

# No Further Action Proposed Plan Duluth Air National Guard Base Duluth, Minnesota

## Draft Final

**Site:**

Lead Contaminated Soils Area and Small Arms Range  
Duluth Air National Guard Base

**Prepared for:**

Air National Guard  
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3501 Fetchet Avenue  
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Contract #: DAHA92-02-D-0012  
Task Order #: 0077

November 2012



**Proposed Plan for  
Lead Contaminated Soils Area and  
Small Arms Range  
Duluth Air National Guard Base, Minnesota**



**Air National Guard**

## ***1 Introduction***

The Air National Guard (ANG) is submitting this No Further Action (NFA) Proposed Plan for two Munitions Response Sites (MRSs): the Lead Contaminated Soils Area (LCSA), also known as SR739, and the Small Arms Range (SAR), also known as SR736, at the 148th Fighter Wing (FW), Duluth Air National Guard Base (ANGB), Duluth, Minnesota. Historical munitions-related activities at the two MRSs led to the potential for contamination of environmental media with munitions constituents that could potentially present a threat to human health and the environment. The SAR was used for small arms munitions training (including pistols and rifles) from the 1960s to 1992. In 1992, metals contaminated soil from the SAR firing berm was deposited in what became known as the LCSA. Investigative and removal actions conducted at the LCSA and SAR have addressed any residual contamination from these historical munitions-related activities and led the ANG to recommend NFA due to the absence of residual risk to human health and the environment. The work conducted to date at the two sites has been performed under the United States Air Force's Military Munitions Response Program (MMRP). The focus of the MMRP is to make the Duluth ANGB MRSs safe in accordance with their anticipated future land use (AFLU), while protecting human health and the environment.

The investigation and subsequent remediation of Department of Defense

facilities is managed through its Defense Environmental Restoration Program (DERP), which encompasses the MMRP. The DERP strictly adheres to and complies with the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), in accordance with the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). The United States Air Force has designated the ANG as the lead agency responsible for the implementation of the DERP program at Duluth ANGB, with regulatory support from the Minnesota Pollution Control Agency (MPCA). The ANG is supported in this effort by AECOM Technical Services (AECOM; ANG's Environmental Consultant) and has issued this document to fulfill public participation requirements under CERCLA §117(a) and NCP §300.430(f)(2).

This NFA Proposed Plan:

- Summarizes the **Removal Action** alternatives that were evaluated in the **Engineering Evaluation/Cost Analysis** (EE/CA) and presented in the **Action Memorandum** prior to implementation;
- Summarizes the Removal Action that occurred at the LCSA as part of a **Non-Time-Critical Removal Action** (NTCRA); and

- Highlights and summarizes other technical documents contained in the Administrative Record for the sites.

The ANG encourages citizens to refer to the Administrative Record (available to the public) and review these documents for more detailed information and a comprehensive understanding of the investigative and removal activities conducted at the sites.

Following the release of this NFA Proposed Plan, the ANG will host a public meeting to present the information it contains. ANG invites and encourages the public to submit oral or written comments during the **30-day public comment period**. If the public is in agreement with this NFA status, ANG, in consultation with MPCA, will then complete a NFA **Record of Decision** for the sites. This NFA Proposed Plan provides a summary of the site characteristics, risks, and removal actions implemented to date at the Duluth ANGB MRSs for which NFA is recommended, and reasons for the recommendation of NFA.

## ***2 Site History and Background***

The Duluth ANGB is co-located with Duluth International Airport in St. Louis County, Minnesota, approximately 7 miles northwest of the City of Duluth, Minnesota (Figure 2-1). The main base occupies 153.3 acres on the northeast corner of the airport. The base has a total of 37 buildings – 18 industrial and 19 administrative. The normal base population is 420 personnel, but surges to 1,100 personnel occur once each month during drill sessions. The main base portion of Duluth ANGB is a secure facility that is fenced on the north, east, and south sides. Security personnel from the 148<sup>th</sup> FW and the Duluth Airport Authority (DAA) patrol the base/airport at all times.

The LCSA is located west of the main base, northeast of the Explosive Ordnance

### **MARK YOUR CALENDARS**

#### **PUBLIC COMMENT PERIOD:**

**November 16 – December 16, 2012**

The ANG in consultation with MPCA will review written comments on the Proposed Plan that are submitted during the public comment period. Written comments should be sent to:

1st Lt Ryan Blazevic  
Environmental Manager  
Duluth Air National Guard Base  
148<sup>th</sup> FW/CEV  
4630 Mustang Drive  
Duluth, MN 55811-7338

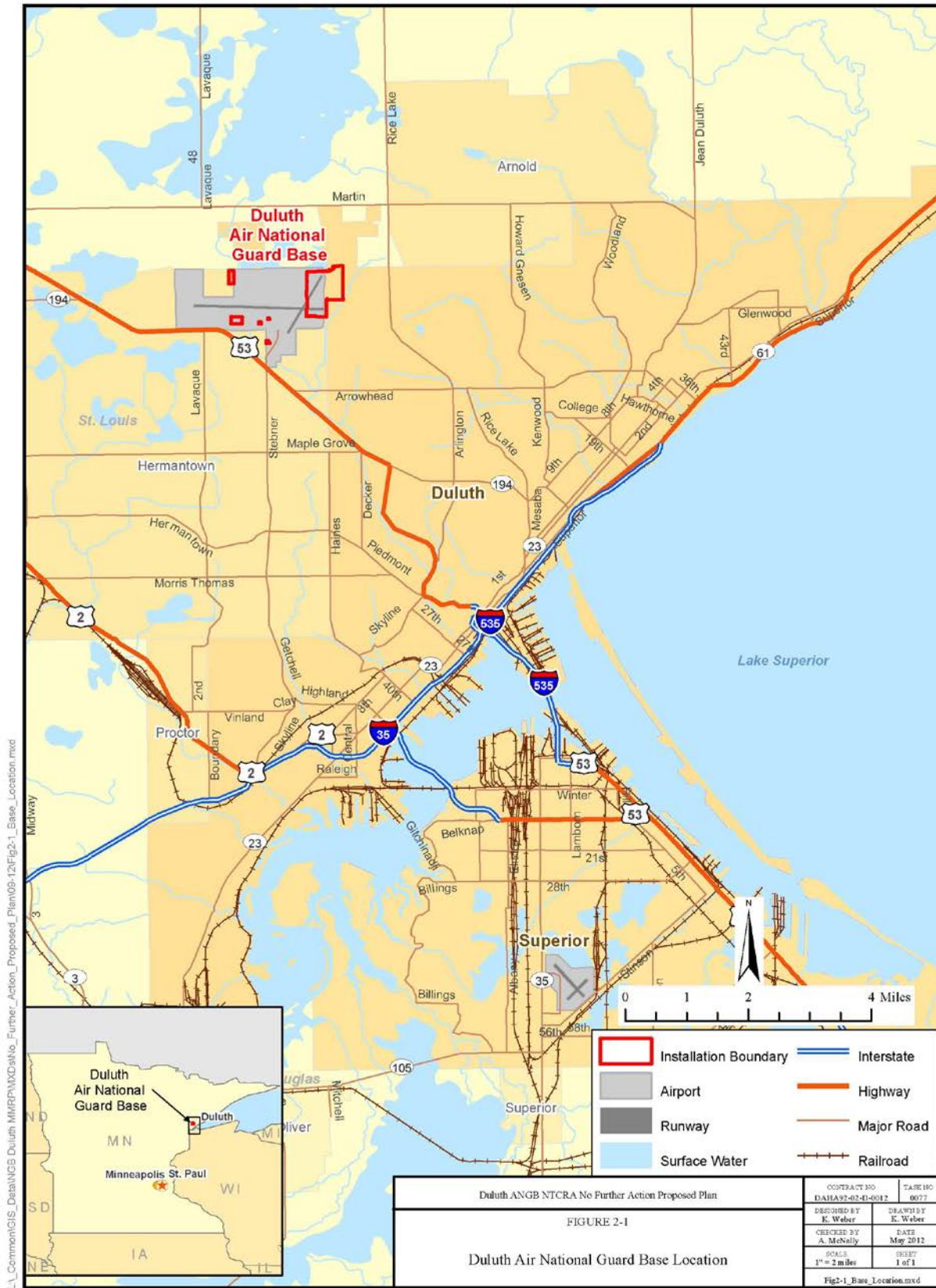
**PUBLIC MEETING:** If any written comments are received or a meeting is requested by the public, the ANG will hold a public meeting to explain the Proposed Plan. If a public meeting is held, details of the meeting will be included in the Final Proposed Plan.

**For more information, see the Administrative Record:**

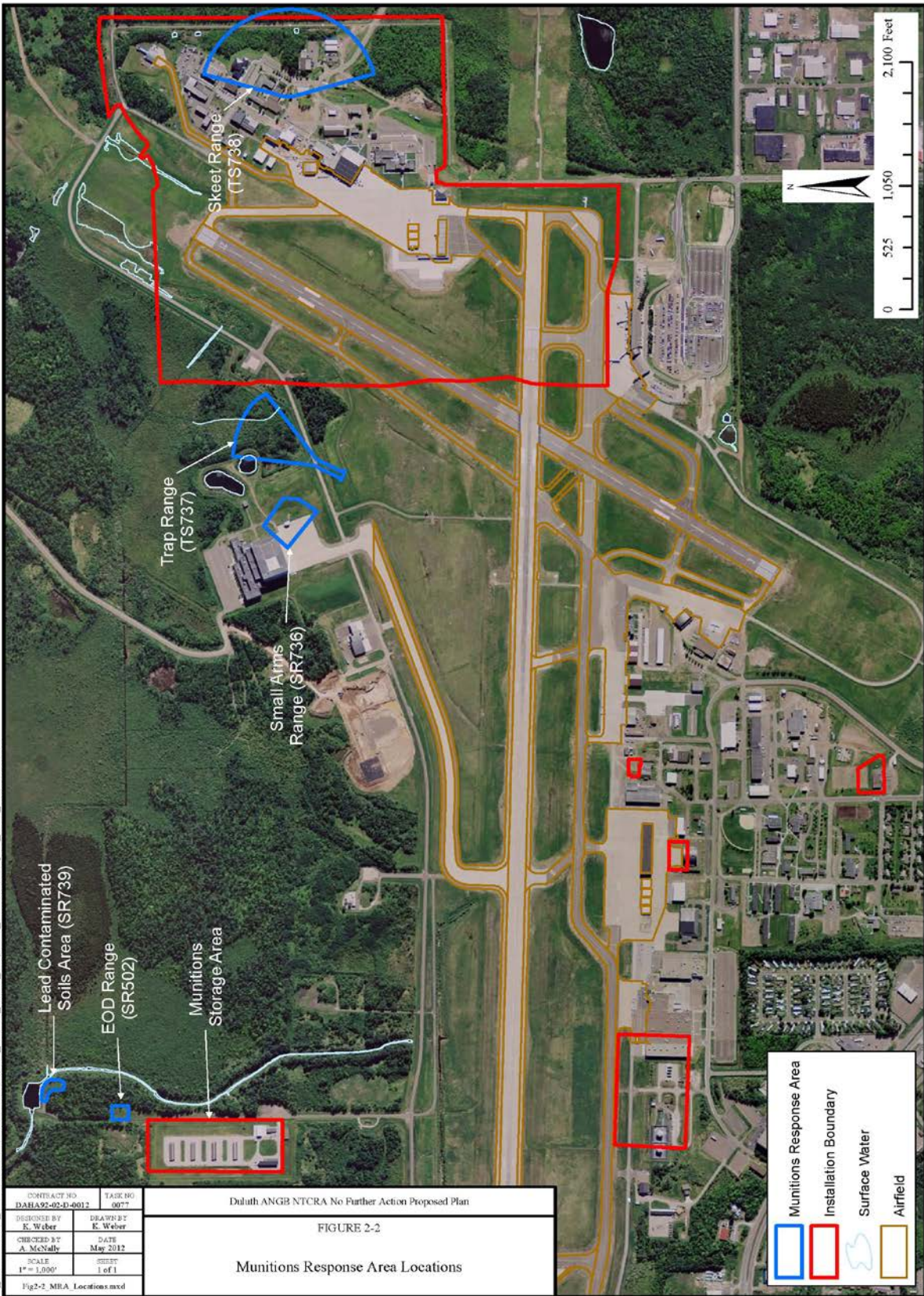
The documents contained in the Administrative Record for the LCSA and SAR are available for public viewing at the Duluth Public Library and at: <http://www.148fw.ang.af.mil/foia.asp>

Disposal (EOD) Range on property owned by the DAA. The EOD Range and LCSA are located on a restrictive easement that is leased from the DAA by the Air ANG. The SAR is located north of the main base and north of the intersection of Runways 21 and 13, on property owned by the DAA. The locations of these MRSs are illustrated in Figure 2-2.

This section provides background information about the LCSA and SAR at Duluth ANGB, including historical activities leading to site contamination, previous investigations, removal actions to date, and previous public involvement activities. Table 2-1 summarizes the prior investigations and removal actions and their



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CONTRACT NO. DAHA02-03-D-0012		TASK NO. 0077	
DESIGNED BY K. Weber	DRAWN BY K. Weber	Duluth ANGB NTCRA No Further Action Proposed Plan	
CHECKED BY A. McNally	DATE May 2012	FIGURE 2-2	
SCALE 1" = 1,000'	SHEET 1 of 1	Munitons Response Area Locations	

Fig2-2\_MRA\_Locations.mxd

<p align="center"><b>Table 2-1</b>  <b>Summary of Previous Investigations and Removal Actions at the Lead Contaminated Soils Area and Small Arms Range</b></p>		
<b>Year</b>	<b>Action</b>	<b>Results / Recommendations</b>
2005 – 2007	Comprehensive Site Evaluation Phase I (SR739 and SR736)	Recommended a visual survey and sampling of potentially contaminated media in each MRS to determine if MC had been released to the environment.
2008 – 2010	Comprehensive Site Evaluation Phase II (SR739 and SR736)	Based on the environmental media sampling results at the LCSA, a NTCRA was recommended to remove and properly dispose of the metals contaminated soil piles at the LCSA. Because metals of concern were not detected at the SAR above the associated MPCA Tier I Soil Reference Values (SRVs; MPCA, 1999) (with the exception of iron in one sample; the concentration of lead was below the associated regional background concentration) or soil leaching values (SLVs; MPCA, 2005), NFA was recommended.
2011	Engineering Evaluation/Cost Analysis (SR739)	Evaluated three alternatives for remediation of the LCSA to address metals contaminated soil. The recommended alternative was to complete a NTCRA, including excavation, treatment and off-site disposal of 500 cubic yards of metals contaminated soil. Since NFA was already recommended for the SAR (SR736) it was not necessary to include this MRS in the EE/CA.
2011	Action Memorandum (SR739)	Documented the selection of NTCRA as the selected removal alternative for the LCSA. Since NFA was already recommended for the SAR (SR736), it was not necessary to include this MRS in the Action Memorandum.
2011	Non-Time-Critical Removal Action Work Plan (SR739)	Described the field activities to be conducted during the NTCRA. Since NFA was already recommended for the SAR (SR736), it was not necessary to include this MRS in the NTCRA Work Plan.
2011 – 2012	Non-Time-Critical Removal Action Completion Report (SR739)	Excavation, treatment and off-site disposal of approximately 500 cubic yards of metals contaminated soil. Based on the results of verification sampling conducted at the LCSA following the removal action, NFA was recommended. Since NFA was already recommended for the SAR (SR736), it was not necessary to include this MRS in the NTCRA Completion Report.

respective findings in chronological order. Additional details of the response actions performed are also presented.

The activities conducted at Duluth ANGB under the MMRP area analogous to various components of the CERCLA process. The CSE Phase I investigation (July 2007), which identified the five MRSs for further evaluation (URS, 2007), including the EOD Range, SAR, Skeet Range, Trap Range, and LCSA, is analogous to the CERCLA Preliminary Assessment. The CSE Phase II investigation (December 2008) included a geophysical survey and environmental sampling at the five MRSs, and is analogous to the CERCLA Site Inspection. Following the CSE Phase II, a Remedial Investigation (RI) was recommended for the Trap Range and Skeet Range; No Further Action was recommended for the SAR; and NTCRAs were recommended for the EOD Range and LCSA (AECOM, 2010). An RI is currently being conducted for the Trap Range and Skeet Range, which are not included as part of this Proposed Plan. Following the CSE Phase II, an EE/CA was prepared to evaluate removal alternatives to address Munitions and Explosives of Concern (MEC) and Munitions Constituent (MC) contamination at the EOD Range and LCSA (AECOM, 2011a). The EE/CA is analogous to the CERCLA Feasibility Study (FS) and included recommendation of removal actions as preferred alternatives at the EOD Range and LCSA. The Action Memorandum (AECOM, 2011b) served as the decision document for the EOD Range and LCSA removal actions. Following the NTCRAs in October and November 2011, a NTCRA Completion Report was prepared that recommended NFA for the LCSA. A streamlined RI/FS was recommended for the EOD Range to address any residual risk posed by potential subsurface MEC (AECOM, 2012).

## ***2.1 Lead Contaminated Soils Area***

During the construction of the Northwest Airlines Maintenance Facility in 1992, the soil removed from the SAR target berm was transported and placed in piles at what is now known as the LCSA. The LCSA is irregularly shaped, mostly flat, and covers approximately 0.43 acres (Figure 2-2). The area is primarily grass-covered and partially wooded. The area is bordered to the west by a gravel road, to the south by a wooded area, to the north by a detention basin, and to the east by a drainage ditch (Figure 2-3). The detention basin and drainage ditch are associated with the Duluth International Airport storm water drainage system. The nearest building is the Munitions Storage Area, located approximately 1,000 feet south of the LCSA. The site is accessible from a dirt road through the DAA access gate, located approximately 1,800 feet south of the LCSA. There are no access limitations to the site from the north, east or west.

The CSE Phase I was completed in 2007 (URS, 2007). Recommendations for the LCSA included sampling of potentially impacted surface and subsurface soil, sediment and surface water to determine if MC had been released to the environment. In 2008, the CSE Phase II investigation was completed with details provided in Table 2-2.

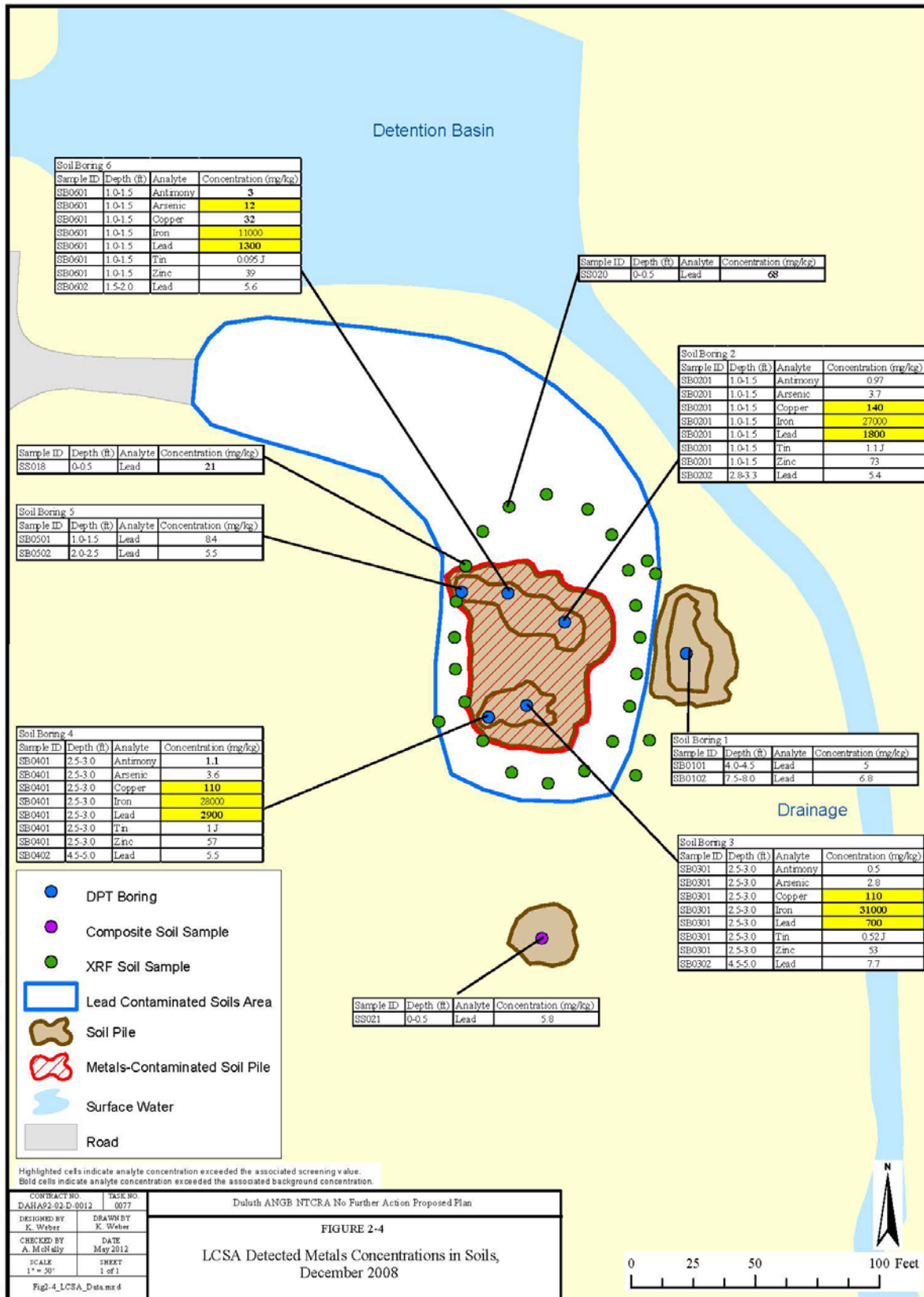
Samples collected from the soil piles during the CSE Phase II investigation indicated lead was present in the soils at concentrations up to 2,900 mg/kg, exceeding the MPCA Tier I Soil Reference Values (SRVs). Concentrations of other metals, including arsenic, copper and iron, were also present at concentrations above the SRVs (Figure 2-4). Concentrations of lead, arsenic and copper also exceeded the toxic characteristic leaching procedure (TCLP) screening levels, indicating the potential for hazardous levels of metals in soils that would

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<b>Table 2-2 Lead Contaminated Soils Area Comprehensive Site Evaluation Phase II Results</b>	
<b>Activity</b>	<b>Findings</b>
Visual survey of 0.43 acre area	Small arms rounds (0.50 caliber or smaller) were observed on the ground surface at the LCSA.
X-Ray Fluorescence (XRF) surface soil screening (25 locations) to determine lateral extents of contamination	The lateral extents of the metals contamination was identified using the field screening results from the XRF. GPS coordinates of the screening locations were recorded in the field.
Surface and subsurface soil sampling at six locations to determine vertical extents of contamination. Two samples from each location were analyzed for lead. Three of the twelve samples were also analyzed for antimony, arsenic, copper, iron, tin, and zinc.	Arsenic, copper, iron, and lead were detected in one or more of the soil piles samples at concentrations above both background and MPCA Tier I Soil Reference Values (SRVs). However, no metals were detected above screening values in the native subsurface soils beneath the soil piles. This lack of subsurface contamination was attributed to the plastic sheeting encountered under the soil piles which prevented the migration of contaminants.
Surface water and sediment sampling in nearby drainage ditch and retention basin.	Metals were not detected above screening values in the nearby sediment or surface water samples.



require disposal as hazardous waste if not treated.

The approximate volume of impacted soil was 500 cubic yards. When originally deposited in the area, the soil was placed on top of plastic sheeting, which likely prevented migration of contaminants to the underlying native soils. Figure 2-4 illustrates the extent of contaminated soil and the results of soil sampling at the site during the CSE Phase II.

Based on the CSE Phase II environmental media sampling results at the LCSA, a NTCRA was recommended to treat and properly dispose of the metals-contaminated soils. The response action at the LCSA, conducted in 2011, included:

- Excavation of approximately 500 cubic yards of lead contaminated soil;
- On-site stabilization of the soil using EnviroBlend® CS, a proprietary product containing primarily magnesium oxide and magnesium hydroxide;
- Transportation of the stabilized soil as non-hazardous waste to an off-site Subtitle D landfill; and
- Verification sampling of the excavation footprint and mixing areas.

The NTCRA served to remove contaminated material from the site and eliminate the risks to identified receptors. The extents of contaminated soil were delineated during the CSE Phase II in 2008 and reacquired using global positioning system prior to the excavation in 2011. Stabilization of the excavated soils was required to reduce the leachable quantities of lead, copper and arsenic to allow disposal of the soil as non-hazardous waste at the selected Subtitle D landfill. Based on AECOM's professional judgment and experience on similar projects, EnviroBlend® CS was selected as the stabilizing additive. This product chemically binds the metals to the soil matrix and reduces

the TCLP concentrations below hazardous levels.

The EnviroBlend® CS was delivered to the site in one-ton bags and mixed with excavated soil at a concentration of approximately 3 percent by weight. Verification sampling was conducted once the soil excavation and treatment was completed to verify that remaining soils did not contain lead or other metals of concern at concentrations above the MPCA Tier I SRVs. A total of 20 samples were collected from the footprint of the excavation and mixing area; two samples (SR739-EXC-03 and SR739-EXC-15) contained lead and copper at concentrations above the associated MPCA Tier I SRVs. An additional one foot of soil in the vicinity of these two samples was excavated and a second verification sample was collected at each location. The results of these samples, summarized in Table 2-3, indicated that remaining soils did not contain metals of concern at concentrations above the MPCA Tier I SRVs, thereby achieving the Removal Action Objectives identified in the NTCRA Work Plan (AECOM, 2011c). Figure 2-5 illustrates the soil excavation area, approximate stockpile and mixing areas, and locations of discrete verification samples. Details of the NTCRA are presented in the NTCRA Completion Report (AECOM, 2012).

## ***2.2 Small Arms Range***

The former SAR is located west of the main base and is north of the intersection of Runway 21 and Runway 13, on property owned by the Duluth Airport Authority (Figure 2-2). The area encompasses approximately 2.5 acres. During construction of the Northwest Airlines Maintenance Facility in 1992, the soil removed from the SAR target berm was transported and placed in piles at what is now known as the LCSA. No evidence of the former range exists on the site, which is

**Table 2-3  
LCSA Verification Sampling Results**

Sample ID	Type	Total Metals Analysis (6010B) (mg/kg)			
		Arsenic	Lead	Copper	Iron
<b>MPCA Tier I SRV (mg/kg)<sup>1</sup></b>		<b>9</b>	<b>300</b>	<b>100</b>	<b>9,000</b>
SR739-EXC-01	Grab	2.6	11	47	27,000
SR739-EXC-02	Grab	2.6	53	51	29,000
SR739-EXC-03	Grab	2.8	<b>2,400 D</b>	<b>130</b>	25,000
SR739-EXC-03-2	Grab	2.7	9.3	46	22,000 B
SR739-EXC-04	Grab	2.2	8.8	42	23,000
SR739-EXC-05	Grab	2.3	92	58	29,000
SR739-EXC-06	Grab	2.4	25	46	24,000
SR739-EXC-07	Grab	2.3	13	48	25,000
SR739-EXC-08	Grab	2.3	7.7	52	25,000
SR739-EXC-09	Grab	2.5	53	50	24,000
SR739-EXC-10	Grab	3.2	8.2	55	24,000
SR739-EXC-11	Grab	2.5	7.8 J	51 J	28,000 J
SR739-EXC-12	Grab	2.0 J	6.9	62	23,000
SR739-EXC-13	Grab	2.5	6.2	44	24,000
SR739-EXC-14	Grab	2.5	7.0	48	25,000
SR739-EXC-15	Grab	3.6	<b>740</b>	<b>140</b>	26,000
SR739-EXC-15-2	Grab	2.8	8.1	44	24,000 B
SR739-EXC-16	Grab	2.2	5.3	43	24,000
SR739-EXC-17	Grab	2.1 J	5.8	46	26,000
SR739-EXC-18	Grab	2.0 J	14	48	26,000
SR739-EXC-19	Grab	2.4	35	39	22,000
SR739-EXC-20	Grab	1.7 J	17	39	22,000

**Notes:**

<sup>1</sup>MPCA, 1999. *Draft Guidelines; Risk-Based Guidance for the Soil-Human Health Pathway Volume 2. Technical Support Document.* Minnesota Pollution Control Agency, Site Remediation Section. January 1999 (Tables updated 2007).

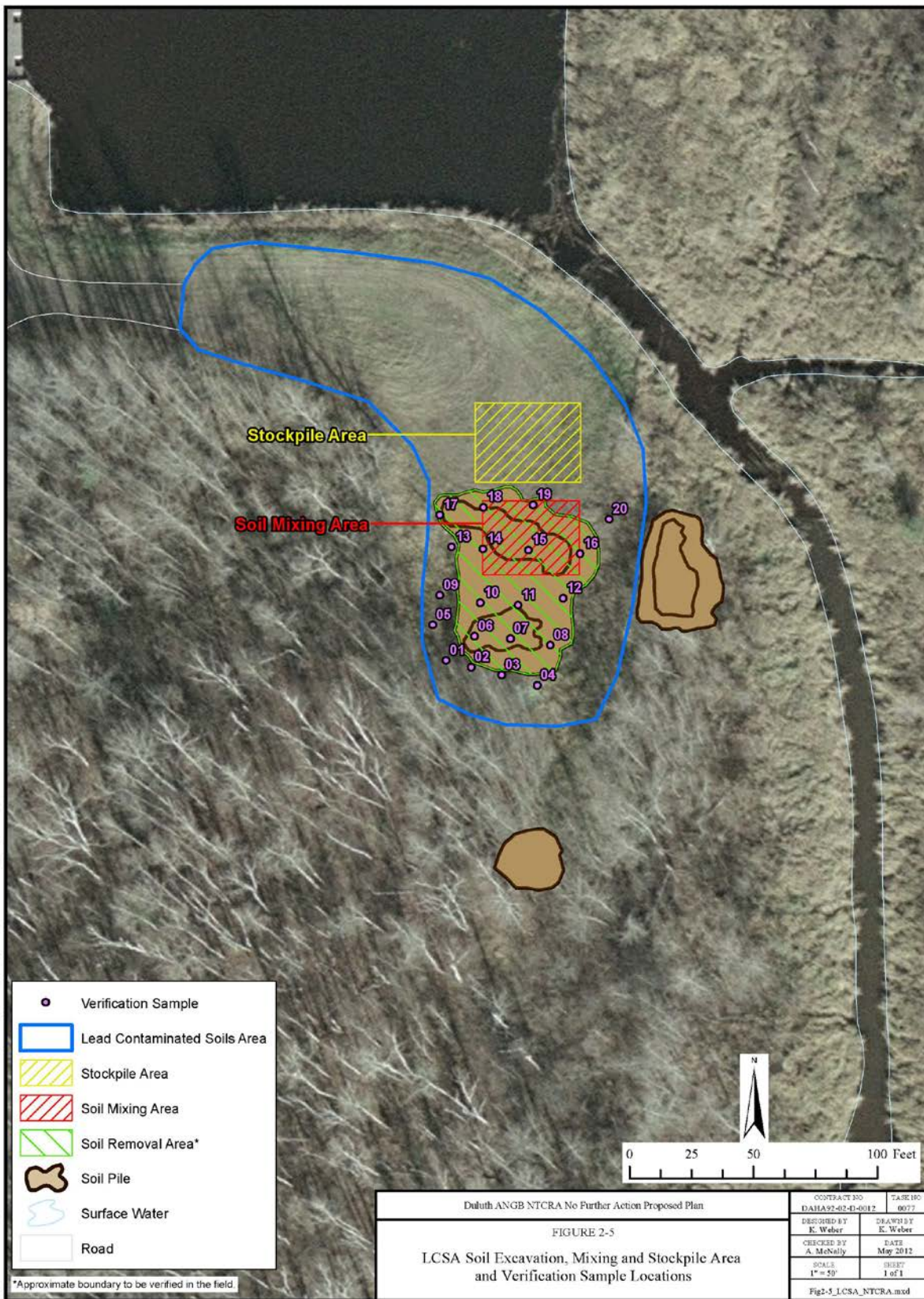
Bold results represent concentrations above the associated MPCA Tier I SRV

B = blank contamination

J = estimated quantity

mg/kg = milligrams per kilogram

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mostly covered with dirt and grass, with a portion of the site located within the concrete parking apron associated with the maintenance facility. The area is bordered to the south by Perimeter Road and by DAA fencing to the north and east (Figure 2-6). The area outside of the DAA property is currently undeveloped.

Two retention ponds are located approximately 300 feet northwest of the range. The basins are used for both storm water management and fire emergency water supply. A small berm/hill on the eastern portion of the site is composed of off-site soil from the old cross-runway construction and excavation of the fire protection ponds. The area west of the hill is flat.

In 2007, a CSE Phase I was conducted. Recommendations for the SAR included XRF screening and sampling of surface and subsurface soil to determine if MC had been released to the environment (URS, 2007). In 2008, a CSE Phase II investigation was completed for the ANG and the details are provided in Table 2-4.

The CSE Phase II investigation of MC at the SAR included significant field screening (94 XRF sample points) and laboratory analysis (10 surface soil samples and 11 subsurface soil samples) of soil for metals. Iron was detected in one subsurface soil sample at a concentration exceeding the MPCA Tier I SRV screening level. No other detected metals exceeded Tier I SRVs. Figure 2-7 illustrates the sampling results at the SAR.

Because metals of concern were not detected at the SAR above the associated MPCA Tier I SRVs (with the exception of iron in one sample; the concentration of lead was below the associated regional background concentration) or SLVs, it was concluded that MEC and MC exposure is not a concern to current or future receptors at the SAR. Based on these conclusions,

NFA was recommended for the SAR and approved by the ANG and MPCA as part of the approval of the CSE Phase II report. Details of the CSE Phase II investigations and results are presented in the CSE Phase II Report (AECOM, 2010).

### ***3 Site Characteristics***

This section presents a discussion of the contaminants present at the site and of the Munitions Response Site Prioritization Protocol (MRSPP) which was completed using data gathered during the CSE Phase II and the NTCRA. The MRSPP consists of three modules for each MRS: the Explosive Hazard Evaluation (EHE), the Chemical Hazard Evaluation (CHE), and the Health Hazard Evaluation (HHE). Each module contains a series of data tables that attribute a numeric score for each data entry. Data for each site includes physical site characteristics and chemical concentration data. The scores in each table are combined to generate Module ratings. The highest priority Module rating is considered the overall Priority rating for the MRS, which is used by the DOD to prioritize response actions.

#### ***3.1 Lead Contaminated Soils Area***

Based on the results of the verification sampling conducted as part of the NTCRA (described in Section 2.1 and summarized in Table 2-3), no contaminants of concern remain at the site above MPCA Tier I SRVs, allowing for unrestricted use/unrestricted exposure (UU/UE) at the site.

The MRSPP scores for the LCSA are summarized in Table 3-1. The EHE, CHE, and HHE all carry a rating of “No Known or Suspected Hazard.” This alternative (non-numeric) rating was assigned because no MEC was identified at the site, no chemical warfare material (CWM) was used at the site, and the NTCRA removed all sources of MC contamination. Therefore the overall MRSPP Priority is “No Known or Suspected

**Table 2-4  
Small Arms Range Comprehensive Site Evaluation Phase II Results**

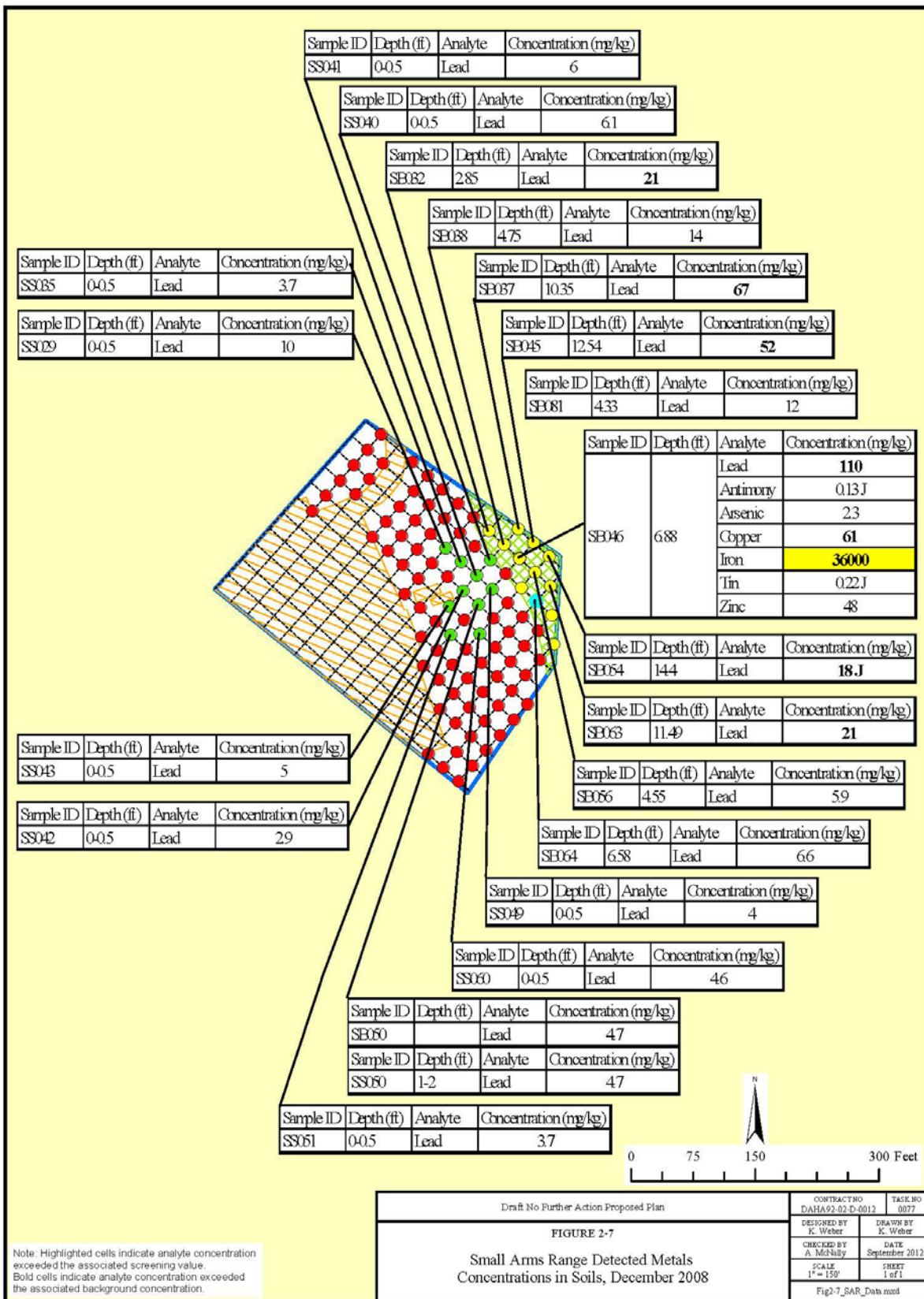
Activity	Findings
Visual survey of 2.5 acre area	No small caliber ammunition or related components were observed at the SAR. A berm/hill exists on the eastern side of the MRS, which was constructed from non-native soils during construction of the Northwest Airlines Maintenance Facility.
X-Ray Fluorescence (XRF) surface soil screening on a grid measuring 25 feet by 25 feet, at 94 locations across the site. In flat areas of the site, surface soil was screened in place. At twelve of the 94 locations, subsurface soil was collected for XRF screening to characterize native soils beneath the berm.	<p>In-situ XRF screening results did not indicate any exceedances of the MPCA Tier I SRV for lead of 300 mg/kg, nor the field screening value of 100 mg/kg.</p> <p>At twelve of the 94 locations, soil borings were advanced to the approximate original grade of the site. The soil from these boreholes was placed in gallon size re-sealable plastic bags and screened ex-situ with XRF. The XRF screening results did not indicate any exceedances of the MPCA Tier I SRV for lead of 300 mg/kg, nor the field screening value of 100 mg/kg. Of the eleven subsurface soil samples analyzed for metals, one sample exceeded the lead field screening value of 100 mg/kg; however, the concentration was below the MPCA Tier I SRV of 300 mg/kg and the SLV of 525 mg/kg.</p> <p>Ten of the samples were containerized and sent to the laboratory for confirmation of metals concentrations. Laboratory results confirmed that concentrations were below the 100 mg/kg screening level.</p>

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FIGURE 2-7 Small Arms Range Detected Metals Concentrations in Soils, December 2008		DESIGNED BY K. Weber	DRAWN BY K. Weber
		CHECKED BY A. McNally	DATE September 2012
		SCALE 1" = 150'	SHEET 1 of 1
Fig2-7_SAR_Data.mxd			

<b>Table 3-1 LCSA MRSP Priority Summary</b>		
<b>Module</b>	<b>Module Rating</b>	<b>Justification</b>
Explosive Hazard Evaluation	No Known or Suspected Explosive Hazard	No MEC was identified at the LCSA during the CSE Phase II or NTCRA.
Chemical Hazard Evaluation	No Known or Suspected Chemical Warfare Material (CWM) Hazard	No CWM was used or disposed of at the LCSA; therefore, there is no known or suspected hazard.
Human Health Evaluation	No Known or Suspected Hazard	The verification sampling conducted during the NTCRA verified that all soil containing metals at elevated concentrations was removed, treated, and disposed of off-site.
Overall MRSP Priority:	No Known or Suspected Hazard	EHE, CHE, and HHE Module Ratings become the Overall MRSP Priority

<b>Table 3-2 SAR MRSP Priority Summary</b>		
<b>Module</b>	<b>Module Rating</b>	<b>Justification</b>
Explosive Hazard Evaluation	Prioritization No Longer Required	No MEC was identified at the LCSA during the CSE Phase II.
Chemical Hazard Evaluation	Prioritization No Longer Required	No CWM was used or disposed of at the LCSA.
Human Health Evaluation	Prioritization No Longer Required	The results of the CSE Phase II indicated that all concentrations of MC were below established MPCA screening levels in evaluated environmental media.
Overall MRSP Priority:	Prioritization No Longer Required	EHE, CHE, and HHE Module Ratings become the Overall MRSP Priority. MPCA has concurred with the recommendation for NFA.

Hazard.” This rating indicates that no response actions are warranted at the LCSA.

### **3.2 Small Arms Range**

Based on the results of the CSE Phase II at the former SAR (described in Section 2.2), no contaminants of concern remain at the site above MPCA Tier I SRVs, indicating the MRS is eligible for UU/UE.

The MRSPP scores for the former SAR are summarized in Table 3-2. The EHE, CHE, and HHE each carry a rating of “Prioritization No Longer Required.” Therefore, the overall MRS Priority is “Prioritization No Longer Required.” This alternative (non-numeric) rating was assigned because MPCA concurred with the recommendation of NFA in the CSE Phase II Report.

## **4 Scope and Role of Response Action**

The objective of the MMRP, and of the response actions implemented to date, is to make the MRSs safe for reuse, such that these sites are compatible with their AFLU, while protecting human health and the environment. Based on the results of the NTCRA (for the LCSA) and CSE Phase II (for the SAR), NFA is recommended for both sites. Because both sites are eligible for UU/UE, no further response actions are warranted at either site. Details of the CSE Phase II investigations and results are presented in the CSE Phase II Report (AECOM, 2010). Details of the NTCRA are presented in the NTCRA Completion Report (AECOM, 2012).

## **5 Summary of Site Risks**

Below is a summary of the human health and ecological risks at the LCSA and SAR as evaluated during the CSE Phase II and following the NTCRA at the LCSA.

### **5.1 Lead Contaminated Soils Area**

Following the NTCRA at the LCSA, verification samples were collected from the

footprint of the excavation and mixing area. These sampling results, presented in the NTCRA Completion Report (AECOM, 2012) indicated that all soils with concentrations of lead above the MPCA Tier I SRVs (listed in Table 5-1 with the range of pre-NTCRA concentrations for metals of concern) had been removed from the area, allowing for UU/UE and eliminating the risk to receptors from metals-contaminated soil.

### **5.2 Small Arms Range**

Following the CSE Phase II investigation, it was concluded that there are no complete MC exposure pathways at the SAR for potential current or future receptors based on soil sampling results. Therefore, neither MEC nor MC exposure is a concern to current or future receptors at the SAR.

## **6 Remedial Action Objectives**

At the LCSA, remedial action objectives established in the EE/CA (AECOM, 2011a) were achieved with the excavation, treatment, and off-site disposal of approximately 500 cubic yards of metals contaminated soil. NFA was recommended for the LCSA in the NTCRA Completion Report (AECOM, 2012); therefore, no additional remedial action objectives were required nor established for the LCSA.

At the SAR, NFA was recommended following the CSE Phase II; therefore, no remedial action objectives were required nor established for the SAR.

## **7 Summary of Removal Alternatives**

An EE/CA was completed for the LCSA to evaluate removal alternatives to achieve the stated objectives (AECOM, 2011a). Three alternatives were considered in the EE/CA to address the hazards present at the LCSA. These alternatives were evaluated using the alternative technology selection criteria established by the NCP for evaluating alternatives (effectiveness, implementability,

<b>Table 5-1 Lead Contaminated Soils Area Metals Pre-NTCRA Concentrations and Screening Levels</b>			
<b>Metal</b>	<b>Range of Concentrations at LCSA Prior to NTCRA (mg/kg)</b>	<b>MPCA Tier I SRV (mg/kg)</b>	<b>Regional Background Concentration (mg/kg)<sup>1</sup></b>
Arsenic	2.8 – 12	9	4.1
Copper	32 – 140	100	20
Iron	11,000 – 31,000	9,000	30,000
Lead	5.4 – 2,900	300	18

**Notes:**

MPCA = Minnesota Pollution Control Agency

SRV = Soil Reference Value

mg/kg = milligrams per kilogram

<sup>1</sup>Source: Element Concentrations in Soils and Other Surficial Materials of the Conterminous United States (Shacklette et al., 1984)

and cost) and then subsequently evaluated in a comparative analysis.

The alternatives considered for the LCSA included:

- Alternative One: No Action;
- Alternative Two: Soil Cover and Institutional Controls; and
- Alternative Three: Soil Removal

The evaluation of these alternatives, as presented in the EE/CA (AECOM, 2011a), is summarized in Section 8 of this Proposed Plan.

Following the NTCRA, NFA was recommended for the LCSA in the NTCRA Completion Report and no additional removal alternatives were evaluated.

At the SAR, removal alternatives were not evaluated, as NFA was recommended in the CSE Phase II Report, which was approved by the ANG and MPCA.

## **8 Evaluation of Alternatives**

A comparative analysis of the three removal alternatives was conducted during the EE/CA using the alternative technology selection criteria established by the NCP for evaluating alternatives for effectiveness, implementability, and cost. The comparative analysis is summarized in Table 8-1. As a result of the analysis, soil removal (alternative three) was recommended to address the metals contaminated soil hazard at the LCSA because it would provide a permanent remedy for the site by physically treating and removing the metals hazard at the site. The results of the EE/CA and the selected removal alternatives were subsequently summarized in the Action Memorandum (AECOM, 2011b).

Following the NTCRA, NFA was recommended for the LCSA in the NTCRA Completion Report and no additional removal alternatives were evaluated.

At the SAR, removal alternatives were not evaluated as NFA was recommended in the CSE Phase II Report, which was approved by the ANG and MPCA.

## **9 Preferred Alternative**

Based on the results of the NTCRA at the LCSA and CSE Phase II at the former SAR, NFA is the preferred alternative for both MRSs. No MC is present at either site that would pose a risk to current or future receptors and no additional remedial action is warranted.

## **10 Community Participation**

ANG and MPCA provide information regarding the investigation activities at the LCSA and SAR and the removal action at the LCSA to the public through public meetings, the Administrative Record for the sites, and announcements published in the Duluth News Tribune. ANG and MPCA encourage the public to gain a more comprehensive understanding of the site and any remedial activities planned for the future.

The dates of the public comment period; the date, location and time of the meeting; and the locations of the Administrative Record files are provided on Page 2 of this Proposed Plan.

**For further information on LCSA and Small Arms Range MRSs at Duluth ANG, please contact:**

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**Table 8-1  
LCSA: Comparative Analysis Summary by Alternative**

Criterion	Alternative		
	No Action	Soil Cover and Institutional Controls	Soil Removal
<b>Effectiveness</b>			
Protection of Human Health and the Environment	<ul style="list-style-type: none"> <li>□ Not protective of human health and environment; does not meet removal action objectives.</li> </ul>	<ul style="list-style-type: none"> <li>■ Somewhat protective of human health and environment by reducing contact with metals.</li> </ul>	<ul style="list-style-type: none"> <li>■ Protective of human health and environment; meets removal action objectives.</li> </ul>
Compliance with ARARs	<ul style="list-style-type: none"> <li>■ Meets some action and location-specific ARARs.</li> </ul>	<ul style="list-style-type: none"> <li>■ Meets some action and location-specific ARARs.</li> </ul>	<ul style="list-style-type: none"> <li>■ Meets all action and location-specific ARARs.</li> </ul>
Long-term Effectiveness and Permanence	<ul style="list-style-type: none"> <li>□ Not effective or permanent in the long-term.</li> </ul>	<ul style="list-style-type: none"> <li>■ Effective in the long-term as long as contamination does not migrate to groundwater and deed restrictions are complied with in the future. Not permanent.</li> </ul>	<ul style="list-style-type: none"> <li>■ Effective and permanent in the long-term because metals hazards are removed from the site.</li> </ul>
Short-Term Effectiveness	<ul style="list-style-type: none"> <li>■ Because no action is taken, workers and the community would not be adversely affected in the short-term.</li> </ul>	<ul style="list-style-type: none"> <li>■ Soil cover would not adversely affect workers and the community in the short-term.</li> </ul>	<ul style="list-style-type: none"> <li>■ Soil removal would not adversely affect workers and the community in the short-term.</li> </ul>
Reduction of Toxicity, Mobility, or Volume	<ul style="list-style-type: none"> <li>□ There is no reduction of toxicity, mobility, or volume.</li> </ul>	<ul style="list-style-type: none"> <li>■ There is no reduction of toxicity or volume. By limiting infiltration, mobility would be reduced.</li> </ul>	<ul style="list-style-type: none"> <li>■ Toxicity, mobility, and volume of metals is reduced as on-site treatment and off-site disposal would occur.</li> </ul>
<b>Implementability</b>			
Technical Feasibility	<ul style="list-style-type: none"> <li>■ There are no technical feasibility concerns.</li> </ul>	<ul style="list-style-type: none"> <li>■ The technical feasibility of institutional controls is diminished since the property is not owned by the ANG.</li> </ul>	<ul style="list-style-type: none"> <li>■ There are no technical feasibility concerns.</li> </ul>
Administrative Feasibility	<ul style="list-style-type: none"> <li>■ There are no administrative feasibility concerns.</li> </ul>	<ul style="list-style-type: none"> <li>■ There administrative feasibility of institutional controls is diminished since the property is not owned by the ANG.</li> </ul>	<ul style="list-style-type: none"> <li>■ There are no administrative feasibility concerns.</li> </ul>
Availability of Services and Materials	<ul style="list-style-type: none"> <li>■ There are no availability concerns.</li> </ul>	<ul style="list-style-type: none"> <li>■ The DAA would have to voluntarily implement and enforce institutional controls.</li> </ul>	<ul style="list-style-type: none"> <li>■ There are no availability concerns.</li> </ul>
Regulatory Acceptance	<ul style="list-style-type: none"> <li>■ MPCA has reviewed and accepted these alternatives.</li> </ul>	<ul style="list-style-type: none"> <li>■ MPCA has reviewed and accepted these alternatives.</li> </ul>	<ul style="list-style-type: none"> <li>■ MPCA has reviewed and accepted these alternatives.</li> </ul>
Community Acceptance	NE	NE	NE

**Table 8-1 (Continued)  
LCSA: Comparative Analysis Summary by Alternative**

Criterion	Alternative		
	No Action	Soil Cover and Institutional Controls	Soil Removal
<b>Cost</b>			
Capital	\$0	\$118,680	\$382,260
O&M (annual)	\$0	\$12,420	\$0
Present Worth	\$0	\$130,509	\$382,260

**Notes:**

ARAR = Applicable or Relevant and Appropriate Requirements

O&M = Operations and Maintenance

NE = Not evaluated at this time pending comments from the regulatory agencies and community.

O&M Costs were discounted using a 5 percent interest rate in the present worth calculations

- Legend: ■ Meets Criteria  
 ■ Somewhat Meets Criteria  
 □ Does Not Meet Criteria

## 11 References

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- AECOM, 2011a. *Final Engineering Evaluation/Cost Analysis for the Explosive Ordnance Disposal Range and Lead Contaminated Soils Area*, Duluth ANGB, Duluth, Minnesota. February.
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- AECOM, 2011c. *Final Non-Time-Critical Removal Action Work Plan for the Explosive Ordnance Disposal Range and Lead Contaminated Soils Area*, Duluth ANGB, Duluth, Minnesota. October.
- AECOM, 2012. *Draft Final Non-Time-Critical Removal Action Completion Report for the Explosive Ordnance Disposal Range and Lead Contaminated Soils Area*, Duluth ANGB, Duluth, Minnesota. July.
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- MPCA, 2005. *Risk Based Guidance for Evaluating the Soil Leaching Pathway*. Minnesota Pollution Control Agency, Site Remediation Section. June 2005.
- Shacklette, H.T. and Josephine G. Borngen, 1984. *Element Concentrations in Soils and Other Surficial Materials of the Conterminous United States*. USGS Professional Paper 1270. United States Department of the Interior.
- URS, 2007. *Comprehensive Site Evaluation Phase I, Duluth Air National Guard Base, Minnesota*. Prepared for Air National Guard and 148<sup>th</sup> Fighter Wing under Contract to United States Army Corps of Engineers Omaha District. July.



## *12 Acronyms and Abbreviations*

AECOM	AECOM Technical Services
AFLU	Anticipated Future Land Use
ANG	Air National Guard
ANGB	Air National Guard Base
ARAR	Applicable or Relevant and Appropriate Requirements
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CHE	Chemical Hazard Evaluation
CSE	Comprehensive Site Evaluation
DAA	Duluth Airport Authority
DERP	Defense Environmental Restoration Program
EE/CA	Engineering Evaluation/Cost Analysis
EHE	Explosive Hazard Evaluation
EOD	Explosive Ordnance Disposal
FW	Fighter Wing
HHE	Health Hazard Evaluation
LCSA	Lead Contaminated Soils Area
MC	Munitions Constituents
MEC	Munitions and Explosives of Concern
mg/kg	Milligram per Kilogram
MMRP	Military Munitions Response Program
MPCA	Minnesota Pollution Control Agency
MRS	Munitions Response Site
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NFA	No Further Action
NTCRA	Non-Time-Critical Removal Action
SLV	Soil Leaching Value
SRV	Soil Reference Value
TCLP	Toxicity Characteristic Leaching Procedure
XRF	X-Ray Fluorescence

### *13 Glossary of Terms*

Specialized terms used in this Proposed Plan are defined below:

<p><b>Action Memorandum:</b> Intended to document selection and approval of the non-time-critical removal action for a given site.</p>	<p><b>Discarded Military Munitions (DMM):</b> Military munitions that have been abandoned without proper disposal or removed from storage in a military magazine or other storage area for the purpose of disposal.</p>
<p><b>Administrative Record:</b> A record or file made available to the public that includes all information considered and relied on in selecting a remedy for a site.</p>	<p><b>Engineering Evaluation/Cost Analysis:</b> Document that evaluates remedial alternatives and related costs and presents the decision logic for the chosen alternative.</p>
<p><b>Air National Guard (ANG):</b> A civilian reserve component of the U.S. Air Force that provides prompt mobilization during war and assistance during national emergencies.</p>	<p><b>Explosive Ordnance Disposal:</b> The detection, identification, field evaluation, rendering-safe recovery, and final disposal of unexploded ordnance or munitions. It may also include the rendering-safe and/or disposal of explosive ordnance that has become hazardous by damage or deterioration, when the disposal of such explosive ordnance is beyond the capabilities of the personnel normally assigned the responsibilities for routine disposal. EOD activities are performed by active duty military personnel.</p>
<p><b>Applicable or Relevant and Appropriate Requirements (ARARs):</b> These are federal or state environmental rules and regulations and there are three types; chemical-specific for the contaminant in question, location-specific where the site is located, and action-specific for the remedial alternative.</p>	<p><b>Installation Restoration Program:</b> This program was established by the DOD in 1975 to identify, assess, characterize, and clean up or control contamination caused by historical disposal activities and other operations at military installations.</p>
<p><b>Capital Cost:</b> The initial cost for development, construction, and the equipment required. Excludes operation and maintenance cost.</p>	<p><b>Munitions Constituents:</b> Any materials originating from unexploded ordnance, discarded military munitions, or other military munitions, including explosive and nonexplosive materials, and emission, degradation, or breakdown elements of such ordnance or munitions.</p>
<p><b>Comprehensive Environmental Response, Compensation and Liability Act (CERCLA):</b> Passed in 1980 and amended in 1986, CERCLA is commonly referred to as the Superfund Law. It provides for liability, compensation, cleanup, and emergency response in connection with the cleanup of inactive hazardous waste disposal sites that endanger public health and safety of the environment. CERCLA is codified at 42 U.S.C. §§ 9601 to 9675.</p>	<p><b>Munitions and Explosives of Concern:</b> This term, which distinguishes specific categories of military munitions that may pose unique explosives safety risks, means: (1) Unexploded ordnance (UXO); (2) Discarded military munitions (DMM); or (3) Munitions Constituents (e.g. TNT, RDX) present in high enough concentrations to pose an explosive hazard.</p>
<p><b>Contaminants of Concern (COCs):</b> Specific chemical contaminants that could pose adverse health effects that are identified for cleanup.</p>	<p><b>Munitions Debris:</b> A military munition or components thereof that do not contain explosives or pyrotechnics. Examples can be practice munitions without spotting charges, inert training munitions, expended ejection munitions, and fragments of exploded/destroyed military munitions that do not contain explosives or pyrotechnics.</p>

<p><b>Munitions Response Site (MRS):</b> Any location on a defense site that is known or suspected to contain UXO, DMM, or MC. Examples include former ranges and munitions burial areas.</p>	<p><b>Public Comment Period:</b> A time for the public to review and comment on various documents and actions taken by the ANG and regulatory agencies. A 30-day comment period is required by 40 CFR Section 300.430(f)(3)(C) to provide a sufficient opportunity for community members to review the Administrative Record file and review and comment on the Proposed Plan.</p>
<p><b>National Oil and Hazardous Substances Pollution Contingency Plan (NCP):</b> The purpose of the NCP is to provide the organizational structure and procedures for preparing and responding to discharges of oil and releases of hazardous substances, pollutants, or contaminants. The NCP is located at 40 C.F.R. Part 300.</p>	<p><b>Record of Decision (ROD):</b> An official public document that explains which cleanup alternative(s) will be implemented at CERCLA sites. The ROD is based on information and technical analysis generated during the RI and FFS and considers public comments and community concerns. The ROD explains the remedy selection process and is issued by the ANG in consultation with the state and local regulatory agencies, following the public comment period.</p>
<p><b>Non-Time Critical Removal Action (NTCRA):</b> Conducted when the lead agency determines that removal action is appropriate and that at least six months planning time exists before on-site activities must be initiated. A NTCRA requires an EE/CA.</p>	<p><b>Remedial Action:</b> The course of action taken at a CERCLA site to eliminate or reduce site contamination and protect human health and the environment.</p>
<p><b>Operation and Maintenance Cost:</b> The cost and timeframe of operating labor, maintenance, materials, energy, disposal, and administrative components of the remedy.</p>	<p><b>Remedial Action Objectives (RAOs):</b> Site-specific objectives developed based on an evaluation of the potential risks to public health and to the environment. The future protection of environmental resources and the means of minimizing long-term disruption to existing facility operations also are considered.</p>
<p><b>Present Worth Cost:</b> The total present worth assumes the entire amount of money required to implement the alternative is invested today and the money accumulates interest over the life span of each alternative. Because the total present worth costs take into consideration the interest rate and timeframe of each alternative, alternatives with longer life spans often have lower present worth costs than shorter life span alternatives.</p>	<p><b>Unexploded ordnance (UXO).</b> Military munitions that have been primed, fuzed, armed, or otherwise prepared for action, and have been fired, dropped, launched, projected, or placed in such a manner as to constitute a hazard to operations, installation, personnel, or material and that remain unexploded either by malfunction, design, or any other cause.</p>
<p><b>Proposed Plan:</b> A public participation requirement of CERCLA and the NCP, in which the lead agency summarizes and presents to the public the preferred cleanup strategy and rationale. The Proposed Plan also summarizes the alternatives presented in the detailed analysis of the FS. The Proposed Plan may be prepared either as a fact sheet or as a separate document. In either case, it must actively solicit public review and comment on all alternatives under consideration.</p>	

