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# DRAFT FINAL PROPOSED PLAN

## TOBYHANNA ARTILLERY RANGE FORMERLY USED DEFENSE SITE TOBYHANNA, PENNSYLVANIA

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**USACE FUDS Property  
No. CO3PA0396**

Contract Number W912DR-05-0022  
Task Order 0014

**November 2006**

*Prepared For:*



Baltimore District  
US Army Corps of Engineers  
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*Prepared By:*



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*Draft Final*

**Proposed Plan  
for  
Tobyhanna Artillery Range  
Formerly Used Defense Site**

**Tobyhanna, Pennsylvania**

Delivery Order 0014  
Contract Number W912DR-05-D-0022

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W.O. No. 03886.110.014.0010

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# PROPOSED PLAN FOR TOBYHANNA ARTILLERY RANGE FORMERLY USED DEFENSE SITE

MONROE AND WAYNE COUNTIES, PENNSYLVANIA

NOVEMBER 2006

## 1.0 INTRODUCTION

The U.S. Army Corps of Engineers (USACE) is presenting this **Proposed Plan** for public review and comment describing the **remedial action** proposed for the cleanup of **unexploded ordnance (UXO)** at the Tobyhanna Artillery Range Formerly Used Defense Site (TOAR-FUDS) in Tobyhanna, PA (see Figure 1). Past artillery range training activities have resulted in UXO contamination in nine (9) **areas of concern (AOCs)** at the Site.

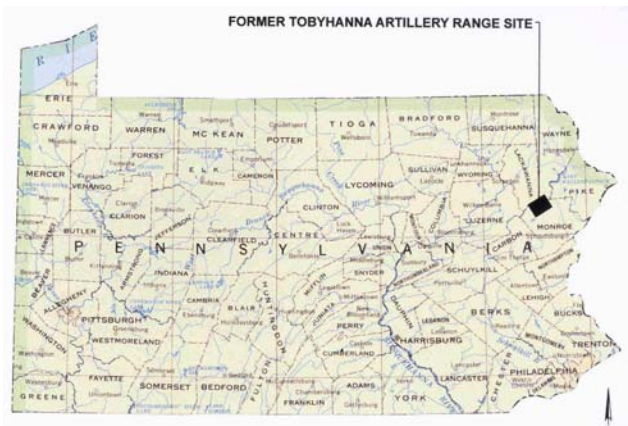


Figure 1 TOAR-FUDS Site Location Map

The purpose of this Proposed Plan is to:

- Summarize the Site history and the results of Site investigations.
- Present a summary of remedial alternatives evaluated to reduce the explosive hazard due to UXO at the Site.
- Present the preferred remedial alternatives for the nine AOCs.
- Solicit public review and comment.

Site investigation documents can be found in the **Administrative Record** for the TOAR-FUDS. USACE, the U.S. Environmental Protection Agency (EPA), and the Pennsylvania Department of Environmental Protection (PADEP) encourage the public to review these documents to gain a more comprehensive understanding of the Site.

USACE is the lead agency for investigating, reporting, making cleanup decisions, and taking cleanup actions regarding UXO at the TOAR-FUDS. PADEP and EPA are the support agencies. This Proposed Plan is part of USACE's community relations program, meets the public participation responsibilities under Section 117(a) of the **Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)** and Section 300.430(f)(2) of the **National Oil and Hazardous Substances Pollution Contingency Plan (NCP)**, and was prepared in accordance with EPA guidance (EPA, 1999).

*This Proposed Plan identifies the preferred remedies for low to moderate and high risk areas of encountering UXO at the TOAR-FUDS. To minimize the risk to the public, the preferred remedy for the low to moderate risk areas consists of **land use controls (LUCs)**, whereas the preferred remedy for high risk areas consists of removal of UXO to **detection depth** and LUCs.*

### MARK YOUR CALENDAR

#### PUBLIC COMMENT PERIOD: November 8 to December 8, 2006

The USACE will accept written comments on the Proposed Plan during a 30-day public comment period. Written comments should be addressed to:

Mr. Chris Augsburger  
Public Affairs Office  
U.S. Army Corps of Engineers, Baltimore District  
P.O. Box 1715  
Baltimore, MD 21203-1715  
email: christopher.augsburger@nab02.usace.army.mil

#### PUBLIC MEETING: Wednesday, November 8, 2006

USACE, PADEP and EPA will hold a public meeting to discuss the Proposed Plan for the TOAR-FUDS, including the alternatives evaluated for the Site. The meeting will be held in the Coolbaugh Township Volunteer Fire House located on Laurel Drive in Tobyhanna, PA from 4 p.m. to 8 p.m., with formal presentations at 4:30 p.m. and 6:30 p.m. Copies of the Proposed Plan and the presentation will be available at the meeting.

#### For more information on the Site, see the Administrative Record at the following location:

Pocono Mountain Public Library  
5540 Memorial Boulevard  
Tobyhanna, PA 18466  
(570) 894-8860

Public comments on this Proposed Plan will be accepted during a public meeting and during a 30-day public review and comment period. These comments will be considered when USACE, in consultation with EPA and PADEP, makes a final decision in a **Decision Document (DD)** regarding the AOCs identified at the TOAR-FUDS. The Figure 2 flow chart summarizes the process flow and public participation steps in achieving a final DD.

USACE responses to public comments on this Proposed Plan will appear in a responsiveness summary section of the DD.

Terms appearing in **bold print** in this Proposed Plan are defined in the glossary provided in the back of this document.

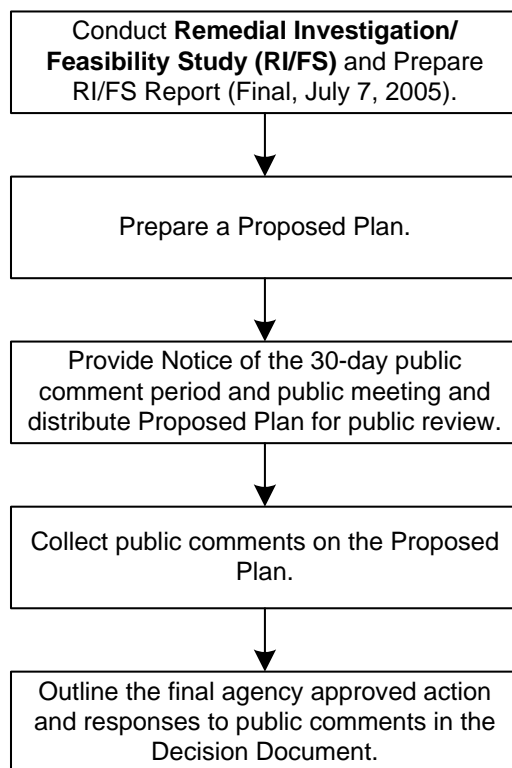


Figure 2 TOAR-FUDS DD Process

## 2.0 SITE BACKGROUND

### 2.1 HISTORY

The majority of the TOAR-FUDS is located in Monroe County, with a small portion of the northeast quadrant of the Site falling within Wayne County, in northeastern Pennsylvania. The TOAR-FUDS comprises a total of 25,218 acres and consists of two adjacent land areas owned by the Commonwealth of Pennsylvania and divided by Interstate 380. The northeastern portion is comprised of portions of Tobyhanna State Park and Gouldsboro State Park. The southwestern portion is

comprised of portions of State Game Lands Number 127.

In 1912, the U.S. Department of the Army (Army) originally leased the lands of the TOAR-FUDS for the purpose of troop training. Later that year the Army formally acquired the lands. Both regular Army and National Guard field artillery units from throughout the Northeast and Mid-Atlantic states trained at Tobyhanna. During World War I, the reservation also served as a training center for tank and ambulance units. Prior to World War II, training was expanded to include cadets from the Army's Military Academy at West Point. Training reached its height during World War II with intensive artillery training being conducted. After the end of World War II, both the mission and activities of the artillery ranges were phased out.

In 1949, 14,000 acres were deeded to the Commonwealth of Pennsylvania's Game Commission (PGC). This land formed the basis for State Game Lands Number 127, referred to hereafter as "Game." Also in 1949, an additional 7,080 acres were deeded to the Commonwealth of Pennsylvania's Department of Forest and Waters. This land formed the basis for Tobyhanna State Park and Gouldsboro State Park, referred to hereafter as "Park."

In 1952, the Commonwealth of Pennsylvania sold 1,418 acres of the area back to the U.S. Government. This tract of the original TOAR was required for the establishment and development of the Tobyhanna Signal Depot, later renamed the Tobyhanna Army Depot (TYAD). TYAD remains active today and is therefore not part of the FUDS and is not being addressed in this action.

Today, the Park covers the northeastern third of the TOAR-FUDS, contains minimal infrastructure, and is used for multiple recreational purposes, including camping, boating, swimming, hunting, fishing, hiking, snowmobiling, and mountain biking. Game covers the remaining southwestern two-thirds of the TOAR-FUDS and serves as a habitat for large and small game animals that are hunted in season, and features several lakes and streams that are fished regularly. The PGC uses some of the land in Game for food plots, and has designated much of the land in Game for future timber sales.

### 2.2 PHYSICAL DESCRIPTION

The TOAR-FUDS is characterized as partly swampy and heavily wooded, with dense brush and outcroppings of bedrock. The majority of the Site is undeveloped. The terrain has slopes ranging from 0 to 20%. Based on historical aerial photographs, when the artillery range was in operation, very few trees existed onsite. Now, about 81% of the Site is wooded. As a result of glaciation

in the region, most of the soils are too stony for cultivation. Soil erosion, low water capacity in the rapidly permeable soils, and insufficient drainage in the low-lying areas cause major problems for development of the area. Groundwater throughout the region generally occurs under unconfined conditions with the groundwater surface being a subdued reflection of the surface topography. Rainfall in the region averages 45 inches each year.

## 2.3 UXO SOURCES

The primary source of UXO at the Site is from weapons training on firing ranges during World Wars I and II. A firing range consists of a **firing point**, an **impact area**, and a **buffer zone** (or range fan). The firing point is the location where a weapon was prepared for use and placed into use. The impact area is the area where a fired ordnance item landed and either detonated completely or malfunctioned. The impact area is usually centered around a target area, which is a fixed area where weapons were targeted. The buffer zone is created to provide a safety zone for ordnance that does not land on target. This area is a buffer area extending out from the firing point to beyond the target area. **Other areas** are located outside the range fan where no UXO are expected. Figure 3 illustrates a generic artillery range layout.

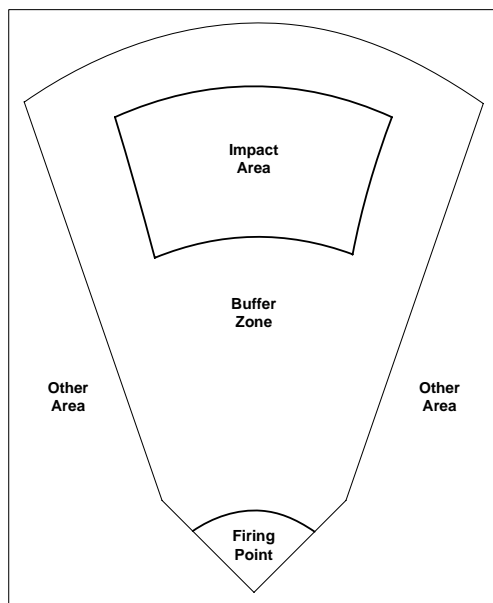


Figure 3 Generic Firing Range Layout

At the Site, two firing range areas were used: the northeast firing range area (located in what is now Park), and the southwest firing range area (located in what is now Game). Figure 4 illustrates the various range fans utilized in the northeast and southwest firing range areas.

As shown in Figure 4, the northeast range area contained two firing points, #1 and #2/2A, and four target areas, #1 thru #4. The southwest artillery range area had four firing points, #3, #4, #4A, and #5, and six target areas, #6 through #11. Based on historical information and site investigations, the munitions most probably used at the Site included .30 and .50-caliber small arms, and 37-mm, 75-mm, 3-inch, and 155-mm artillery munitions.

Almost all ordnance items fired at the Site would have been fired at one of the target areas described above, and would have either functioned correctly (complete detonation) or malfunctioned, causing incomplete detonation or a dud fire in which the ordnance item failed to function as designed. A malfunction would result in the presence of UXO at the Site, most likely in the impact area. Use of munitions can result in the presence of **munitions constituents (MC)** and/or **munitions debris (MD)** at the Site. Complete detonations result in less explosive residuals than incomplete detonations.

UXO at the Site can be present on the ground surface and below the ground surface. UXO present below the ground surface can move toward the surface over time due to **frost heave** or soil erosion. At the Site, frost can reach as deep as 40 inches. Therefore, UXO at depths of up to 40 inches below the ground surface have the potential to migrate to the surface because of frost heave. UXO at depths greater than 40 inches would not migrate to the surface. Based on the munitions believed to have been used at the Site, UXO is not expected to have penetrated the ground to depths greater than 40 inches.

## 2.4 MUNITIONS RESPONSE ACTIVITIES

Over the past decade, several **munitions response (MR)** actions have occurred at the TOAR-FUDS, including **removal actions, construction support**, remedial investigation, and feasibility study analysis. In 1998 and 2004, several removal and construction support actions were conducted in high use and development areas of the TOAR-FUDS and at TYAD to limit public and worker exposure to **munitions and explosives of concern (MEC)**. Also in 2004, PADEP, USACE, and the EPA worked together as a team to complete the site-wide **remedial investigation and feasibility study (RI/FS)** for all of the 25,218 acres of the TOAR-FUDS.

The purpose of the RI was to identify the nature and extent of MEC and MC contamination at the Site. The sources of data evaluated as part of the RI to characterize contamination at the Site included historical information, UXO recovered at the Site and at TYAD to date, MD recovered during the 2004 RI field effort, artillery range

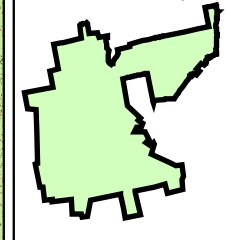


**Legend**

- 1932 Firing Points
- Range Fan
- T1 1932 Target Areas
- 1932 Boundary
- 1918 Boundary
- EPA Boundary
- ⊠ Machine Gun Range
- FUDS Boundary

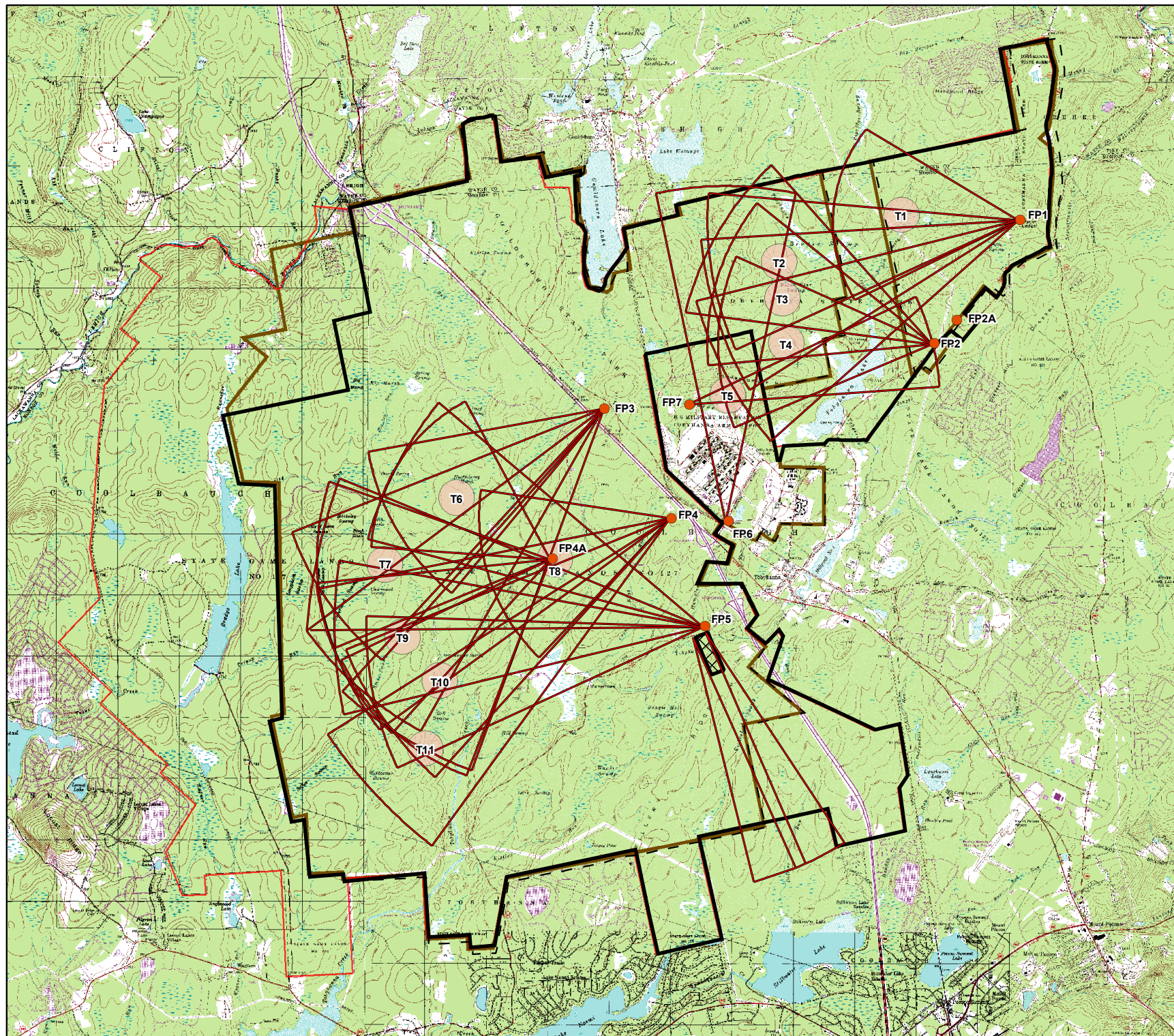
Base Map:  
USGS Topographic Quadrangles  
Blakeslee; Buck Hill Falls; Moscow;  
Mount Pocono; Newfoundland; Pocono  
Pines; Sterling; Thornhurst; Tobyhanna

TOAR - FUDS Area Key Map



0 1,250 2,500 5,000 Feet

**Figure 4**  
**Historic Firing Ranges**  
**at the TOAR - FUDS**





layouts (historical and current standards), visual evidence of targets, and extensive local knowledge provided by area residents, Game and Park employees, and TYAD employees.

In addition to investigating the Site for UXO, the RI evaluated MC concentrations in site media to identify potential **chemicals of concern (COCs)**. MC investigations focused on evaluating metals and explosive chemical contamination in site soils, sediments, and surface water that may have originated from UXO, or munitions breakdown/degradation elements thereof.

As a result of the investigation work completed as part of the RI, a total of nine (9) areas of concern (AOC-1 through AOC-9) were identified at TOAR-FUDS. The locations of the nine AOCs are shown in Figure 5. The results of the RI are presented in the *Final Remedial Investigation Report, Tobyhanna Artillery Range Formerly Used Defense Site, Tobyhanna, Pennsylvania*, which was completed in July 2005 (WESTON, 2005a).

The results of the RI were used to develop the FS, which identified remedial objectives and goals for the Site to protect human health and the environment, and evaluated remedial alternatives to address the UXO contamination in the nine AOCs. The results of the FS were presented in the *Final Feasibility Study, Tobyhanna Artillery Range Formerly Used Defense Site, Tobyhanna, Pennsylvania*, which was also completed in July 2005 (WESTON, 2005b).

Subsequent to the completion of the RI/FS, USACE initiated a **time-critical removal action (TCRA)** in AOC-1 located along the northern FUDS boundary and abutting an expanding Lake Watawga residential community (see Figure 5). This action was conducted to address the explosive risk to neighboring residents and included the removal of UXO to detection depth.

### 3.0 SITE CHARACTERISTICS

In total, approximately 720 acres of the TOAR-FUDS have been physically investigated or subjected to some form of removal action, including approximately 564 acres in Park, and approximately 156 acres in Game. In addition, numerous acres have been visually inspected during USACE site visits.

#### 3.1 Nature and Extent of MC

A total of approximately 50 surface soil, sediment, and surface water samples were collected during the site-wide RI and analyzed for metals and explosives to assess the presence/absence of MC contamination at the Site and to evaluate the potential risk to human health

and the environment. Samples were collected at biased-high locations (such as within impact/target area detonation craters) where contamination, if present, would most likely be located.

MC investigation sampling results detected only one explosive compound in soils at one location at a low concentration. Metals including lead, copper, and antimony were found exceeding background levels in soil, sediment, and surface water. However, based on risk screening results, as well as fate and transport analysis, it was concluded that the concentrations of MC present at the TOAR-FUDS do not pose an unacceptable risk to human health or the environment and additional evaluation or sampling for MC is not warranted.

#### 3.2 Nature and Extent of MEC

All MEC recovered at the TOAR-FUDS has been UXO. No **discarded military munitions (DMM)** have been recovered, no **disposal pits** have been found, and no MC such as TNT has been found in high enough concentrations to pose an explosive hazard. UXO that have been recovered during activities at the TOAR-FUDS and at TYAD are summarized in Table 1.


**Table 1 UXO Recovered at the TOAR-FUDS and at TYAD**

Year	Activity	Location	No. of UXO Recovered
1998	TCRA for Campground and Trails	TOAR-FUDS Park	278
1998	Construction Support for Radar Site	TYAD	228
2004	Construction Support for Radar Site	TYAD	7
2004	Construction Support for Training and Conference Center	TYAD	0
2004	TCRA for Roadways and Trails	TOAR-FUDS Game	1
2004	Site Visit	TOAR-FUDS Park	3
2004	Site Visit	TOAR-FUDS Park	2
2004	RI	TOAR-FUDS Park	40
2004	RI	TOAR-FUDS Game	38
2006	TCRA for AOC-1	TOAR-FUDS Park	44
Total UXO Recovered =			<b>641</b>










UXO that have been recovered at TOAR-FUDS consist primarily of 37-mm, 75-mm, and 155-mm artillery rounds. All UXO have been recovered in suspected UXO source areas, specifically in impact areas and buffer zones. No MEC was recovered that could be associated with former activities at firing points or other areas





**Legend**

 FUDS Boundary

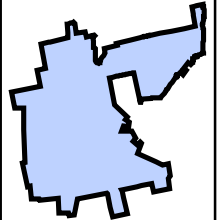
**Areas of Concern (AOC)**

-  AOC 1 - TOAR
-  AOC 2 - TOAR
-  AOC 3 - TOAR
-  AOC 4 - TOAR
-  AOC 5 - TOAR
-  AOC 6 - TOAR
-  AOC 7 - TOAR
-  AOC 8 - TOAR
-  AOC 9 - TOAR

**Wet Areas**

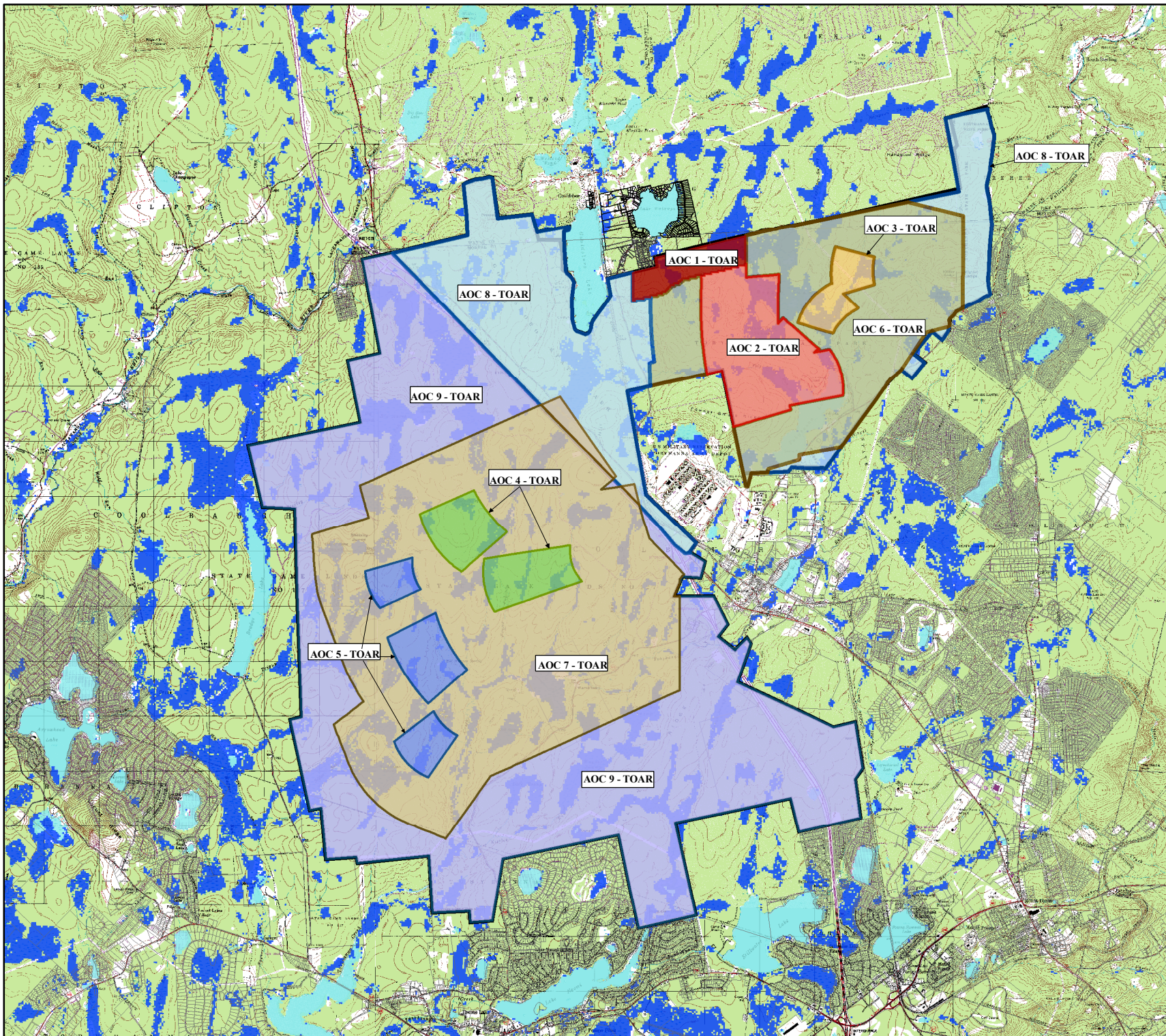
-  Wetland Areas
-  Water Bodies

TOAR - FUDS Area Key Map



0 1,200 2,400 4,800 Feet

**Figure 5**  
**Areas of Concern**  
**at the TOAR - FUDS**





(areas outside the area of expected or anticipated contamination).

Approximately 95% of the UXO recovered during the site-wide RI was found within 12 inches of the ground surface (and 80% within 6 inches of the ground surface). The deepest UXO item recovered was 24 inches below the ground surface. This surficial or shallow recovery depth of UXO can be attributed to the rocky geology of the region limiting munition penetration depth as well as frost heave causing the upward migration of UXO over the past 60 years since active range use.

The following subsections present a summary of site characteristics for each of the nine AOCs.

### **AOC-1**

AOC-1 is located in Park along the northern boundary of the TOAR-FUDS, near Lake Watawga, and is approximately 279 acres in size. Approximately 104 acres in AOC-1 are considered inaccessible “wet areas” (i.e., lakes, ponds, streams, wetlands). AOC-1 is located adjacent to residential housing and is located within a designated natural area open only to passive recreation and hunting.

Based on historical artillery range use at the TOAR-FUDS and the results of the RI, AOC-1 encompasses an area that was a buffer zone. During the RI field investigation, approximately 55 acres within AOC-1 were investigated for MEC, and four (4) UXO were recovered, along with numerous MD items. As noted previously, subsequent to the RI/FS, a TCRA was conducted in AOC-1 to address the imminent safety hazard to neighboring residents from UXO. UXO clearance was conducted to detection depth over all accessible areas of AOC-1 and 44 UXO were recovered, along with 1,857 pounds of MD. Based on the results of the ongoing TCRA, the western and southern borders of AOC-1 have been revised from the RI/FS (see Figure 5). The western border of AOC-1 was expanded westward to provide additional clearance coverage adjacent to the neighboring residences. The southern border was revised to parallel the northern FUDS border in order to provide a consistent buffer zone for the most likely munition to be encountered in AOC-1: the 75-mm high explosive artillery round.

### **AOC-2**

AOC-2 is located in Park and is approximately 1,142 acres in size. Approximately 274 acres in AOC-2 are considered inaccessible “wet areas” (i.e., lakes, ponds, streams, wetlands). AOC-2 is used for recreational activities such as camping, hiking, fishing, mountain biking, snowmobiling, etc. Parts of AOC-2 are

located within a designated natural area open only to passive recreation and hunting.

Based on historical artillery range use at the TOAR-FUDS and the results of the RI, AOC-2 encompasses an area that was an impact area. To date, approximately 235 acres within AOC-2 have been investigated for MEC, and 307 UXO have been recovered, along with numerous MD items.

### **AOC-3**

AOC-3 is located in Park and is approximately 255 acres in size. Approximately 98 acres in AOC-3 are considered inaccessible “wet areas” (i.e., lakes, ponds, streams, wetlands). AOC-3 is used for recreational activities such as camping, hiking, fishing, mountain biking, snowmobiling, etc. Parts of AOC-3 are located within a designated natural area open only to passive recreation and hunting.

Based on historical artillery range use at the TOAR-FUDS and the results of the RI, AOC-3 encompasses an area that was an impact area. To date, approximately nine (9) acres within AOC-3 have been investigated for MEC, and seven (7) UXO have been recovered, along with numerous MD items.

### **AOC-4**

AOC-4 is located in Game and is approximately 656 acres in size. Approximately 142 acres in AOC-4 are considered inaccessible “wet areas” (i.e., lakes, ponds, streams, wetlands). AOC-4 is used primarily for hunting, but also for recreational activities such as camping, hiking, fishing, mountain biking, snowmobiling, etc.

Based on historical artillery range use at the TOAR-FUDS and the results of the RI, AOC-4 encompasses an area that was an impact area. To date, approximately 16 acres within AOC-4 have been investigated for MEC, and 28 UXO have been recovered, along with numerous MD items.

### **AOC-5**

AOC-5 is located in Game and is approximately 625 acres in size. Approximately 126 acres in AOC-5 are considered inaccessible “wet areas” (i.e., lakes, ponds, streams, wetlands). AOC-5 is used primarily for hunting, but also for recreational activities such as camping, hiking, fishing, mountain biking, snowmobiling, etc.

Based on historical artillery range use at the TOAR-FUDS and the results of the RI, AOC-5 encompasses an area that was an impact area. To date, approximately 17 acres within AOC-5 have been investigated for MEC,

and seven (7) UXO have been recovered, along with numerous MD items.

#### AOC-6

AOC-6 is located in Park and is approximately 2,907 acres in size. Approximately 611 acres in AOC-6 are considered inaccessible “wet areas” (i.e., lakes, ponds, streams, wetlands). AOC-6 is used for recreational activities such as camping, hiking, fishing, mountain biking, snowmobiling, etc. Parts of AOC-6 are located within a designated natural area open only to passive recreation and hunting.

Based on historical artillery range use at the TOAR-FUDS and the results of the RI, AOC-6 encompasses an area that includes firing points and buffer zone. To date, approximately 66 acres within AOC-6 have been investigated for MEC, and five (5) UXO have been recovered, along with numerous MD items.

#### AOC-7

AOC-7 is located in Game and is approximately 7,193 acres in size. Approximately 1,577 acres in AOC-7 are considered inaccessible “wet areas” (i.e., lakes, ponds, streams, wetlands). AOC-7 is used primarily for hunting, but also for recreational activities such as camping, hiking, fishing, mountain biking, snowmobiling, etc.

Based on historical artillery range use at the TOAR-FUDS and the results of the RI, AOC-7 encompasses an area that includes firing points and buffer zone. To date, approximately 67 acres within AOC-7 have been investigated for MEC, and four (4) UXO have been recovered, along with numerous MD items.

#### AOC-8

AOC-8 is located in Park and is approximately 3,456 acres in size. Approximately 519 acres in AOC-8 are considered inaccessible “wet areas” (i.e., lakes, ponds, streams, wetlands). AOC-8 is used for recreational activities such as camping, hiking, fishing, mountain biking, snowmobiling, etc. Parts of AOC-8 are located within a designated natural area open only to passive recreation and hunting.

Based on historical artillery range use at the TOAR-FUDS and the results of the RI, AOC-8 encompasses areas outside areas of expected MEC contamination. To date, approximately 59 acres within AOC-8 have been investigated for MEC, and no UXO or MD have been recovered.

#### AOC-9

AOC-9 is located in Game and is approximately 8,706 acres in size. Approximately 1,847 acres in AOC-9 are considered inaccessible “wet areas” (i.e., lakes, ponds,

streams, wetlands). AOC-9 is used primarily for hunting, but also for recreational activities such as camping, hiking, fishing, mountain biking, snowmobiling, etc.

Based on historical artillery range use at the TOAR-FUDS and the results of the RI, AOC-9 encompasses areas outside areas of expected MEC contamination. To date, approximately 55 acres within AOC-9 have been investigated for MEC, and no UXO have been recovered. Several MD items have been recovered.

## 4.0 SCOPE AND ROLE

Past artillery range training has resulted in UXO contamination of the TOAR-FUDS. The role of the remedial action selected for the TOAR-FUDS is to reduce the risk associated with UXO to human health and the environment for the Park’s and Game’s current and intended future land use of public access for outdoor recreational activities (e.g., camping, hiking, hunting, and fishing).

## 5.0 SUMMARY OF SITE RISKS

The results of the RI were used to evaluate risk associated with MC and **explosive safety risk** associated with UXO. Based on the screening-level risk assessment completed in the RI, MC, including metals and explosive compounds, were not detected at concentrations that pose an unacceptable risk to human health or the environment. Therefore, explosive safety risk associated with UXO is the only MEC-related risk at the Site.

Explosive safety risk is the probability for a UXO item to detonate and potentially cause harm as a result of human activities. An explosive safety risk exists if a person can come into contact with a UXO item and act upon it to cause detonation. The potential for explosive safety risk depends on the presence of three critical elements: a source (presence of UXO), a receptor (person), and interaction between the source and receptor (such as picking up the item or disturbing the item during construction). There is no explosive safety risk if any one element is missing.

The **exposure pathway** for a UXO item to a receptor is primarily through direct contact as a result of some human activity. Agricultural or construction activities involving subsurface intrusion are examples of human activities that will increase the likelihood for direct contact with buried UXO. A UXO item will tend to remain in place unless disturbed by human or natural forces, such as erosion or frost heave. Movement of the UXO item by natural forces may increase the probability

for direct human contact, but not necessarily result in a direct contact or exposure.

A qualitative risk evaluation was conducted using the **Ordnance and Explosives Risk Impact Assessment (OERIA)** Interim Guidance document (USACE, 2001) to assess explosive safety risks to the public at the TOAR-FUDS. The potential explosive safety risk posed by UXO was characterized qualitatively by evaluating the following three primary risk factors and associated secondary risk factors (in parentheses):

1. Presence of a UXO source (type, sensitivity, density, and depth distribution).
2. Site Characteristics (site accessibility and stability).
3. Human Factors (population and site activity).

Using these risk factors, explosive safety risk associated with UXO at the TOAR-FUDS was evaluated for the following UXO source areas: firing points, impact areas, buffer zones, and other areas. The results of the risk evaluation were used to assign a qualitative risk (low, moderate, or high) associated with UXO to each of the nine AOCs, as shown in Table 2 below. In general, the explosive safety risk associated with UXO is high in impact areas, where UXO densities are highest. The explosive safety risk associated with UXO is low in other areas where no UXO was found. Where only limited UXO was encountered, the explosive safety risk is considered low to moderate. The explosive safety risk for AOC-1 was originally determined to be high during the FS due to its close proximity to residential housing; however, due to the completion of the AOC-1 TCRA, the explosive safety risk is now considered to be low.

**Table 2 Summary of Explosive Safety Risk Evaluation Results for the TOAR-FUDS**

AOC	UXO Source Area	Risk Associated with UXO
1	Lake Watawga Area	Low*
2	Impact Area Park	High
3	Impact Area Park	High
4	Impact Area Game	High
5	Impact Area Game	High
6	Firing Points Park and Buffer Zone Park	Low-Moderate
7	Firing Points Game and Buffer Zone Game	Low-Moderate
8	Other Areas Park	Low
9	Other Areas Game	Low

\*Based on completed TCRA.

## 6.0 REMEDIAL ACTION OBJECTIVES

The TOAR-FUDS is used by the public for outdoor recreational activities, including camping, hiking, hunting, and fishing. There is no stated intent by the landowners to change the land use. The goal of the TOAR-FUDS remedial action is to reduce explosives safety hazards to ensure protection of human health, public safety, and the environment. The objective(s) established for remedial action guides the development of remedial action alternatives. The **remedial action objective (RAO)** for the TOAR-FUDS Site is to:

- Minimize or eliminate the explosive safety risk to the public and site personnel.

## 7.0 EVALUATION OF REMEDIAL ALTERNATIVES

A total of five (5) potential remedial alternatives were identified for evaluation based on Site RAOs. They were evaluated against the first eight (8) CERCLA/NCP criteria, as required by EPA guidance (EPA, 1988). The ninth criterion will be applied after public comments are received.

### 7.1 DESCRIPTION OF REMEDIAL ALTERNATIVES

The five remedial alternatives evaluated for the TOAR-FUDS AOCs included the following:

1. No Action – Required to be evaluated by the NCP.
2. LUCs.
3. Surface removal of UXO with LUCs.
4. Removal of UXO to one foot with LUCs.
5. Removal of UXO to detection depth with LUCs.

These alternatives are described in the following subsections.

It should be noted that CERCLA requires the review of remedial actions no less than every five years if the selected remedy does not allow for unlimited use and unrestricted exposure. The reviews are conducted to assure that human health and the environment are being protected. **Recurring reviews** for UXO remedial actions determine if a remedial action continues to minimize explosives safety risks and continues to be protective of human health and the environment. Since none of the alternatives evaluated for the Site allow for unlimited

use and unrestricted exposure, recurring reviews will be completed by the government at least every five years.

#### EVALUATION CRITERIA FOR CERCLA/NCP REMEDIAL ALTERNATIVES

##### Threshold Criteria:

- 1. Overall Protectiveness of Human Health and the Environment** determines whether an alternative eliminates, reduces, or controls threats to public health and the environment through institutional controls, engineering controls, or treatment.
- 2. Compliance with Applicable or Relevant and Appropriate Requirements (ARARs) and To Be Considered Criteria (TBCs)** evaluates whether the alternative meets Federal and state environmental statutes, regulations, and other requirements that pertain to the site, or whether a waiver is justified.

##### Balancing Criteria:

- 3. Long-Term Effectiveness and Permanence** considers the ability of an alternative to maintain protection of human health and the environment over time.
- 4. Reduction of Toxicity, Mobility, or Volume (TMV) of Contaminants through Treatment** evaluates an alternative's use of treatment to reduce the harmful effects of principal contaminants, their ability to move in the environment, and the amount of contamination present.
- 5. Short-Term Effectiveness** considers the length of time needed to implement an alternative and the risks the alternative poses to workers, residents, and the environment during implementation.
- 6. Implementability** considers the technical and administrative feasibility of implementing the alternative, including factors such as the relative availability of goods and services.
- 7. Cost** includes estimated capital and annual O&M costs, as well as present worth cost. Present worth cost is the total cost of an alternative over time in terms of today's dollar value. Cost estimates are expected to be accurate within a range of +50 to -30%.

##### Modifying Criteria:

- 8. State/Support Agency Acceptance** considers whether the state and/or support agency agrees with USACE's analyses and recommendations, as described in the RI/FS and Proposed Plan.
- 9. Community Acceptance** considers whether the local community agrees with USACE's analyses and preferred alternative. Comments received on the Proposed Plan are an important indicator of community acceptance.

implementation of LUCs would provide a means for the landowners and their representatives to coordinate in an effort to reduce UXO exposure risk through behavior modification. The LUCs alternative can be used in combination with other UXO remedial actions or in cases where it may not be possible or practical to physically clear UXO from the AOC (e.g., in "wet areas"). Successful implementation of LUCs is contingent on the cooperation and active participation of the existing powers and authorities of the property owners, as well as other government agencies to protect the public from UXO risks. The remedial design will specify steps and controls to be put in place that will ensure the LUCs are maintained, thus ensuring long-term effectiveness and permanence.

In general, all organizations interviewed during the RI expressed an interest/willingness to participate in LUCs. LUCs proposed for the TOAR-FUDS include the following:

- UXO hazard/warning signs and/or information display boards at Park and Game entrance points and high use areas.
- UXO hazard notification as part of the permitting process for construction/excavation and timber harvesting activities.
- Community education and outreach activities including, but not limited to:
  - Distribution of informational brochures/fact sheets.
  - Distribution of visual and audio educational and training media.
  - Performance of classroom education and training.
  - Operation and maintenance of educational Internet website.
- Requirement of MEC construction support in areas where clearance has not been conducted.

### ALTERNATIVE 1 – NO ACTION

Alternative 1 – No Action is provided, as required under CERCLA and the NCP, as a baseline for comparison to the other proposed alternatives. Alternative 1 is for the government to take no action in regards to locating, removing, and disposing of any potential UXO present within an AOC at the TOAR-FUDS. In addition, no public awareness or education training would be initiated with regards to the risk of UXO. The No Action alternative assumes continued land use of the AOC in its present state.

### ALTERNATIVE 2 – LAND USE CONTROLS

Aside from conventional UXO remedial actions, risks related to potential UXO hazards may be managed through LUCs consisting of various access control and/or public awareness components. The

### ALTERNATIVE 3 – SURFACE REMOVAL OF UXO WITH LAND USE CONTROLS

Surface removal of UXO includes removal of UXO detected on the ground surface and breaching the ground surface using visual observation and analog instrument assistance. LUCs would also be implemented as part of this alternative as described in Alternative 2, and would address the potential UXO hazards associated with "wet areas."

## ALTERNATIVE 4 – REMOVAL OF UXO TO ONE FOOT WITH LAND USE CONTROLS

Removal of UXO to one foot includes removal of UXO detected on the ground surface and removal of UXO with any part within one foot of the ground surface. A detection depth of one foot was chosen as a general remedial action because 95% of the UXO items recovered at the TOAR-FUDS during the RI were located within one foot of the ground surface. LUCs would also be implemented as part of this alternative as described in Alternative 2, and would address the potential UXO hazards associated with “wet areas.”

## ALTERNATIVE 5 – REMOVAL OF UXO TO DETECTION DEPTH WITH LAND USE CONTROLS

Removal of UXO to detection depth includes removal of all UXO detected. Depth of detection varies based on depth of UXO at the Site, detection technology used, as well as several other UXO and site-specific factors. LUCs would also be implemented as part of this alternative as described in Alternative 2, and would address the potential UXO hazards associated with “wet areas.”

## 7.2 DETAILED EVALUATION OF REMEDIAL ALTERNATIVES

Remedial alternatives for AOCs with the same risk were combined to minimize redundancy in the detailed analysis. Therefore, remedial alternatives for AOCs with low or low-moderate risk (AOC-1, -6, -7, -8 and -9) were analyzed together, and remedial alternatives for AOCs with high risk (AOC-2, -3, -4, and -5) were analyzed together. The remedial alternatives evaluated for the TOAR-FUDS included the following:

For AOCs with low or low-moderate risk (AOC-1, -6, -7, -8 and -9):

1. No Action.
2. LUCs.

For AOCs with high risk (AOC-2, -3, -4, and -5):

1. No Action.
2. LUCs.
3. Surface removal of UXO with LUCs.
4. Removal of UXO to one foot with LUCs.
5. Removal of UXO to detection depth with LUCs.

The strengths and weaknesses of the remedial alternatives relative to one another were evaluated in the FS with respect to each of the NCP criteria.

Alternatives 1 and 2 were compared for AOCs with low or low-moderate risk, and Alternatives 1 through 5 were compared for AOCs with high risk.

In the FS, the alternatives were evaluated qualitatively, then ranked from best to worst and given a corresponding score for each criterion. The scores for each alternative were then totaled in order to develop a relative ranking of alternatives for all AOCs. For more detailed information regarding the scoring and relative ranking process, see the *Final Feasibility Study, Tobyhanna Artillery Range Formerly Used Defense Site, Tobyhanna, Pennsylvania* (WESTON, 2005b). In this Proposed Plan, the alternatives are evaluated and compared qualitatively below, relative to the nine CERCLA/NCP criteria.

## AOCs WITH LOW OR LOW-MODERATE RISK

The alternatives for AOCs with low or low-moderate risk (Alternatives 1 and 2) can be compared relative to the NCP criteria as follows:

- Overall Protectiveness of Human Health and the Environment – Alternative 1 is not protective because no action would be taken to prevent human exposure to UXO. Alternative 2 is more protective than Alternative 1 because the LUCs would reduce unacceptable exposure. No unacceptable ecological risk exists that must be addressed.
- Compliance with ARARs and TBCs – There are no regulations or criteria associated with Alternative 1, and Alternative 2 would be implemented to comply with all ARARs and TBCs.
- Long-Term Effectiveness and Permanence – Alternative 1 is not effective or permanent. Alternative 2 is more effective and permanent than Alternative 1, assuming the cooperation and active participation of the existing powers and authorities of government agencies. The LUCs recommended as Alternative 2 have been designed to provide effectiveness in the long-term.
- Reduction of Toxicity, Mobility, or Volume (TMV) of Contaminants Through Treatment – Neither alternative will reduce the toxicity, mobility or volume of UXO at the site.
- Short-Term Effectiveness – Because there are no construction activities associated with either alternative, Alternatives 1 and 2 would not present significant additional risk to the community or to workers at the Site. Also, Alternatives 1 and 2 would not cause damage to



the environment because no clearing, grubbing, or excavation would be required.

- Implementability – Alternative 1 would be easily implemented because it requires no action. The LUCs recommended as Alternative 2 could also be easily implemented because they pose no technical difficulties and the materials and services needed are available.
- Cost – The total present-worth cost to perform each alternative is as follows:

Alternative 1 – \$0.

Alternative 2 – \$2,659,000.

Note: Costs have been rounded to the nearest thousand dollars. Costs associated with CERCLA-required five-year reviews are not included here.

- State Acceptance – Based on concerns for public safety and the environment, PADEP would prefer the most protective alternative.

### AOCs WITH HIGH RISK

The alternatives for AOCs with high risk (Alternatives 1 through 5) can be compared relative to the NCP criteria as follows:

- Overall Protectiveness of Human Health and the Environment – UXO densities in high-risk AOCs ranged from 1.9 to 2.6 UXO/acre. 80% of the UXO items recovered in these AOCs during the RI were located within six (6) inches of the ground surface, 95% were located within 12 inches of the ground surface, and the remaining UXO items were located between 12 and 24 inches below the ground surface. Therefore, Alternative 1 is not protective because no action would be taken to prevent human exposure to UXO. Alternative 2 is more protective than Alternative 1 because the LUCs would reduce unacceptable exposure. However, Alternative 2 is less protective than Alternatives 3 through 5 because no UXO items would be removed. Alternative 5 is more protective than Alternatives 3 and 4 because it would remove all detectable UXO items.
- Compliance with ARARs and TBCs – There are no regulations or criteria associated with Alternative 1, and Alternatives 2 through 5 would be implemented and performed to comply with all ARARs and TBCs.
- Long-Term Effectiveness and Permanence – Alternative 1 is not effective or permanent. Alternative 2 is more effective and permanent

than Alternative 1, assuming the cooperation and active participation of the existing powers and authorities of government agencies. The LUCs recommended as Alternative 2 have been designed to provide effectiveness in the long-term. Alternatives 3 through 5 would all be more effective and more permanent than Alternative 2 because UXO items would be removed permanently from the Site. Alternative 5 would be most effective and permanent because all detectable UXO items would be removed permanently, including items deeper than one foot, which could potentially move to the surface due to frost heave and/or erosion.

- Reduction of Toxicity, Mobility, or Volume (TMV) of Contaminants Through Treatment – Alternatives 1 and 2 will not reduce the TMV of UXO at the site. Out of Alternatives 3 through 5, Alternative 5 would most reduce the TMV of UXO at the Site because all detectable UXO items would be removed, including items deeper than one foot, which could potentially move to the surface due to frost heave and/or erosion.
- Short-Term Effectiveness – Because there are no construction activities associated with either alternative, Alternatives 1 and 2 would not present significant additional risk to the community or to workers at the Site. Alternatives 3 through 5 would significantly increase risk to the community and to workers at the Site during removal of UXO. Increased risk to the community during removal of UXO would be significantly mitigated by the use of engineering controls and/or evacuations to maintain minimum safe distances. Alternatives 1 and 2 would not cause damage to the environment because no clearing, grubbing, or excavation would be required. Alternatives 3 through 5 would cause damage to the environment due to those activities.
- Implementability – Alternative 1 would be easily implemented because it requires no action. The LUCs recommended as Alternative 2 could also be easily implemented because they pose no technical difficulties and the materials and services needed are available. Removal of UXO to various depths, like those proposed in Alternatives 3 through 5, have been implemented effectively at the TOAR-FUDS during early removal actions, RI field efforts, and during the recently completed AOC-1 TCRA.

- Cost – The total present-worth cost to perform each alternative is as follows:

Alternative 1 – \$0.

Alternative 2 – \$4,536,000.

Alternative 3 – \$28,079,000.

Alternative 4 – \$49,342,000.

Alternative 5 – \$52,345,000.

Note: Costs have been rounded to the nearest thousand dollars. Costs associated with CERCLA-required five-year reviews are not included here.

- State Acceptance – Based on concerns for public safety and the environment, PADEP would prefer the most protective alternative.

## 8.0 PREFERRED REMEDIAL ALTERNATIVES

The preferred alternatives for AOCs with low or low-moderate risk and for AOCs with high risk at the TOAR-FUDS are described in the following subsections.

### 8.1 PREFERRED REMEDIAL ALTERNATIVE FOR AOCs WITH LOW OR LOW-MODERATE RISK

**Alternative 2 – Land Use Controls** is the preferred alternative for addressing AOCs with low or low-moderate risk associated with UXO at the TOAR-FUDS (AOC-1, -6, -7, -8, and -9). The preferred alternative was selected over Alternative 1 – No Action because it is expected to achieve the RAO, thereby achieving long-term protection of human health and the environment for the current and future intended land use. The preferred alternative will accomplish the following:

- Reduce risk to human health by increasing public awareness of the risks associated with UXO at the TOAR-FUDS.
- Be easy to implement and cost-effective.
- Address risk for the Park's and Game's current and intended future land use of public access for outdoor recreational activities (e.g., camping, hiking, hunting, and fishing).
- Address risk in impractical or inaccessible areas (e.g., "wet areas").

The preferred alternative would include the following components:

- UXO hazard/warning signs and/or information display boards at Park and Game entrance points and high use areas.
- UXO hazard notification as part of the permitting process for construction/excavation and timber harvesting activities.
- Community education and outreach activities including, but not limited to:
  - Distribution of informational brochures/fact sheets.
  - Distribution of visual and audio educational and training media.
  - Performance of classroom education and training.
  - Operation and maintenance of educational Internet website.
- Requirement of MEC construction support in low to moderate risk areas where clearance has not been conducted.

### 8.2 PREFERRED REMEDIAL ALTERNATIVE FOR AOCs WITH HIGH RISK

**Alternative 5 – Removal of UXO to Detection Depth with LUCs** is the preferred alternative for addressing AOCs with high risk associated with UXO at the TOAR-FUDS (AOC-2, -3, -4, and -5). The preferred alternative was selected over the other alternatives because it is expected to meet the threshold criteria and provide the best balance of tradeoffs relative to the balancing and modifying criteria. The preferred alternative will accomplish the following:

- Reduce risk to human health by removing all detectable UXO present at the TOAR-FUDS (more than Alternatives 3 and 4).
- Be easy to implement and cost-effective relative to other UXO removal alternatives (Alternatives 3 and 4).
- Provide the most permanent solution.
- Reduce risk to human health by increasing public awareness of the risks associated with UXO at the TOAR-FUDS.
- Address risk for the Park's and Game's current and intended future land use of public access for outdoor recreational activities (e.g., camping, hiking, hunting, and fishing).
- Address risk in impractical or inaccessible areas (e.g., "wet areas").

The preferred alternative would include the following components:

- UXO Removal:
  - Remove all detected UXO.
- LUCs:
  - UXO hazard/warning signs and/or information display boards at Park and Game entrance points and high use areas.
  - UXO hazard notification as part of the permitting process for construction/excavation and timber harvesting activities.
  - Community education and outreach activities including, but not limited to:
    - Distribution of informational brochures/fact sheets.
    - Distribution of visual and audio educational and training media.
    - Performance of classroom education and training.
    - Operation and maintenance of educational Internet website.
  - Requirement of MEC construction support in high risk areas where clearance has not been conducted.

## 9.0 COMMUNITY PARTICIPATION

Public input is important to the decision-making process. Nearby residents and other interested parties are encouraged by USACE, EPA and PADEP to use the comment period for questions and concerns about the proposed and preferred remedial alternatives for the TOAR-FUDS. USACE will summarize and respond to public comments in a responsiveness summary, which will become part of the official DD.

The Proposed Plan fulfills the public participation requirements of CERCLA Section 117(a), which specifies that the lead agency (USACE) must publish a plan outlining remedial alternatives evaluated for the Site and identify the preferred alternatives. The RI, FS, and other documents referenced in the Proposed Plan are available for public review in the Administrative Record.

### 9.1 PUBLIC COMMENT PERIOD

The Public Comment Period for the Proposed Plan offers the public an opportunity to provide input to the

process for proposing remedial alternatives for the TOAR-FUDS. The Public Comment Period will begin on November 8, 2006 and end on December 8, 2006. A public meeting will be held on Wednesday, November 8, 2006. The meeting will provide an additional opportunity for the public to submit comments regarding the Proposed Plan. All interested parties are encouraged to attend the meeting to learn more about the alternatives proposed for the Site.

During the comment period, interested parties may submit written comments to and obtain further information from:

Mr. Chris Augsburger  
Public Affairs Office  
U.S. Army Corps of Engineers, Baltimore District  
P.O. Box 1715  
Baltimore, MD 21203-1715  
email:christopher.augsburger@nab02.usace.army.mil

### 9.2 COMMUNITY ACCEPTANCE

Community acceptance of the preferred alternatives will be evaluated after the public comment period ends.

### 9.3 DECISION DOCUMENT

Following the public comment period and concurrence by USACE, PADEP, and EPA, a Decision Document will be prepared. It will detail the remedial alternatives selected for the Site, and it will include USACE's responses to comments received during the public comment period.

#### Available Information

Final technical documents, including the Remedial Investigation Report, Feasibility Study and other relevant technical reports for the TOAR-FUDS are available to the public at the following location:

**Administrative Record**  
Pocono Mountain Public Library  
5540 Memorial Boulevard  
Tobyhanna, PA 18466  
(570) 894-8860

#### Public Meeting

**Date:** *Wednesday, November 8, 2006*

**Time:** *4:00 pm to 8:00 pm, with formal presentations at 4:30 pm and 6:30 pm*

**Place:** *Coolbaugh Township Volunteer Fire House  
Laurel Drive  
Tobyhanna, PA*

*Written comments on the Proposed Plan for the TOAR-FUDS must be postmarked no later than December 8, 2006.*

## **GLOSSARY OF TERMS**

## GLOSSARY OF TERMS

Administrative Record	A collection of documents containing all the information and reports generated during the entire phase of investigation and cleanup at a site, which are used to make a decision on the selection of a response action under CERCLA. This file is to be available for public review and a copy maintained near the site, at the Pocono Mountain Library.
Applicable or Relevant and Appropriate Requirements (ARARs)	Federal (or state, if more stringent) environmental statutes, regulations, and other requirements that pertain to the protection of human health and the environment and have been determined to be either directly applicable or relevant and appropriate to the particular cleanup site's hazardous substances, location, or expected cleanup actions.
Area of Concern (AOC)	Areas identified at the TOAR-FUDS as requiring remedial action. For military munitions responses, these are also often referred to as <b>Munitions Response Sites (MRS)</b> .
Buffer Zone	A safety margin on either side, above, and below the approved target area extending to a distance at which the hazard distance limit is reached.
Chemicals of Concern (COCs)	Chemicals identified through the risk assessment process as the primary chemicals that may cause unacceptable human health and/or ecological risk.
Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)	A Federal law passed in 1980 and modified in 1986 by the Superfund Amendments and Reauthorization Act (SARA) to investigate and clean up abandoned and uncontrolled hazardous waste sites.
Construction Support	Support provided by qualified UXO personnel during construction activities at potential MEC sites to ensure the safety of construction personnel from the harmful effects of UXO.
Decision Document (DD)	A legal public document that describes the cleanup action or remedy selected for a site, the basis for the choice of that remedy, and public comments on alternative remedies. The DD is based on information and technical analysis generated during the RI/FS.
Detection Depth	The depth below ground surface at which munitions items can be reliably detected using the best available and most appropriate remote sensing equipment for a given environment. Detection depth is dependent on the equipment, the size/mass of item, the item's depth and orientation, and geological/soil conditions.
Discarded Military Munitions (DMM)	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. The term does not include UXO, military munitions that are being held for future use or planned disposal, or military munitions that have been properly disposed of, consistent with applicable environmental laws and regulations (Army, 2005).
Disposal Pits	Areas within impact areas and/or buffer zones where munitions that were fired and scrap material (old targets or expended munitions) have been collected and buried.

## GLOSSARY OF TERMS (Continued)

Explosive Safety Risk	The probability for a UXO item to detonate and potentially cause harm to people, property, the environment, or operational capability and readiness as a result of human activities. An explosive safety risk exists if a person can come into contact with a UXO item and act upon it to cause detonation. The potential for an explosive safety risk depends on the presence of three critical elements: a source (presence of UXO), a receptor or person, and interaction between the source and receptor (such as picking up the item or disturbing the item by plowing). There is no explosive safety risk if any one element is missing.
Exposure Pathway	Describes the course a chemical or physical agent takes from the source to the exposed individual. Elements of the exposure pathway are: (1) the source of the released chemical or physical agent; (2) the contaminated medium (e.g., soil); (3) a point of contact with the contaminated medium; and (4) an exposure route (e.g., ingestion, inhalation) at a contact point.
Feasibility Study (FS)	An evaluation of potential remedial technologies and treatment options that can be used to clean up a site.
Firing Point	The point or location at which a weapon system (excluding demolitions) is placed for firing.
Frost Heave	The upthrust of ground caused by the freezing of moist soil.
Impact Area	The ground and associated airspace within a firing range used to contain fired, or launched ammunition and explosives, and the resulting fragments, debris, and components from various weapon systems.
Land Use Controls (LUCs)	Physical, legal, or administrative mechanisms that restrict the use of, or limit access to, real property, to prevent or reduce risks to human health and the environment.
Munitions Constituents (MC)	Any materials originating from UXO, discarded military munitions, or other military munitions, including explosive and non explosive materials, and emission, degradation, or breakdown elements of such ordnance or munitions (Army, 2005). At the TOAR-FUDS, potential MC consists of metals and explosives residuals.
Munitions Debris (MD)	Remnants of munitions (e.g., fragments, penetrators, projectiles, shell casings, links, fins) remaining after munitions use, demilitarization or disposal (Army, 2005).
Munitions and Explosives of Concern (MEC)	This term distinguishes specific categories of military munitions that may pose unique explosive safety risks, including: <ul style="list-style-type: none"> <li>▪ UXO,</li> <li>▪ DMM, or</li> <li>▪ Munitions constituents (e.g., trinitrotoluene [TNT], Royal Demolition Explosive [RDX]) present in high enough concentrations to pose an explosive hazard (Army, 2005).</li> </ul>
Munitions Response (MR)	Response actions, including investigation, removal actions, and remedial actions to address the explosives safety, human health, or environmental risks presented by UXO, DMM, or munitions constituents (MC) (Army, 2005).

## GLOSSARY OF TERMS (Continued)

Munitions Response Area (MRA)	Any area on a defense site that is known or suspected to contain UXO, DMM, or MC. A munitions response area is comprised of one or more munitions response sites (Army, 2005).
Munitions Response Site (MRS)	A discrete location within a <b>munitions response area (MRA)</b> that is known to require a munitions response (Army 2005).
National Oil and Hazardous Substances Pollution Contingency Plan (NCP)	The Federal regulation that implements CERCLA. The NCP was revised in February 1990. The purpose of the NCP is to provide the organizational structure and procedures for preparing for and responding to discharges of oil and releases of hazardous substances, pollutants, or contaminants.
Ordnance and Explosives Risk Impact Assessment (OERIA)	A qualitative risk assessment for MEC sites that uses direct analysis of site conditions and human issues that create MEC risk.
Other Areas	Areas outside the area of expected or anticipated UXO contamination.
Proposed Plan	A document that presents a proposed cleanup alternative, rationale for the preference, and requests public input regarding the proposed alternative.
Recurring Reviews	Review required by CERCLA no less than every five years to assure that human health and the environment are being protected by the selected remedial action, where the remedial action does not for unlimited use and unrestricted exposure.
Remedial Action	Action consistent with a permanent remedy, taken to prevent or minimize the release of hazardous substances.
Remedial Action Objective (RAO)	Objectives established for remedial actions to guide the development of alternatives and focus the comparison of acceptable remedial action alternatives, if warranted. RAOs also assist in clarifying the goal of minimizing risk and achieving an acceptable level of protection for human health and the environment.
Remedial Investigation (RI)	A study of a site that provides information supporting the evaluation for the need for a remedy and/or selection of a remedy for a site where hazardous substances have been disposed of. The RI identifies the nature and extent of contamination at the facility.
Removal Action	Short-term immediate actions taken to address releases of hazardous substances that may require expedited response.
Time Critical Removal Action (TCRA)	Removal actions where, based on the site evaluation, a determination is made that a removal action is appropriate, and that less than six (6) months exists before on-site removal activity must begin.
To Be Considered Criteria (TBCs)	Criteria used to evaluate remedial alternatives when there are no ARARs, or when ARARs alone may not adequately protect human health and the environment.
Unexploded Ordnance (UXO)	<p>Military munitions that fulfill the following criteria:</p> <ol style="list-style-type: none"> <li>1. Have been primed, fuzed, armed, or otherwise prepared for action;</li> <li>2. Have been fired, dropped, launched, projected, or placed in such a manner as to constitute a hazard to operations, installations, personnel, or material; and</li> <li>3. Remain unexploded either by malfunction, design, or any other cause.</li> </ol>

## LIST OF ACRONYMS



## LIST OF ACRONYMS

AOC	area of concern
ARAR	applicable or relevant and appropriate requirement
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	chemical of concern
DCNR	Pennsylvania Department of Conservation and Natural Resources
DD	Decision Document
DMM	discarded military munitions
DOD	U.S. Department of Defense
EPA	U. S. Environmental Protection Agency
FS	feasibility study
FUDS	Formerly Used Defense Site
LUC	Land Use Control
MC	Munitions Constituents
MD	munitions debris
MEC	munitions and explosives of concern
MR	Munitions Response
MRS	Munitions Response Site
NCP	National Oil and Hazardous Substance Pollution Contingency Plan
NPL	National Priorities List
OERIA	Ordnance and Explosive Risk Impact Assessment
PADEP	Pennsylvania Department of Environmental Protection
RAO	remedial action objective
RDX	cyclotrimethylenetrinitramine
RI	remedial investigation
ROD	Record of Decision
TBC	to be considered
TCRA	Time Critical Removal Action
TMV	toxicity, mobility, or volume
TNT	trinitrotoluene
TOAR	Tobyhanna Artillery Range
TYAD	Tobyhanna Army Depot
USACE	U.S. Army Corps of Engineers
USC	U.S. Code
UXO	unexploded ordnance

## REFERENCES

**REFERENCES**

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