Proposed Plan for
No Further Remedial Action With Land Use Controls
LCAAP Area 10 Sand Piles

1.0 INTRODUCTION

The public is invited to review and comment on this *Proposed Plan* for the Lake City Army Ammunition Plant (LCAAP) Area 10 Sand Piles. The Army is proposing No Further Remedial Action with Land Use Controls at this site, based upon successful completion of the previously implemented non-time critical removal action. The removal action eliminated the potential risks for human health (based on an industrial use scenario) and the environment through excavation, treatment, and off-site disposal of contaminated materials. Therefore, no further *Comprehensive Environmental Response, Compensation and Liability Act* (CERCLA) remedial action is required for Area 10 other than the implementation of land use controls designed to ensure continued industrial use of the site. Because remaining concentrations of lead in Area 10 soils are above levels that allow for unlimited use and unrestricted exposure, five year reviews of this site will be conducted in accordance with CERCLA §121 (c) and the NCP § 300.430(f)(4)(ii).

The public comment period runs from June 24 to July 24, 2009. After evaluation of all public input received, the U.S. Army, in conjunction with U.S. Environmental Protection Agency (USEPA) and Missouri Department of Natural Resources (MDNR), will document a final remedy in the site *Record of Decision*. The proposed remedy may change in response to public comments or the availability of new information.

1.1 Site Name and Location

LCAAP is an active government-owned, contractor-operated small arms industrial manufacturing and testing facility located at the junction of Highways 7 and 78 in Independence, Jackson County, Missouri (see Figure 1). LCAAP is situated approximately 23 miles east of the nearest major metropolitan area, which is Kansas City, MO. The installation was listed on the National Priorities List (NPL) in 1987, and assigned the Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) Identification Number of MO03213890012. Due to the complexity of the site, LCAAP was

PUBLIC COMMENT PERIOD:

June 24 to July 24, 2009
Written comments on the Proposed Plan will be accepted during the public comment period. A public comment form is provided at the back of this document. Comments should be submitted by July 24, 2009, to:

Ms. Sara Clark-Kennedy
ATTN: SJMLC-EN
Lake City Army Ammunition Plant
Independence, MO 64051-1000
sara.b.clark@us.army.mil

PUBLIC MEETING:
July 7, 2009, 7:00 pm
A public meeting will be held to discuss the Proposed Plan and to address comments and concerns. Oral and written comments will also be accepted at the meeting, to be held at:

Building 6
Lake City Army Ammunition Plant

For more information, see the Administrative Record at the following locations:

Mid-Continent Public Library
North Independence Branch
901 N. Spring Street
Independence, Missouri 64050

Lake City Army Ammunition Plant
Intersection of Highways 7 and 78
Independence, Missouri 64051

divided into four operable units (OUs) to facilitate remediation: OU 1 – Installation-Wide OU (IWOU); OU 2 - Area 18 OU; OU 3 - Northeast Corner OU (NECOU); and OU 4 - Area 10 OU. This *Proposed Plan* pertains to OU4, the Area 10 Sand Piles.

1.2 Lead and Support Agencies

The U.S. Army is the lead agency and is responsible for the remediation of Area 10under the regulatory oversight of federal and State authorities, as described below:

Under the Federal Facilities Agreement (FFA), which was signed in 1989, USEPA has primary responsibility for regulatory oversight of the Area 10 remediation. Due to the past presence of licensed radioactive source material, the Nuclear Regulatory Commission (NRC) is responsible for overseeing any activities related to license decommissioning. In 2001, the NRC officially deferred its oversight authority for Area 10 to USEPA in an interagency *Policy Issue Memorandum* (SECY-01-0088), while retaining responsibility for reviewing USEPA's determination as to whether Area 10 had been successfully remediated for depleted uranium (DU), and for ensuring that the remediation complied with NRC decommissioning requirements and the criteria for unrestricted release as specified in the Army's *Nuclear Materials License* (No. SUC-1380). The intent was to facilitate the remediation of both chemical and radiological contaminants without imposing dual regulation.

As signatory to the FFA, MDNR is also responsible for regulatory review and oversight for remedial and/or removal activities related to Area 10.

1.3 Purpose of the Proposed Plan

This *Proposed Plan* has been developed to inform the public of the Army's preferred final remedy for LCAAP Area 10, and to solicit public comments pertaining to preferred remedy. Issuance of this *Proposed Plan* is required to fulfill public participation requirements of the (CERCLA) §117(a) and the *National Oil and Hazardous Substances Pollution Contingency Plan* (NCP) §300.430(f)(2).

1.4 CERCLA Process

In 2005, and in accordance with 40 Code of Federal Regulations (CFR) 300.415(b)(1), the U.S. Army, USEPA and MDNR concurred on the decision to pursue a non-time-critical removal action was determined to be the appropriate means of addressing chemical and radiological contamination at LCAAP Area 10. Figure 2 presents the non-time critical removal action process in relation to the traditional remedial investigation/feasibility study process to map the CERCLA process for the Area 10 site and identify the current status. Work completed at Area 10 to date satisfies the requirements of the CERCLA process and this *Proposed Plan* is offered for public comment in order to allow the public the ability to provide input on the U.S. Army recommendation to take No Further Action (NFA) at this site based upon all site contaminants being removed to levels agreed upon by USEPA and MDNR.

In October 2005, the U.S. Army issued the *Area 10 Sand Piles Engineering Evaluation/Cost Analysis* (EE/CA). This document presented the basis for the proposed removal action by characterizing the current site conditions and associated risks, evaluating potential removal action alternatives, determining cleanup levels and recommending a suitable removal action

approach to address the lead and DU impacted sand and soils. A public meeting was held in October, 2005 to discuss the alternatives presented in the EE/CA, prior to finalization of the document. No public comments were received.

In January 2008, an *Explanation of Significant Difference* (ESD) was prepared to document a revised cleanup level for lead. The cleanup level was revised to be consistent with the approved LCAAP site-wide cleanup level for lead under an industrial scenario. Prior to issuing the ESD, a public meeting was held in January, 2008 to solicit public input. The single public comment received was in support of the recommended removal action.

The *Revised Final Area 10 Sand Piles Action Memorandum* (AM) was then issued in August 2008 to document regulatory approval of both the non-time critical removal action outlined in the EE/CA and the final cleanup criteria specified in the ESD. The ESD is incorporated into the Revised Final AM.

This *Proposed Plan* summarizes the results of the removal action, documents existing site conditions that provide the basis for selection of a final remedy, and presents the proposed final remedy for Area 10 for public review and comment. Upon completion of the 30-day public comment period, a *Record of Decision* (ROD) will be prepared to document the approved final remedy and to address all public comments received on this *Proposed Plan.*

All documents referenced in this *Proposed Plan* are part of the Administrative Record File for the site, located at the public repositories listed in Section 6.0.

2.0 SITE BACKGROUND

2.1 Site Description

LCAAP consists of 3,935 acres located within the corporate boundary of Independence, MO, in eastern Jackson County. Area 10 is located within the controlled perimeter of the active munitions firing range in the eastern portion of the LCAAP installation, as shown in Figure 3.

2.2 Site History

During the 1960s and 1970s, LCAAP developed, test-fired, and demilitarized munitions that contained licensed radioactive source material as well as non-radioactive munitions. Testing and demilitarization activities involved firing munitions into sand-filled structures called “bullet catchers.” Residual solid wastes from these operations (e.g., spent bullet catcher sand, metal debris [MD], munitions constituents [MC], and potential unexploded ordnance [UXO]) were deposited in an area north of the firing range, which became known as “Area 10.” Area 10 was designated for remediation under CERCLA pursuant to the inclusion of LCAAP on the NPL.

Between 1988 and 2007, Area 10 was the subject of five site investigations, three treatability studies, and one limited removal action. These activities are fully documented in the EE/CA, the AM and will be summarized in the ROD for Area 10. Based on the results of the site investigations, which encompassed sand pile material, surface soil, groundwater, surface water, and pond sediments, lead and DU contained in the sand pile material and soils were identified as the primary contaminants of interest in Area 10.

The U.S. Army conducted limited source removal activities between September 1998 and April 1999 to address licensed DU in the sand piles. The work was conducted as an NRC license decommissioning effort, and approximately 30,000 cubic feet of DU contaminated sand pile material were removed and disposed off-site. However, the effort was suspended when it was determined that, in addition to DU, the waste also exhibited concentrations of leachable lead considered to be hazardous, as well as radioactive UXO, neither of which the U.S. Army was prepared to address at that time.

Several treatability studies were conducted to test different methods of physically separating UXO from the rest of the waste, and to evaluate a variety of stabilization reagents and formulations. In 2005, a pilot-scale study was performed to develop operating parameters for the full-scale treatment design.

2.3 Non-Time Critical Removal Action for the Area 10 Sand Piles

In 2008, the U.S. Army performed a non-time-critical removal action under CERCLA that addressed both radioactive and non-radioactive constituents. Approximately 37,102 in-place cubic yards of bullet catcher waste were removed from Area 10. This material was contaminated with DU fragments and hazardous concentrations of leachable lead. As stated in the EE/CA, no contamination had been observed previously in the groundwater, surface water, or submerged pond sediments in Area 10, therefore, these media were excluded from the scope of the removal action.

Radiological surveys and sampling of the sand pile material were performed in 1-foot depth increments (i.e., lifts) accordance with NUREG-1575: *Multi-Agency Radiation Survey and Site Investigation Manual* (MARSSIM) specifications for Class 1 final status surveys (FSS). The scanned sand pile material from each survey unit lift was removed and mechanically screened to separate UXO, MC, and MD from the sand. Manual sorting of the material retained by the screens was conducted to identify and segregate potential UXO and MC from MD and other oversized items.

Non-radioactive UXO and MC items identified during the sorting process were packaged for demilitarization in the LCAAP explosives waste incinerator. Non-radioactive screening fines were chemically treated to stabilize the leachable lead and render the waste non-hazardous. The treated non-radioactive waste was disposed off-site at an industrial waste landfill; while waste from radiological hot-spots was packaged for shipment, treatment, and disposal at a permitted Class C landfill. Within Area 10, there is a small amount of packaged waste material awaiting disposal. Radioactive and radioactively contaminated UXO and MC have been relocated to an area outside of Area 10 for further sorting prior to demilitarization.

Final status surveys and confirmation sampling of the residual soils beneath the sand pile footprint and adjacent surface soils were performed to confirm that the cleanup goals for DU and lead were met. The survey and sampling results indicated that residual soils at Area 10 met the total lead cleanup goal of 1,197 milligram per kilogram (mg/kg). This goal was established in the AM as an installation-wide, risk-based cleanup goal under an industrial land use scenario in the absence of a chemical-specific Applicable or Relevant and Appropriate Requirement (ARAR) for lead. Results also indicated that the residual soils met the DU cleanup goal of 35 picocuries per gram (pCi/g). This goal was established in the AM as the criterion for

unrestricted release based on the Army's Nuclear Materials License (No. SUC-1380), which was an ARAR for DU. (Note: Based on assumptions of the isotopic activity percentages in the DU, it was determined that the DU cleanup goal equated to a uranium-238 (^{238}U) soil concentration of 29.2 pCi/g.)

A total of 154 soil samples were collected for radiological analysis and 156 soil samples were collected for analysis of total lead. Analytical results indicated that the maximum concentrations of ^{238}U in the remaining soil at Area 10 ranged from 1.23 to 4.84 pCi/g, and the maximum concentrations of total lead ranged from 12.4 to 973 mg/kg.

Sand pile material and soil removal activities were conducted at Area 10 from April 2008 through February 2009. Residual MEC has been moved from Area 10 to a separate location within the firing range to allow for continued sorting, segregation and disposal activities. These activities are anticipated to continue through December 2009, and do not impact the basis for the selection of a final remedy for Area 10.

2.4 Scope and Role of Response Action

Prior to implementation of the removal action, the FFA parties mutually agreed to separate Area 10 from the IWOU, which was undergoing a separately funded, accelerated CERCLA remediation process. This decision resulted in the designation of Area 10 as an individual OU, which provided the means for addressing outstanding issues without imposing the schedule limitations of the ongoing IWOU remediation process. Combined with the previous remedies for the other three OUs, the removal action at Area 10 provides a comprehensive remedy for hazardous substances that have been or are threatened to be released into the environment at LCAAP.

3.0 SITE CHARACTERISTICS

Area 10 lies within the eastern upland portion of LCAAP, within the boundaries of the firing range. Total topographic relief within the administrative boundaries of Area 10 is approximately 80 feet (ft); however, the area in which the sand piles were situated is relatively flat terrain, with total topographic relief of approximately 10 ft. Much of the runoff drains to either a small pond situated approximately 400 ft south of the sand piles, or to a ditch (i.e., ephemeral stream) located southwest of Area 10 that eventually discharges to Firing Range Creek.

Previously, there were two distinct sand piles in Area 10, with a shallow drainage ditch between them. Pre-removal action estimates indicated that the northern sand pile contained a maximum sand thickness of 27 ft and an estimated volume of 22,427 cubic yards (cy), while the southern sand pile contained a maximum sand thickness of 22 ft and an estimated volume of 7,796 cy. The total amount of sand in Area 10 was estimated to be 30,223 cy, and the sum of the footprints below each sand pile was estimated to be 91,759 square feet (sf).

The uplands area of LCAAP is underlain by two distinct lithologies: bedrock and unconsolidated material. According to the boring logs generated during the installation of the Area 10 monitoring wells, the local geology in the vicinity of the sand piles consists of 5 to 40 ft of unconsolidated silt and clay, overlying shale and limestone bedrock.

Based upon geologic and hydrogeologic information gathered during the remedial investigation for the site-wide operable unit (EA, 1994), neither the unconsolidated silt and clay layer nor the bedrock formation in the upland areas appears capable of yielding sufficient groundwater to be used for a domestic water supply. Thus, as presented in the EE/CA risk assessment, the groundwater underlying Area 10 is not a likely source of drinking water for current or future inhabitants. Current land use controls in place of for the LCAAP facility ensure that no well drilling may take place without written authorization by the Army.

Groundwater has been sampled on several occasions in the vicinity of Area 10, and no lead or uranium concentrations that exceeded the EPA's Preliminary Remediation Goals (screening levels) were observed. This information is summarized in the *Area 10 Sand Piles Removal Action Completion Report* (RACR) (Cabrera, 2009), which is currently under agency review and finalization. Completion of the removal action has remediated a potential source of future contamination to groundwater with respect to the sand pile material.

The current land use of Area 10 is industrial. LCAAP is enclosed by perimeter fencing and patrolled by armed security personnel. Access to the installation is restricted to military personnel, government employees and contractors, and authorized visitors. Access to the firing range and sand piles is further restricted by additional fencing, and is limited to hours during which the range is not in operation. The Army has no plans to cease firing operations at the range, or to modify its land use to anything other than industrial. Therefore, the only anticipated future land use is industrial.

4.0 SUMMARY OF SITE RISKS

The non-time critical sand pile removal action initiated in April 2008 served to eliminate risks to human health and the environment posed by lead and DU in the sand pile material at Area 10. As presented in the EE/CA, exposure pathways included direct external exposure, ingestion, and/or inhalation of the soil. In addition, contaminant transport by surface water, migration via airborne dispersion and vertical migration over time into the groundwater were evaluated.

The removal action consisted of the excavation of sand pile material contaminated with DU and/or lead, and the subsequent excavation of underlying and adjacent soils where concentrations of DU and lead exceeded the established cleanup goals. As noted in Section 2.3, the sorting, segregation and offsite disposal of waste materials is on-going (estimated completion date of December 2009); however, this activity has been relocated from Area 10 and does not impact the final remedy selection. Once this activity has been completed, an After Action Report will be submitted to the Department of Defense Explosive Safety Board. The report, which will summarize sorting, segregation and offsite disposal activities, will also be appended to the RACR.

As of the completion of the Area 10 removal action, remaining concentrations of lead and DU at the site no longer pose an unacceptable risk to human health or the environment based on an industrial use scenario. Lead-contaminated material has been cleaned up to acceptable concentrations under an industrial land use scenario, and licensed radioactive source material (i.e., DU) has been cleaned up to concentrations that are suitable for unrestricted release. Lead and DU contaminated material has been permanently removed from Area 10; thus, the potential

no longer exists for contaminants to migrate beyond the boundaries of Area 10 and/or to other media such as surface water or groundwater.

Radiation survey and sampling data collected upon completion of the removal action satisfies the NRC requirements for unrestricted release of this site with respect to radioactivity. On June 1, 2009, the NRC submitted the Confirmatory Sampling Report in which the agency confirms that Area 10 meets the NRC unrestricted release criteria.

Lead sampling data collected upon completion of the removal action satisfies the USEPA requirements for continued use of this site for industrial purposes.

5.0 DESCRIPTION OF THE "NO FURTHER REMEDIAL ACTION WITH LAND USE CONTROLS" PREFERRED REMEDY

No further CERCLA remedial action is required for Area 10 other than the implementation of land use controls designed to ensure continued industrial use of the site. The previously implemented removal action eliminated the potential risks for human health (based on an industrial use scenario) and the environment through excavation, treatment, and off-site disposal of contaminated materials.

Area 10 is contained within the boundaries of the active firing range, as shown on Figure 4. The CERCLA removal action and associated site closure addressed the lead and DU in the sand pile material and soils within Area 10. The Area 10 closure is not considered to be a firing range closure under the Military Munitions Response Program (MMRP) for MEC and MD constituents. This material was removed to the extent possible under the Area 10 removal action; however, following completion of site restoration, Area 10 will be part of the active firing range and will be subject to range closure requirements under the MMRP at such time as the firing range is closed.

Details of the specific mechanisms that will be used to implement to land use controls for Area 10 will be presented in a Land Use Implementation Plan, to be designed as part of the remedy implementation subsequent to the ROD. Controls will be designed to achieve the goal of restricting land use to industrial only (until such time as unlimited use and unrestricted exposure is met) and to be compatible with other land use controls in place across the LCAAP facility.

Based on current site conditions, a No Further Remedial Action with Land Use Controls decision is appropriate for Area 10. The proposed final remedy is protective of human health and the environment, and is considered cost effective. Because remaining concentrations of lead in Area 10 soils are above levels that allow for unlimited use and unrestricted exposure, five year reviews of this site will be conducted in accordance with CERCLA §121 (c) and the NCP § 300.430(f)(4)(ii).

6.0 COMMUNITY PARTICIPATION

The Proposed Plan will be made available for a 30-day public review beginning June 24, 2009, and ending July 24, 2009, at the following locations:

Mid-Continent Public Library
North Independence Branch

901 N. Spring Street
Independence, Missouri 64050

Lake City Army Ammunition Plant
Intersection of Highways 7 and 78
Independence, Missouri 64051

A public meeting will be held during the public comment period at Building 6 of LCAAP on July 7, 2009, at 7:00 p.m. to elaborate further on the reasons for recommending the remedy, and to receive public comments. Written comments may be submitted at the meeting or mailed to the following address:

Ms. Sara Clark-Kennedy
ATTN: SJMLC-EN
Lake City Army Ammunition Plant
Independence, MO 64051-1000
sara.b.clark@us.army.mil

The USACE and regulatory agencies will consider all formal comments prior to making a final decision for Area 10. All comments and responses will be documented in a *Responsiveness Summary*, which will be part of the official record and published in the *Record of Decision*.

LIST OF ACRONYMS AND ABBREVIATIONS

AM	Action Memorandum
ARAR	Applicable or Relevant and Appropriate Requirement
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
CFR	Code of Federal Regulations
cy	cubic yards
DU	Depleted Uranium
EE/CA	Engineering Evaluation/Cost Analysis
ESD	Explanation of Significant Difference
FFA	Federal Facilities Agreement
FSS	Final Status Survey
ft	feet
IWOU	Installation-Wide Operable Unit
LCAAP	Lake City Army Ammunition Plant
MARSSIM	Multi-Agency Radiation Survey and Site Investigation Manual
MC	Munitions Constituents
MD	metal debris
MDNR	Missouri Department of Natural Resources
mg/kg	milligram(s) per kilogram
MMRP	Military Munitions Response Program
NCP	National Oil and Hazardous Substance Pollution Contingency Plan
NECOU	Northeast Corner Operable Unit
NFA	No Further Action
NPL	National Priorities List
NRC	Nuclear Regulatory Commission
OU	Operable Unit
pCi/g	picocurie(s) per gram
RACR	Removal Action Completion Report
ROD	Record of Decision
sf	square feet
^{238}U	Uranium-238
USEPA	U.S. Environmental Protection Agency
UXO	Unexploded Ordnance

REFERENCES

CABRERA, 2005a. *Area 10 Sand Piles Engineering Evaluation and Cost Analysis.* Final. Cabrera Services, Inc., Baltimore, MD. October 2005.

CABRERA, 2007. *Groundwater Sampling and Analysis Report for Area 10 , Lake City Army Ammunition Plant, Independence MO.* Final Technical Memorandum. Cabrera Services, Inc., Baltimore, MD. May, 2007

CABRERA, 2008. *Area 10 Sand Piles Action Memorandum.* Revised Final. Cabrera Services, Inc., Baltimore, MD. August 2008.

EA, 1994. *Remedial Investigation Report of the Installation Wide Operable Unit at Lake City Army Ammunition Plant, Independence, Missouri.* Draft-Final. EA Engineering, Science, and Technology, Inc. February 1994.

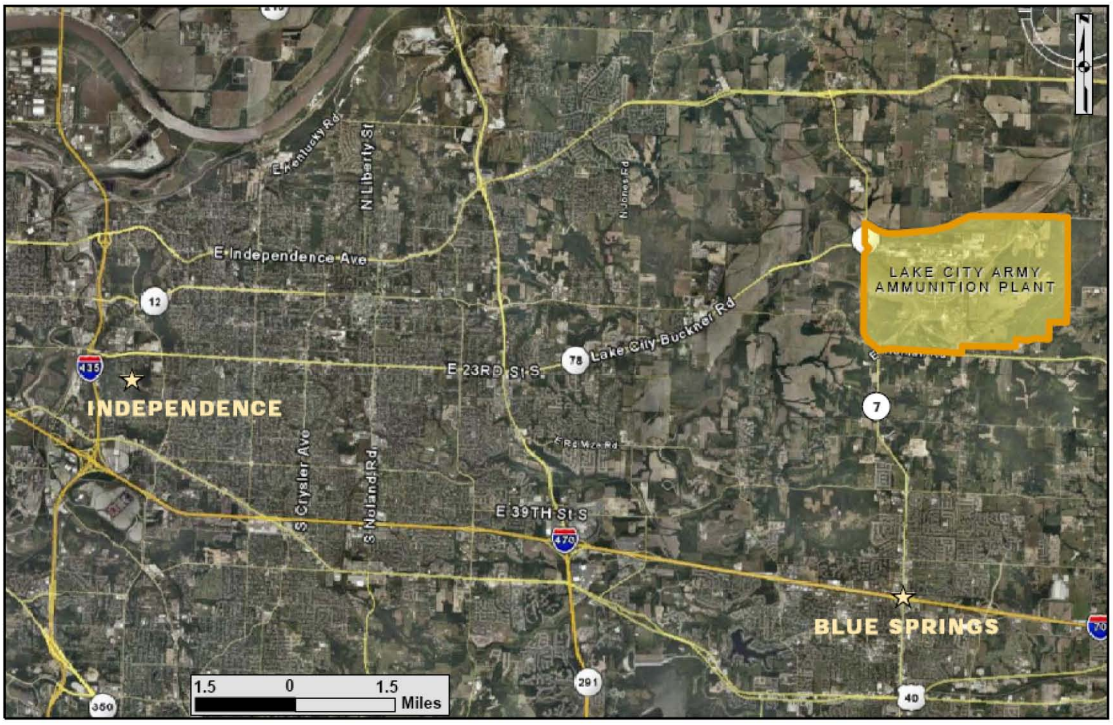

Figure 1: LCAAP Site Location Map

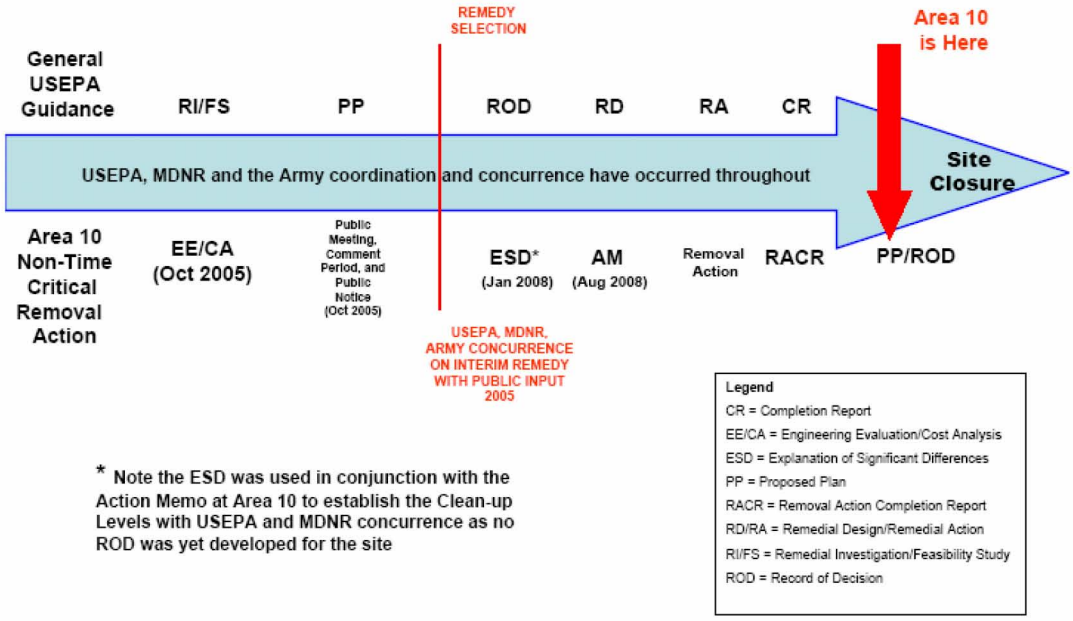

Figure 2: CERCLA Process Comparison Using Traditional and Non-Time Critical Removal Action Terminology

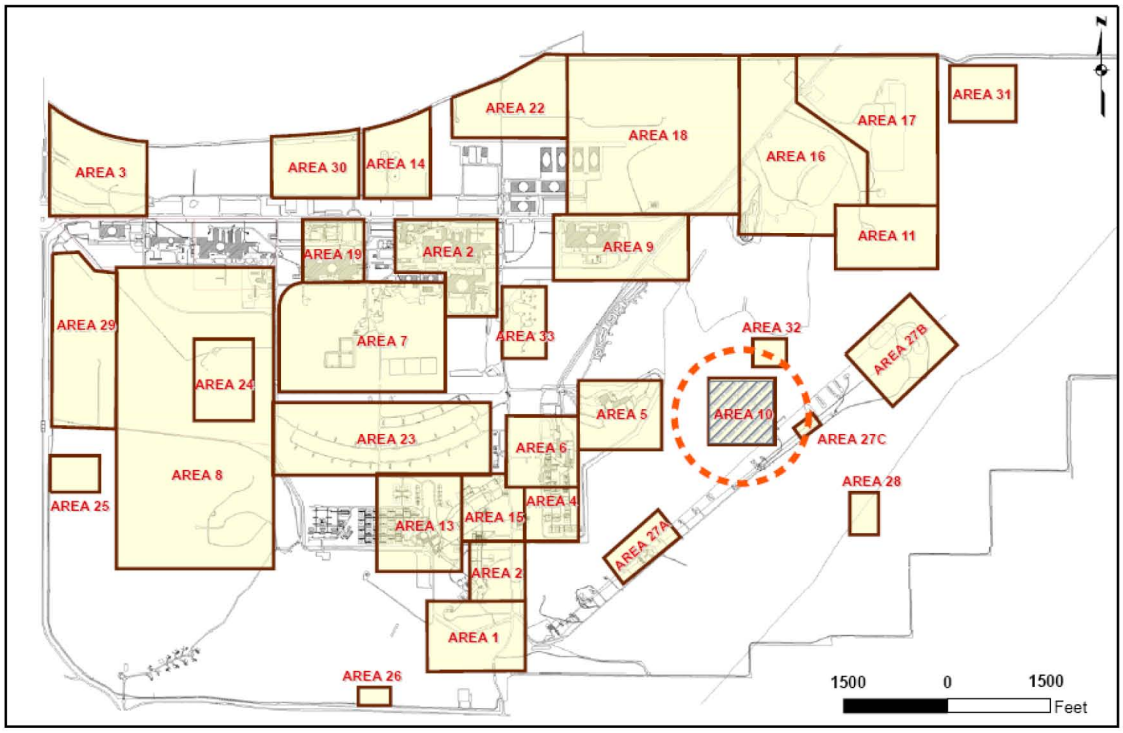

Figure 3: Location of Area 10

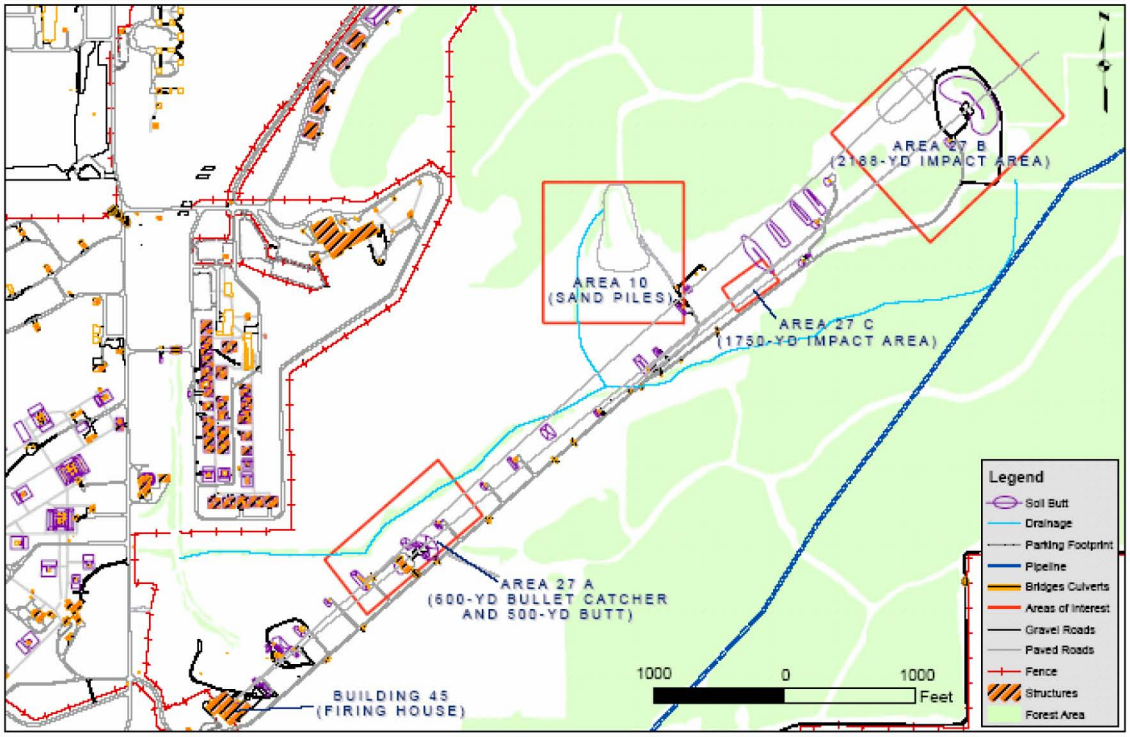

Figure 4: Firing Range

Proposed Plan for
No Further Remedial Action With Land Use Controls
LCAAP Area 10 Sand Piles

Use This Space to Write Your Comments

The Army wants your comments on the *Area 10 Sand Piles Proposed Plan.* You may use the form below to submit written comments. If you have questions about how to comment, please call Sara Clark-Kennedy, at (816) 796-7159. Send this form or any other written comments, postmarked no later than July 24, 2009 to:

Sara Clark-Kennedy
ATTN: SJMLC-EN
Lake City Army Ammunition Plant
Independence, MO 64051-1000

Comment:

Submitted by:

Address: