusted Industrial RSL (May 2012) (mg/kg)	North Carolina Soil Screening Level (Feb 2012) (mg/kg)
Chromium (hexavalent)	6.59 J	VL-SB11-1-4	3.74	0.29	5.6	3.8

Notes:

Screening criteria reflect values that were current at the time that the PA/SI report (CH2M HILL, 2013) was submitted.

TABLE 2-3
Summary of PA/SI Human Health Risk Screening Results – UXO25

Media	Step 1 Chemicals of Potential Concern (COPCs)	Step 2 COPCs	Step 3 COPCs	Conclusions
Surface Soil	Aluminum Arsenic Thallium	None	NA	No unacceptable risk expected from exposure to surface soil.
Subsurface Soil	Hexavalent Chromium Thallium	None	NA	No unacceptable risk expected from exposure to subsurface soil.
Groundwater	Mercury	None	NA	No unacceptable risk expected from exposure to groundwater.

Notes:

NA – Not applicable. There were no COPCs identified in Step 2, therefore, Step 3 was not conducted.

TABLE 2-4
Summary of Ecological Risk Screening – UXO-25

Media	Maximum-Based Hazard Quotient >1	Results	Conclusions
Surface Soil	Aluminum Antimony Iron Lead Selenium Vanadium Zinc	Results were within the range of background or the mean concentration was less than ecological screening values.	No unacceptable risk expected from exposure to surface soil.
Subsurface Soil	Aluminum Iron Lead Selenium Vanadium	Results were consistent with background levels, within the range of background, or the mean concentration was less than ecological screening values.	No unacceptable risk expected from exposure to subsurface soil.
Groundwater	None	Detected constituents in groundwater either had maximum-based hazard quotients less than one or were consistent with the BTV.	No unacceptable risk expected from exposure to groundwater.

3 NFA Determination

Based on results of the site assessment, there are no unacceptable risks to human health or the environment for current and potential future use at Site UXO-25. The Navy and Marine Corps, with concurrence by the USEPA Region 4 and NCDENR, determine NFA is warranted (**Attachment A**). The no action determination meets the statutory requirements of CERCLA and the regulatory requirements of the NCP for protection of human health and the environment.

4 Community Participation

The Navy, MCIEAST-MCB CAMLEJ, USEPA, and NCDENR provide information regarding the environmental cleanup of sites at MCIEAST-MCB CAMLEJ to the public through the community relations program, which includes a Restoration Advisory Board (RAB), public meetings, the Administrative Record file for the site, and announcements published in local newspapers. RAB meetings are held quarterly and are open to the public to provide an information exchange among community members, the Navy, MCIEAST-MCB CAMLEJ, USEPA, and NCDENR.

References

CH2M HILL. 2013. *Preliminary Assessment/Site Inspection Report, UXO-25 – Verona Loop, Marine Corps Installations East - Marine Corps Base Camp Lejeune, Jacksonville, North Carolina*. February.

Redmond, Ben. 2011. Personal Communication with Ben Redmond, Former Camp Lejeune Range Officer. July 7.

U.S. Army Corps of Engineers (USACE). 2001a. *Final Range Identification and Preliminary Range Assessment, Marine Corps Base Camp Lejeune, Onslow, North Carolina. St. Louis District.* December.

USACE. 2001b. *Archives Search Report, Marine Corps Base Camp Lejeune, Onslow County, North Carolina*. St. Louis District. December.

Acronyms and Abbreviations

ASR	Archives Search Record
BTV	background threshold value
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
COPC	chemical of potential concern
DGM	digital geophysical mapping
FFA	Federal Facilities Agreement
MCIEAST–MCB CAMLEJ	Marine Corps Installations East – Marine Corps Base Camp Lejeune
MEC	munitions and explosives of concern
mg/kg	milligram per kilogram
MMRP	Military Munitions Response Program
MPPEH	material potentially presenting an explosive hazard
NADD	No Action Decision Document
NCDENR	North Carolina Department of Environment and Natural Resources
NFA	No Further Action
NPL	National Priorities List
PA/SI	Preliminary Assessment/Site Inspection
PRA	Preliminary Range Assessment
RAB	Restoration Advisory Board
RSL	regional screening level
SARA	Superfund Amendments and Reauthorization Act of 1986
SVOCs	semi-volatile organic compounds
µg/kg	micrograms/kilogram
µg/L	micrograms/liter
USEPA	U.S. Environmental Protection Agency
UXO	unexploded ordnance

Attachment A
EPA and NCDENR Approval Letters

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

February 12, 2013

NAVFAC Mid-Atlantic
Attn: Bryan Beck Code: OPQE3
NC IPT, EV Business Line
6506 Hampton Blvd
Norfolk, VA 23508-1273

SUBJ: MCB Camp Lejeune
Draft Preliminary Assessment/Site Inspection Report
UXO-25, Verona Loop

Dear Mr. Beck:

The Environmental Protection Agency has completed its review of the above subject document, dated January, 2013 and has no comments. This document can be prepared for finalization.

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

Sincerely,

Gena Townsend

Digitally signed by Gena Townsend
DN: cn=Gena Townsend, o=Superfund Division, Federal Facilities Branch, ou=Environmental Protection Agency, email=townsend.gena@epa.gov, c=US
Date: 2013.02.12 09:05:00 -05'00'

Gena D. Townsend
Senior Project Manager

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

NCDENR
North Carolina Department of Environment and Natural Resources
Division of Waste Management

Pat McCrory
Governor

Dexter R. Matthews
Director

John E. Skvarla, III
Secretary

January 31, 2013

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

RE: Draft Preliminary Assessment/Site Inspection Report
Site UXO-25, Verona Loop
NCDENR Concurrence for No Further Action
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 Preliminary Assessment/Site Inspection Report for Site UXO-25, Verona Loop. Section 7.1 of the report summarizes the conclusions that there are no Human Health or Ecological risks associated with low level detections of select metals in surface and subsurface soils. Additionally, the DGM investigation resulted in no MEC, MPPEH, or munitions related debris. Section 7.2 of the report provides the recommendations that no further action is warranted and recommends closure of Site UXO-25 under the MMRP. NCDENR concurs with these recommendations.

If you have any questions, please contact me at (919) 707-8342.

Sincerely,

Marti Morgan

Marti Morgan
Environmental Engineer
NCDENR Superfund Section

Cc: Charity Rychak, MCB Camp Lejeune
Gena Townsend, US EPA
Randy McElveen

1646 Mail Service Center, Raleigh, North Carolina 27699-1646
Phone: 919-707-8200 \ Internet: http://portal.ncdenr.org/web/wm

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Attachment B
Risk Screening Methodology

Human Health Risk Screening and Assessment Methodology

The Human Health Risk Screening (HHRS) was conducted in three steps using a risk ratio technique (Navy, 2000) as follows.

Step 1. The maximum detected constituent concentration for each media was screened against the following criteria. Note that screening criteria were current at the time that the reports were submitted and may not reflect current standards:

- USEPA-adjusted residential RSLs (soil), tap water RSLs (groundwater), (USEPA, 2012), or other human health risk screening levels (if appropriate)
- BTVs for combined soil types in undeveloped areas (CH2M HILL, 2011a), BTVs for surficial aquifer groundwater (CH2M HILL, 2011b)

Step 2. If the maximum detected concentration exceeded the screening criteria the constituent was retained as a chemical of potential concern (COPC) and a corresponding risk level was calculated in Step 2 using the following equation:

$$\text{corresponding risk level} = \frac{\text{concentration} \times \text{acceptable risk level}}{\text{RSL}}$$

The acceptable risk level is 1 for noncarcinogens and 10^{-6} for carcinogens. The corresponding risk levels for each media were summed to calculate the cumulative hazard index (HI) for noncarcinogens and the cumulative cancer risk for carcinogens. A cumulative HI for each target organ/effect was also calculated. If any target organ/effect HI exceeded 0.5 or cancer risk exceeds 5×10^{-5}, the chemicals corresponding to these values were retained as COPCs and carried forward to Step 3. However, as no COPCs were retained for any of the media, Step 3 was not performed for UXO-25.

Ecological Risk Screening Methodology

The Ecological Screenings (ERS) were conducted as follows.

For each medium (surface soil, subsurface soil, and groundwater), the maximum and arithmetic mean concentrations were compared to Ecological Screening Values (ESVs) intended to be protective of ecological receptors. Hazard Quotients (HQs) were calculated by dividing the exposure concentrations by the ESVs.

The following screening criteria were selected as ESVs. Note that screening criteria were current at the time that the reports were submitted and may not reflect current standards:

- For soil, the USEPA Ecological Soil Screening Levels (EcoSSL) (EPA, 2011a) were preferentially selected over the USEPA Region 4 values (EPA, 2001). When no EcoSSL was available for a constituent, the USEPA Region 4 value was selected.
- For groundwater, the National Recommended Water Quality Criteria (NRWQC) (EPA, 2011b) was preferentially selected over the USEPA Region 4 values. Freshwater ESVs were also used to screen groundwater concentrations and were selected based on nearby Mill Run Creek.

When ESVs were not available using the selected hierarchy above, supplemental ESVs were identified as available. Maximum concentrations of metals in surface and subsurface soil were compared to BTVs for combined soil in undeveloped areas. Maximum concentrations of metals in groundwater were compared to the BTV for the surficial aquifer. Additional lines of evidence in the evaluation include the frequency of detection, frequency of exceedance, magnitude of exceedance, and identification of potential laboratory contaminants.

References

CH2M HILL. 2011a. Expanded Soil Background Study Report, Marine Corps Base Camp Lejeune, Jacksonville, North Carolina. August.

CH2M HILL. 2011b. Draft Expanded Groundwater Background Study Report, Marine Corps Base Camp Lejeune, North Carolina. September.USEPA. 2001. Region 4 Recommended Ecological Screening Values. http://www.epa.gov/region04/waste/ots/ecolbul.htm.

USEPA. 20011a. Ecological Soil Screening Level. http://www.epa.gov/ecotox/ecossl/.

USEPA. 2011b. National Recommended Water Quality Criteria. Originally published May 2005. Website version updated in 2009. http://epa.gov/waterscience/criteria/wqctable/

USEPA. 2012. Regional Screening Levels for Chemicals Contaminants at Superfund Sites. May. http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/Generic_Tables/index.htm

U.S. Navy. 2000. Overview of Screening, Risk Ratio, and Toxicological Evaluation. Procedures for Northern Division Human Health Risk Assessments. May.