FINAL



NO FURTHER ACTION DECISION DOCUMENT

FORMER MARKLEY SMALL ARMS FIRING RANGE

FORMER FORT DEVENS ARMY INSTALLATION, DEVENS, MA

AUGUST 2013

Prepared for: US Army Corp of Engineers New England District Concord, Massachusetts

Prepared by: Sovereign Consulting Inc. Contract No.: W912WJ-10-D-0003 Delivery Order: 0007

NOTICE

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No Further Action Decision Document Former Markley Small Arms Firing Range

FINAL

Devens, Massachusetts

August 2013

CERTIFICATION:

I hereby certify that the enclosed Report, shown and marked in this submittal, is that proposed to be incorporated with Contract Number W912WJ-10-D-0003 DO#0007. This Document has been prepared in accordance with USACE Scope of Work and is hereby submitted for Government Approval.

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No Further Action Decision Document - Markley Range

Sovereign Consulting Inc.

Pursuant to the requirements in Section 6.7 of the FFA, as modified in March 1996, this No Further Action Decision Document documents the determination by the Army that no further action is necessary to address contamination associated with the Former Markley Range Small Arms Firing Range. Therefore, in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act and the National Contingency Plan, all response actions are complete and the United States Environmental Protection Agency and the Massachusetts Department of Environmental Protection signatures constitute concurrence with

this degision.

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8/01 Date

U.S. ENVIRONMENTAL PROTECTION AGENCY

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ABBREVIATIONS, ACRONYMS, AND SYMBOLS

AM	Action Memorandum
Army	U.S. Army
ASR	Archives Search Report
BAR	Browning Automatic Rifle
BCT	Base Closure Team
bgs	below ground surface
BRAC	Base Realignment and Closure
BTAG	Biological Technical Advisory Group
COPC	Contaminant of Potential Concern
COPEC	Contaminant of Potential Environmental Concern
CSM	Conceptual Site Model
Fort Devens	former Fort Devens
DOD	Department of Defense
DU	Decision Unit
E&E	Ecology & Environment
EcoSSL	Ecological Soil Screening Levels
ft	feet
HGL	HydroGeologic, Inc.
ISM	Incremental Sampling Method
LOAEL	lowest observed adverse effects levels
MA	Massachusetts
Markley Range	former Markley Small Arms Firing Range
MassDEP	Massachusetts Department of Environmental Protection
MassDevelopment	Massachusetts Development and Finance Agency
MCP	Massachusetts Contingency Plan
MC	Munitions Constituent
mg/kg	milligram per kilogram
NFA	No Further Action
NFADD	No Further Action Decision Document
PAL	Project Action Level
QA/QC	Quality Assurance/Quality Control
RACR	Removal Action Completion Report
RAWP	Removal Action Work Plan
SOW	Statement of Work
Sovereign	Sovereign Consulting Inc.
SI	Site Inspection
TAL	Target Analyte List
TCLP	Toxicity Characteristic Leaching Procedure
USACE	United States Army Corp of Engineers
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
UXO	Unexploded Ordinance
XRF	X-Ray Florescence technology

1.0 INTRODUCTION

This No Further Action Decision Document (NFADD) was prepared by Sovereign Consulting Inc. (Sovereign) for the former Markley Small Arms Firing Range (Markley Range) at the former Fort Devens Army Installation (Fort Devens) located in Devens, Massachusetts. This NFADD was prepared to explain the reasons why no further investigation or remediation is required at the Markley Range, based on review of available soil, groundwater, and sediment investigative data collected to date and comparison of the data to applicable human health and ecological project-based action levels.

In accordance with the approved Removal Action Work Plan (RAWP) (Sovereign, October 2011) and the RAWP Addendum (Sovereign, February 2012), a removal action was conducted at the Markley Range from August 2011 through July 2012 to remove lead impacted soils from Decision Unit (DU)-1, also known as the South Berm, and DU-6, also known as the Uphill Unit. Lead in soil is a contaminant of potential concern (COPC) for human health and a contaminant of potential ecological concern (COPEC) at the Markley Range. The removal action addressed lead-impacted soil removal, stabilization, and disposal. The primary project goal was to reduce lead concentrations in soil at the DU-1 and DU-6 portions of the former range to below an established Project Action Level (PAL) in order to be protective of human health and the environment and prepare the Markley Range for eventual reuse or redevelopment into open space and/or recreational use. In addition, in order to determine if additional impacts existed to nearby ecological receptors, groundwater and sediment data were collected and further risk evaluations were conducted. The data collected during the removal action confirm that current site conditions do not pose a threat to human health or the environment.

2.0 SITE DESCRIPTION AND HISTORY

2.1 Surrounding Area and Land Use

Devens is located approximately 35 miles northwest of the city of Boston, within the towns of Ayer, Shirley (Middlesex County), Harvard and Lancaster (Worcester County) in the Commonwealth of MA (see Figure 1). Fort Devens was established in 1917 for military training and logistical support during World War I. Fort Devens became a permanent Base in 1931 and continued service until its Base Realignment and Closure (BRAC) Committee closure in 1996. Following the closure of the Base in March 1996, portions of the facility have been subject to property transfer to Massachusetts Development and Finance Agency (MassDevelopment) as part of closure activities. The Markley Range is located on property owned and managed by MassDevelopment and is currently zoned for open space/recreation use.

To the south, the Markley Range abuts the former Davao housing area, zoned innovation and technology business. Robbins Pond is located approximately 750 feet west of the site. The area located north of Markley Range, across Barnum Road, is zoned industrial and trade and is developed with a currently vacant distribution building and the 94th Regional Readiness Command (U.S. Army Reserves) (Figure 2).

2.2 Site Background

The Markley Range is a former rifle and machine gun range that was operational from the 1920s through the 1940s, and possibly into the mid-1950s [HydroGeologic, Inc. (HGL), 2011]. A 1942 range location map from the 1995 Archives Search Report (ASR) identified the Markley Range

as a "1000-Inch Rifle and Machine Gun Range," with target storage, observation and other support structures. Subsequent range maps (1950s era) identify the Markley Range as a 1000-inch Browning Automatic Rifle (BAR) and carbine range (HGL, 2011).

2.3 Historical Investigations

A review of historical aerial photographs for the years 1965, 1980, and 2007 was performed as part of the August 2011 *Final Site Inspection Report, Markley Range, Former Fort Devens Army Installation, Devens, Massachusetts,* prepared by HGL (HGL, 2011). This review indicated that the Markley Range may have been active in the early 1960s, due to ground scarring and the absence of vegetation observed in the 1965 aerial photograph; however, the construction of the Davao housing area immediately downrange (south) of the Markley range in the early 1960s suggests the range was largely abandoned once the housing area was developed. Based on observations made of the 1980 and 2007 aerial photographs, HGL confirmed the likely firing line was located at the northern end of the range with a backstop at the southern end. The South Berm (DU-1) was historically a sandy former backstop/berm area at the southern end of the range which was removed at an unknown date (**Figure 3**).

Cold Spring Brook is located to the south and east of the former range, flowing generally to the east (Figure 1). Based on groundwater data collected by Sovereign in 2011, groundwater flows west to east in the vicinity of the Markley Range. To the south of the site, the terrain rises steeply in elevation. Local topography drains to the wetland to the east of the site. An overgrown and unimproved gravel road leads from Barnum Road to a partial clearing that represents the remnants of the Markley Range. The old access road then continues to the southeast along the wetland area located to the east. No buildings or structures remain at the site. The site is largely flat and forested at the perimeter (Figures 3 and 4).

In 2009 and 2010, HGL performed Site Inspection (SI) activities which included unexploded ordnance (UXO) clearance, establishing individual sample area DUs, collection of soil and sediment samples to confirm the presence or absence of munitions constituents (MC), evaluation of analytical results and identifying COPCs, performing cumulative human health and risk screening, and developing a Conceptual Site Model (CSM) for the Markley Range area to identify whether the Markley Range required a response action such as soil removal, or qualified for No Further Action (NFA) (HGL, 2011).

Shallow soil samples were collected in six (6) DUs (DU-1 through DU-6) across the Markley Range including the presumed berm areas (DU-1 and DU-2), the firing areas (DU-3 and DU-4), the down range area (DU-5), and the uphill area (DU-6) at multiple depth intervals up to 18 inches below grade (Figure 3). As part of an Incremental Sampling Method (ISM) approach (USACE, 2009), a systematic, random sampling grid was developed for each DU where 80 or more increments were collected between depths of 0 to 18 inches below grade and combined into one (1) composite sample. For each DU, one (1) composite sample (1 kilogram or larger) was submitted for metals analysis and select samples from three (3) of the six (6) DUs (DU-3, DU-4, and DU-5) were submitted for explosives analysis. To assess additional ecological risk of grit ingestion by fowl, HGL conducted a lead fragment count analysis of samples collected from three (3) DUs (DU-1, DU-2, and DU-6) where lead shot would likely be found. One (1) sediment sample (MR-SD200-0409) was also collected from the wetland located to the east of the former range and analyzed for metals and explosives (Figure 3).

HGL conducted human health and ecological risk screenings to evaluate contaminants detected in investigation data and determine risk threshold values for each receptor. A human health risk screening value for lead in soil of 300 milligrams per kilogram (mg/kg) was established based on the Massachusetts Contingency Plan (MCP) S-1 soil standard for lead for unrestricted use of the property. Based on this screening value and a lead detection of 1,100 mg/kg at 16-18 inches below grade at DU-1, lead was retained as the primary COPC at the site. HGL determined that the extent of lead concentrations above the 300 mg/kg human health screening value for lead appeared limited to the DU-1 area. Lead-contaminated soil at DU-1 was detected at up to 18 inches below grade, however, further vertical extent of lead-contaminated soil was not conducted during the SI. Lead concentrations in shallow soil at DU-1 were deemed to pose a potential risk to human health due to soil contact and potential impact on the underlying groundwater.

HGL established an ecological risk screening value for lead in soil of 100 mg/kg for ecological receptors, based on a screening level cleanup goal developed by the United States Environmental Protection Agency (USEPA) for a trap and skeet range at the Patuxent Research Refuge in Maryland and used for a removal action at the Bryant Range (Weston, 2006), located 1.2 miles from the Markley Range. The similarities between the ecological communities and sources of lead contamination for the Markley Range and Bryant Range sites suggested that the Bryant Range cleanup goal was appropriate for use at the Markley Range. Maximum lead concentrations in soil at the Markley Range exceeded the ecological screening value at four (4) DUs: DU-1 (1,100 mg/kg), DU-4 (110 mg/kg), DU-5 (120 mg/kg), and DU-6 (160 mg/kg). However, lead concentrations at DU-4, DU-5, and DU-6 were considered to pose minimal threat to ecological receptors based on the low ratios by which the three lead detections exceeded the screening value and based on a comparison to the lowest observed adverse effects levels (LOAELs) calculated in the Patuxent Research Refuge risk assessment (260 mg/kg for the earthworm; 320 mg/kg for the American robin; and 440 mg/kg for the short-tailed shrew), [U.S. Fish and Wildlife Service (USFWS) and USEPA, 2004]. The lead concentration in soil at DU-1 was greater than all the LOAELs and was determined to pose a threat to ecological receptors. Thus, lead was retained as a primary COPEC at the site. Antimony at DU-1 and copper at DU-1 were also retained as COPECs based on exceedances of the USEPA Ecological Soil Screening Levels (EcoSSL) (USEPA, 2007) for these metals in soil. It was determined that lead was the major risk driver at the site; all other contaminants of concern were typically co-located with lead and a removal action targeted towards lead within the DU-1 area would directly result in the reduction of ancillary contaminant of concern risks (HGL, 2011).

The results of the lead particle evaluation were within the range considered to be protective of avian species, with the exception of one (1) sample collected at DU-1 which exceeded the acceptable range of 3-13 particles. The recommended DU-1 removal action to address COPCs and COPECs in soil was deemed suitable to address lead particle exceedances and no additional site actions were recommended. No explosives were detected above PALs in any of the samples submitted for analysis.

HGL compared results from a single sediment sample collected in the wetland to USEPA Region 3 Biological Technical Advisory Group (BTAG) Freshwater Sediment Screening Benchmarks (USEPA Region 3, 2012) and maximum background levels for sediment, specific to Fort Devens [Ecology & Environment (E&E), 1994]. Based on these screening levels, HGL identified the following primary COPECs in sediment: antimony, arsenic, copper, lead, manganese, and nickel.

3.0 INVESTIGATION AND REMOVAL ACTION

In accordance with the RAWP (Sovereign, October 2011), the primary project goal was to reduce concentrations of lead in soil at the Markley Range to below the established PAL of 300 mg/kg in order to be protective of human health and reduce the threat to ecological receptors. The project goal is intended to prepare the former Markley Range for eventual reuse or redevelopment into open space/recreation use. The PAL is based upon the Massachusetts Department of Environmental Protection (MassDEP) soil standard for unrestricted use and addresses the potential human health risks associated with lead contamination.

In addition, an evaluation of the condition of underlying groundwater and nearby wetland sediments was needed to determine if threats to nearby ecological receptors existed. Updated data following the removal was used to evaluate human-health and ecological risks at Markley Range. All data collected and additional detailed information are included in the Final Removal Action Completion Report (RACR) (Sovereign, 2013).

3.1 Soil

The removal action included the excavation of lead-impacted soil from existing decision units DU-1 and DU-6 and from two (2) extension areas adjacent to the decision units. The DU-1 Extension (DU-1 EXT) was located to the east of DU-1 and the DU-6 Extension (DU-6 EXT) was located to the west of DU-6 (Figure 4).

The initial DU-1 excavation consisted of removing soil from an approximate $200 \times 30 \times 2$ ft deep area. Screening of soil was conducted using X-ray Fluorescence (XRF) technology in order to record soil lead levels in the field and indicate if deeper excavation was warranted. During the excavation, soil lead concentrations above the PAL were observed at the excavation base and outside of the proposed excavation boundary on the eastern sidewall. The excavation base was excavated further to 4 ft below ground surface (bgs) in DU-1 East and 3.5 ft bgs in DU-1 West, based on field screening levels (Figure 4). Additional excavation of an approximately $50 \times 50 \times 3$ ft area, based on field screening levels, was conducted adjacent to the eastern excavation boundary. This area was identified as DU-1 EXT (Figure 4). The base of DU-1 EXT was further excavated to 4 ft bgs in order to reach lead concentrations below the primary PAL for lead of 300 mg/kg. A total of approximately 1,600 tons of soil was removed from the DU-1 areas.

DU-6 had not been previously identified during the HGL SI as an impacted area needing soil removal. To confirm, Sovereign conducted preliminary soil sampling within DU-6, consisting of three (3) surficial soil samples (SO001, SO002, and SO003). These samples were collected within DU-6 at approximately 1.5 ft bgs and submitted to the laboratory for lead analysis. The resulting analytical data revealed lead impacts above the PAL in areas where Sovereign had visually observed bullet fragments beginning at approximately 1.5 ft bgs. Sovereign began initial removal of shallow soils in these areas and conducted test-pitting along the length of the hillside thus revealing observable target areas and a bullet fragment layer that extended across the hillside at approximately 2 to 4 ft below grade. Soil was stained with rust from rounds containing steel jackets. Target posts, used to hold vertical targets in place, were found below grade in areas with high bullet concentrations. Based on this evidence, the U.S. Army (Army) concluded that the DU-6 hillside was historically used as a range backstop behind the primary berm at DU-1.

The DU-6 excavation area measured approximately 200 x 50 ft, to an approximate depth of 3-7 ft below grade, varying based on the elevation change of the DU-6 hillside (Figure 4). Where

possible, the top 1 ft of organic soil (documented to be non-impacted during the HGL investigation) was set aside to be reused as fill material. During the excavation, soil was screened in the field by XRF and soils with lead concentrations above the PAL were observed outside of the proposed DU-6 excavation boundary on the western sidewall. A series of testpits were dug beyond the western sidewall to find the extent of target areas and bullet fragments. Based on test pit results and XRF field screenings, an additional 270 cubic yards (400 tons) of soil was removed from an area adjacent to the western excavation boundary identified as DU-6 EXT (Figure 4). This excavation area extended to an approximate depth of 3 ft below grade. A total of approximately 2,400 tons of soil was removed from the DU-6 areas.

Soil within the excavation areas containing bullet fragments and high lead concentrations was excavated, stockpiled and treated using EnviroBlend® stabilization material to reduce lead leachability prior to removal from the site. Following treatment, excavated soil was mechanically screened to remove lead particles greater than 0.25 inches in diameter using a Trommel screen and a secondary vibratory screen. Samples were collected from treated and screened soil piles and analyzed for Toxicity Characteristic Leaching Procedure (TCLP) for lead to confirm the effectiveness of the EnviroBlend® treatment and to ensure soil met non-hazardous disposal facility requirements. Treated soil was subsequently transported off site for disposal as non-hazardous material at the Waste Management Landfill Facility in Rochester, New Hampshire (NH). The lead bullets and other tailings and debris removed during the screening process were segregated, containerized, and disposed of as hazardous material at the EQ Detroit Class C facility for hazardous waste in Detroit, Michigan (MI).

The collection of confirmatory soil samples was completed in all excavation areas. An ISM approach (USACE, 2009) was conducted at the base of each excavation. One (1) composite sample (at approximately 1 kilogram) was submitted based on incremental samples collected from within a systematic, random grid set up within each of the excavation bases for DU-1 EXT, DU-6 EXT, DU-1, and DU-6. Due to the size of DU-6 and DU-1, each of these units was separated into east and west sampling grids. In total, six (6) ISM sampling grids, or decision units, were created. The number of incremental sample points per grid varied from 37 to 85 depending upon the size of the particular excavation area. Refer to Figure 5 for a depiction of the sampling grids for each DU. For each grid, a duplicate and triplicate sample was collected, according to ISM protocol and the approved RAWP. The collection location of the incremental sample in each grid square varied based on the sample's designation as the primary, duplicate or triplicate, according to ISM protocol. ISM soil samples were submitted to TestAmerica Laboratories, Inc. (TestAmerica) in Burlington, Vermont for lead analysis following laboratory preparation by Method 8330B protocol, including air drying and sieving, however the samples were not ground with a puck mill by the laboratory, due to possible positive bias of metals data due to the wear metals of the case iron puck mill grinder contaminating the incremental soil sample. The low chromium case ion puck mill grinder bowl and disc that TestAmerica uses contains known concentrations of lead and other metals. Subsequent analysis of lead was performed using USEPA Method 6010B, which also includes a thorough homogenization procedure as well as a sub-sampling procedure of the entire incremental sample.

Confirmatory sidewall samples were collected from each outer wall of the excavation areas. The shallow depth of the sidewall samples was consistent at 18-24 inches so as to be relevant for the ecological risk evaluation for the Markley Range. Grab samples were collected along each sidewall at a rate of approximately one (1) per 20 lateral feet and composited into one (1) sample per sidewall. Soil samples were composited and homogenized using stainless steel

scoops and bowls and properly preserved prior to submittal to Alpha Laboratories (Alpha) of Westborough, MA for lead analysis by EPA Method 6010B.

Upon completion of the removal and receipt of the confirmatory soil data, each excavation area was backfilled with clean fill from the USACE-approved P.J. Keating Company (Keating) of Lunenberg, MA off-site backfill source. A total of 3,900 tons of fill material was brought on-site from Keating. Site restoration included re-grading to complement the local topography to return the site to approximate prior conditions. To protect from erosion, topsoil was added over disturbed areas and a USACE-approved native seed mix was applied to the restored area.

3.2 Groundwater

Five (5) temporary groundwater monitoring points were installed via direct-push drilling methods at the site in August 2011. Two (2) points (MR-GSP001, and MR-GSP002) were placed on the downgradient path to the wetland and one (1) point (MR-GSP003) was placed upgradient of DU-1. The final two (2) points (MR-GFCP004 and MR-GFCP005) were used as groundwater flow confirmation points and were placed laterally to sampling points in order to obtain an accurate triangulation of groundwater flow (Figure 4). Groundwater from three (3) of the monitoring points (MR-GSP001, MR-GSP002, and MR-GSP003) was sampled in order to characterize background conditions and determine groundwater quality in the area downgradient of DU-1 (i.e., between DU-1 and the nearby wetland). Samples were collected within 24-72 hours of installation, field-filtered, and submitted for lead analysis.

All five (5) temporary groundwater monitoring points were removed in October 2012.

3.3 Sediment

In order to confirm the results of the one (1) sediment sample collected by HGL during the SI (Figure 3) and document whether or not sediment conditions are potentially harmful to ecological receptors, four (4) sediment samples (MR-SD001 through MR-SD004) were collected from the wetland sediments located to the east of the site. Sediment samples were collected from the nearby wetland in drainage locations in-line with the presumed groundwater flowpath from the Markley Range. Sample locations were also based on the direction of stormwater runoff from the area of contamination, in-line with the potential locations where eroded soils from the impacted area enter the wetland. Samples were submitted to the laboratory for analysis of target analyte list (TAL) metals.

4.0 FINDINGS AND RISK EVALUATION

Sample results were compared to several screening tools in order to determine if concentrations found in soil, groundwater, or sediment presented a risk to human health or the environment. The MassDEP S-1 soil standard for lead of 300 mg/kg for unrestricted future use of the property was established as the PAL. Groundwater concentrations were compared to the suitable analogous MCP Method 1 S-1/GW-3 standard for lead for use with any groundwater potentially discharging to surface water. Sediment concentrations were compared to the maximum background concentrations for sediment specific to Fort Devens and to USEPA Biological Technical Assistance Group (BTAG) Sediment Screening Benchmarks for freshwater.

4.1 Soil

The sidewall composite samples contained a mean lead concentration (arithmetic average) of 76.5 mg/kg for DU-1, including the DU-1 EXT, and 28.8 mg/kg for DU-6 including the DU-6 EXT. The bottom ISM sample results contained a mean lead concentration of 46.1 mg/kg for

DU-1, including the DU-1 EXT, and 48.9 mg/kg for DU-6 including the DU-6 EXT. No samples exceeded the PAL of 300 mg/kg and current site conditions do not pose a threat to human health. Of the 27 total soil samples collected, 26 lead results were less than the ecological benchmark value of 100 mg/kg. This value was selected for the Markley Range from a similar ecological assessment for a trap and skeet range at the Patuxent Research Refuge in Laurel, Maryland and used for a removal action at the Bryant Range (Weston, 2006), located 1.2 miles from the Markley Range. One (1) composite sidewall sample result collected from the DU-1 Extension (210 mg/kg at MR-DU1EXT-102511) exceeded this screening value. However, this detection was less than the lowest observed adverse effects levels (LOAELs) (260 mg/kg for the earthworm; 320 mg/kg for the American robin; and 440 mg/kg for the short-tailed shrew) calculated in the Patuxent Research Refuge risk assessment (USFWS and USEPA, 2004). Based on the isolated exceedance and the comparison to the LOAELs, lead in soil at the Markley Range poses minimal threat to ecological receptors, even with this isolated detection below the LOAELs.

4.2 Groundwater

Results for groundwater collected from the three (3) temporary monitoring wells were nondetect for dissolved lead. These data demonstrate that lead has not leached from the site into groundwater and that the groundwater does not pose a threat to human health. An exposure pathway was not found to exist between lead in soil and underlying groundwater.

4.3 Sediment

Concentrations of TAL metals in sediment samples were below established USEPA BTAG Freshwater Sediment Screening Benchmarks, with the exception of arsenic in sample MR-SD004 at 14.3 mg/kg. This result was duplicated in the Quality Assurance/Quality Control (QA/QC) duplicate sample collected at this location at 16.3 mg/kg. However, these arsenic results were within the range of maximum background concentrations for sediment specific to Fort Devens (E&E, 1994), suggesting that the arsenic is naturally occurring. In addition, this arsenic value was consistent with background arsenic concentrations in soil, as found in the Final Metals In Soil Investigation In Support of Arsenic Background Study performed by Nobis Engineering, Inc. (Nobis, 2004). Thus, it is unlikely that elevated contaminant concentrations in soil at the Markley Range have migrated to nearby wetland sediments through a groundwater exposure pathway.

5.0 COMMUNITY RELATIONS

A press release was published to inform the public of the existence of an Action Memorandum (AM) summarizing actions underway to reduce risk to human health and the environment from contaminants in soil. An informal public comment period on this document was held from October 24 to November 23, 2011. No comments were received. Throughout the investigation and response action, the Base Closure Team (BCT), including representatives from USEPA, MassDEP, MassDevelopment, the Devens Restoration Advisory Board (RAB), and the People of Ayer Concerned about the Environment (PACE), was kept informed of activities at the site through informational correspondence and monthly meetings. Details of the changing scope, including soil screening and analytical results which determined the necessity for further investigation, were delivered to the BCT in regular electronic mail updates on recent findings and activities.

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6.0 CONCLUSIONS

Historic firing range activities led to elevated levels of lead in the soil at the Markley Range. The removal action conducted at the site from August 2011 through July 2012 removed soil with concentrations above the MassDEP S-1 soil cleanup standard for lead. Excavation extents were confirmed by post-excavation confirmatory soil sampling results. Final soil lead results confirm that the Markley Range was remediated below the PAL and therefore, the remaining soils do not pose a threat to human health or the environment.

Historic elevated lead concentrations in soil at DU-1 offered the potential for an adverse impact to the underlying groundwater if lead leached out of the soil into groundwater. In order to update the CSM for the site, groundwater flow and sampling data were collected as part of initial Sovereign removal action activities. Groundwater flow data confirmed the depth to groundwater in the vicinity of the Markley Range (7 to 16 ft bgs) and the direction of groundwater towards the east and the nearby wetland. Dissolved lead concentrations were non-detect in groundwater samples collected from one (1) point upgradient of DU-1 and two (2) downgradient points; therefore, these data demonstrate that historical lead contamination within the soils has not leached from the site into groundwater and that groundwater does not pose a threat to human health. An exposure pathway was not found to exist between lead in soil and underlying groundwater. Furthermore, sediment samples collected from the nearby wetland in drainage locations in line with the presumed groundwater flowpath from the Markley Range contained metal concentrations below the range of background values for Fort Devens. Thus, it is unlikely that that elevated contaminant concentrations in soil at the Markley Range have migrated to nearby wetland sediments through a groundwater exposure pathway.

Based on potential pathways of exposure to current and future human and ecological receptors, the results of the soil and sediment analyses completed as part of the SI performed by HGL, and the results of the soil, groundwater and sediment analyses completed as part of removal activities completed by Sovereign in 2011 and 2012, no significant risks to human or ecological receptors are identified at the site and current site conditions do not pose a threat to human health or the environment.

7.0 SUPPORTING DATA

Detailed information on the site is included in the Final Removal Action Completion Report dated May 15, 2013. Additional information is found in the Administrative Record for the site. The RACR for the Former Markley Range memorializes the completion of the removal action objectives.

8.0 DECISION

Following the USEPA's February 25, 2008 designation of the Markley Range as a Study Area under the Fort Devens Federal Facility Agreement (FFA), the site was investigated and a subsequent removal action was performed. The response activities conducted at the Markley Range are protective of human health and the environment. The Army has determined that the response activities have achieved the objectives set forth in Statement of Work (SOW) (USACE, 2011) for the Markley Range and the RAWPs. Therefore, the Army requires no further response actions with respect to the Markley Range and the decision has been made to remove the former Markley Range from further consideration in the Army's BRAC Environmental Restoration Program.

8

Sovereign Consulting Inc.

Pursuant to the requirements in Section 6.7 of the FFA, as modified in March 1996, this No Further Action Decision Document documents the determination by the Army that no further action is necessary to address contamination associated with the Former Markley Range Small Arms Firing Range. Therefore, in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act and the National Contingency Plan, all response actions are complete and the United States Environmental Protection Agency and the Massachusetts Department of Environmental Protection signatures constitute concurrence with this degision.

Robert I. Simeone Army BRAC Environmental Coordinator

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Q. Cnollm

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David Chaffin **Remedial Project Manager**

Concur Non-Concur (Provide reasons for non-concurrence)

9.0 **REFERENCES**

Ecology & Environment, Inc. (E&E). 1994. Remedial Investigations Report, Functional Area II, General Information, Vol IV, Appendix K, Former Fort Devens Army Installation, Devens, Massachusetts. August.

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1.1.1

FIGURES

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Notes: 1) Figure based off of "Figure 3.1 Former Markley Range" created by HydroGeoLogie (HGL) Inc (November 19, 2010).

7/25/2012 ROV Updated 8/03/2012 ROV



7/25/2012 ROV Updated 12/18/2012 ROV



7/25/2012 ROV Updated 02/25/2013 ROV

Reviewers:	Ron Ostro	Comment	Location		Comment Response	
Reviewer	Cmt. #		Sec.	Page		
MassDevel	opment (Ma	ssDev)				
RO	1	Add month to Base closure date	2.1	1	Added 'March 1996'.	
RO	2.	Reworded 'To the South, the Markley Range abuts the former Davao housing area, zoned innovation and technology business.'	2.1	1	Reworded.	
RO	3.	Replace Anheuser Busch distribution building	2.1	1	Corrected to 'currently vacant' distribution building.	
RO	4.	Add 'The five (5) temporary groundwater monitoring points were removed in October 2012.'	3.2	6	Text added to the end of Section 3.2.	
Massachus	etts Departn	nent of Environmental Protection (MassDEP)				
DC	5.	The final Removal Action Completion Report should be cited to identify the primary source of information presented in this section and subsequent sections.	3.0	All	Final RACR cited.	
DC	6.	The depth of the DU-1 West excavation should be confirmed and the confirmed value should be noted in Section 3.1 and Figure 4 (text and figure values are inconsistent), and for completeness, listing the depth of the DU-6 EXT excavation in this section is recommended.	3.1	4-5	The depth of DU-1 West corrected to '3.5 ft bgs' in the text and the depth of the DU-6 EXT added with the text: 'This excavation area extended to an approximate depth of 3 ft below grade.'	
DC	7.	Section 3 should include a subsection that summarizes the site restoration work (refer to completion report).	3.0	6	Site restoration information was included at the end of Section 3.1.	
DC	8.	The final Removal Action Completion Report should be listed here.	9.0	10	Final RACR added to reference list.	
US Enviro	nmental Pro	tection Agency (USEPA)				
GL	9.	Revise the reference to the RACR in Section 7.0 to the March 2013 Draft Final (or a Final version if Army intends to issue a Final) and revise the term Remedial to Removal.	7.0	All	Corrected – reference to the RACR updated to May 2013 Final version and Remedial changed to Removal throughout document.	

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Copies

То 2 - CD / Attachments Ginny Lombardo - USEPA David Chaffin - MADEP CD / Attachments Hui Laing - MADEP CD / Attachments Julia Corenzwit - Co-Chair, Devens Restoration Advisory Board CD / Attachments Laurie Nehring - PACE CD / Attachments Richard Doherty - Engineering and Consultant Resources, Inc. CD James Greacen - Mabbett & Associates CD / Attachments Ron Ostrowski - Mass Development CD / Attachments Deborah Gevalt - Haley & Aldrich, Inc. CD / Attachments

- From: Laura Simkins Sovereign Consulting Inc.
- Cc:Bob Simeone BEC, Devens RFTACD / Daptiv / AttachmentsEllen Iorio USACE New England District2 CD / Daptiv / AttachmentsMarc Cicalese Sovereign ConsultingElectronic copy

Date August 14, 2013

Subject: Former Markley Small Arms Firing Range – No Further Action Decision Document (Final Version) Contract Number W912WJ-10-D-0003, Delivery Order 0007

On behalf of the US Army Corps of Engineers (USACE) New England District and the Army BRAC Environmental Office at Devens, Sovereign is pleased to provide the following attachments:

- 1. CD
- 2. Replacement Binder Cover Pages and Spines
- 3. Replacement Signature Page

These items are provided to update the May 2013 version of the No Further Action Decision Document. Please contact Bob Simeone or myself if there are questions regarding the attachments.

Sincerely,

Laura Simkins Project Manager

Sovereign Consulting Inc 16 Chestnut Street, Suite 520 Foxboro, Massachusetts 02035 Tel 508-339-3200 / Fax 508-339-3248

TRANSMITTAL MEMO

Copies

То	Ginny Lombardo – USEPA	2 - CD / Attachments
	David Chaffin – MADEP	CD / Attachments
	Hui Laing – MADEP	CD / Attachments
	Julia Corenzwit - Co-Chair, Devens Restoration Advisory Board	CD / Attachments
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	Ellen Iorio - USACE New England District	2 - CD / Daptiv / Attachments
	Marc Cicalese – Sovereign Consulting	Electronic copy

Date May 2013

Subject: Former Markley Small Arms Firing Range – No Further Action Decision Document (Draft Final Version) Contract Number W912WJ-10-D-0003, Delivery Order 0007

On behalf of the US Army Corps of Engineers (USACE) New England District and the Army BRAC Environmental Office at Devens, Sovereign is pleased to provide the following attachments:

1. CD

2. Draft Final No Further Action Decision Document

The 45-day review period for this document will conclude on 24 July 2013. Please contact Bob Simeone or myself if there are questions regarding the attachments.

Sincerely, Family

Laura Simkins Project Manager

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