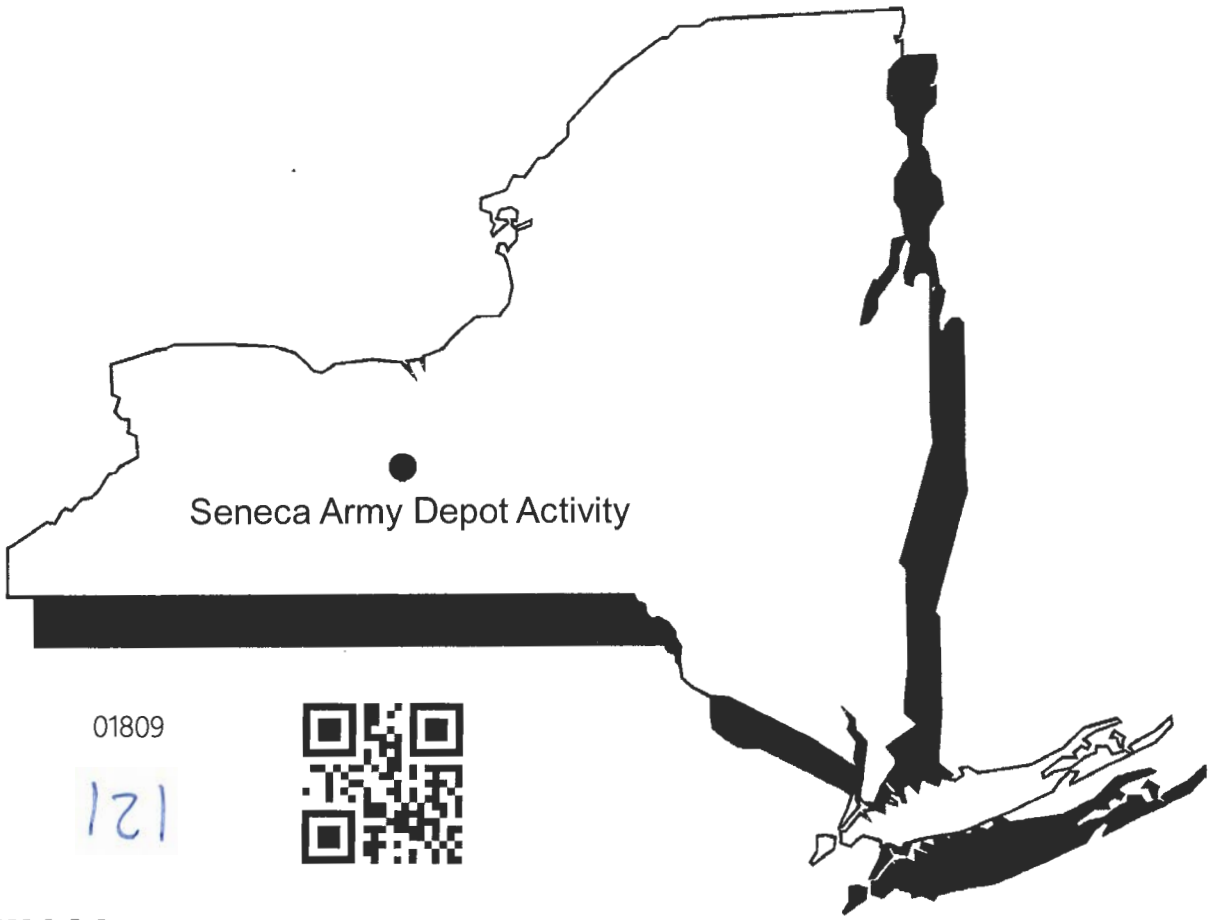
US Army, Engineering & Support Center
Huntsville, AL

Seneca Army Depot Activity
Romulus, NY



FINAL
PROPOSED PLAN

THE SENECA ARMY DEPOT MUNITIONS RESPONSE SITES (SEAD-46, SEAD 003-R-01 [SEAD-57], SEAD 002-R-01, AND SEAD 007-R-01) AND SEAD-70
SENECA ARMY DEPOT ACTIVITY

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Proposed Plan – Final

SEAD-46, SEAD 003-R-01 [SEAD-57], SEAD 002-R-01
and SEAD 007-R-01(Seneca AD Munitions Response Sites) and SEAD-70
at SENECA ARMY DEPOT ACTIVITY (SEDA)
Romulus, New York

January 2017

PURPOSE OF THIS DOCUMENT

This Proposed Plan describes the remedial alternatives selected for the Seneca Army Depot (AD) Munitions Response Sites and SEAD-70. The Seneca AD Munitions Response Sites comprises four areas of concern (AOCs): SEAD-46 Small Arms Firing Range (also known as [aka] 3.5-inch Rocket Range); SEAD 003-R-01, Explosive Ordnance Disposal (EOD) Range 1 (aka SEAD-57, EOD Training Range); SEAD 002-R-01, East EOD Ranges (former EOD-2 and EOD-3); SEAD 007-R-01, Rifle Grenade Range. This Proposed Plan also addresses SEAD-70 (Building T2110 – Filled Area). These areas are located at the Seneca Army Depot Activity (SEDA or the Depot) Superfund Site in Seneca County, New York. This Proposed Plan was developed by the U.S. Army (Army) and the U.S. Environmental Protection Agency (EPA) in consultation with the New York State Department of Environmental Conservation (NYSDEC). The Army and the EPA are issuing this Proposed Plan as part of their public participation responsibilities under Section 117(a) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, and Sections 300.430(f) and 300.435(c) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). Details of the munitions response and the CERCLA response actions performed, and the current site conditions are presented in the Completion Report, Munitions Response and CERCLA Closure, Draft Final (Parsons, 2009). Additional information about the nature and extent of the hazardous substances and other contaminants found at SEAD-46 and SEAD 003-R-01 is presented in the *Remedial Investigation Report for SEAD-46 and SEAD-57* (Parsons, 2001) and the *Expanded Site Inspection (ESI), Three Moderate Priority SWMUs Report* (Parsons, 1995). Further information and data pertinent to the munitions response actions performed at the five AOCs are provided in the *Archives Search Report* (ASR), *Seneca Army Depot*, Final (USACE, 1998), the *Ordnance and Explosives Engineering Evaluation Cost Analysis Report* (OE EE/CA), Final (Parsons, 2004), and the *Geophysical Investigation Munitions Destruction Areas SEADs 46 & 57* (Shaw, 2005). Additional information for SEAD-70 is presented in the *Expanded Site Inspection Report, Seven Low Priority AOCs*, Draft Final (Parsons, 1996), and the *Decision Document, Mini Risk Assessments* (Parsons, 2002). Human health risk assessments for all of the listed AOCs are provided in the *Risk Assessment: Munitions Response AOCs* (Parsons, 2009). The Army, EPA, and NYSDEC encourage the public to review these documents to gain an understanding of the AOCs and the Superfund and Munitions Response activities that have been completed.

This Proposed Plan is provided to supplement the aforementioned documents; to inform the public of the preferred remedy for each AOC as identified by the Army and EPA, with concurrence from the NYSDEC; and to solicit public comments pertinent to the preferred remedies. Each AOC is unique, and each remedy is being proposed after careful examination of the available information for the specific AOC. Based on the current conditions at the AOCs, the preferred remedy for the Seneca AD Munitions Response Sites is to implement land use controls (LUCs) that prohibit the use of the AOCs for residential housing, elementary and secondary schools, childcare facilities, or playgrounds. Residential housing includes, but is not limited to the following: single family or multi-family residences; childcare facilities; playgrounds; nursing homes or assisted living facilities; and any type of educational purpose for children or young adults in grades kindergarten through 12. MEC recognition and safety training in the form of the "3R" (Recognize/Retreat/Report) Explosives Safety Education Program will also be a part of the LUC.

This determination for the Seneca AD Munitions Response Sites is based on the confirmed historic use of these properties for munitions and explosives related activities such as range training and explosive ordnance disposal. Even with the successful completion of munitions response actions at the Seneca AD Munitions Response Sites, a potential exists that material potentially presenting explosive hazard (MPPEH) may remain at the AOCs and could pose hazards to a future receptor.

The preferred remedy identified for SEAD-70 is no further action (NFA). Munitions and explosive materials related use of SEAD-70 is not indicated by review of the available information and the accumulated data from the site; and as such a residential use restriction is not warranted due to concerns of MEC. Available data for other hazardous substances, pollutants, and contaminants indicates that levels of residual concentrations are not sufficient to prohibit future unlimited use and unlimited exposures by potential human receptors.

The remedies described in this Proposed Plan are the preferred remedies for the AOCs. Changes to any of the preferred remedies, or changes from one preferred remedy to another, may be made if public comments or additional data indicate that such a change would result in a more appropriate remedial action. The final decision regarding the selection of remedies for the AOCs will be made after the Army and the EPA have taken into consideration comments from members of the public. The Army and the EPA are soliciting comments from the public because the Army, EPA, and NYSDEC may select a remedy other than the preferred remedy for any AOC discussed in this Proposed Plan.

COMMUNITY ROLE IN SELECTION PROCESS

MARK YOUR CALENDAR

01 February – 02 March 2017

Public comment period related to this Proposed Plan.

09 February 2017 at 7:00PM: Public meeting at the Romulus Town Hall, 1435 Prospect Street, Willard, New York 14588

The Army, EPA, and NYSDEC rely on public input to ensure that community concerns are considered in the selection of an effective remedy for all Superfund sites. To this end, documents in the Administrative Record for the identified AOCs (SEAD-46, SEAD 003-R-01, SEAD-70, SEAD 002-R-001, and SEAD 007-R-01) are available to the public during a public comment period which begins on 01 February 2017 and concludes on 02 March 2017. Key documents included in the Administrative Record for the Munitions Response AOCs include (ordered most recent to oldest):

- *Risk Assessment: Munitions Response AOCs* (Parsons, 2009);
- *Completion Report, Munitions Response, and CERCLA Closure*, Draft Final (Parsons, 2009);
- *Completion Report, Munitions Response, SEAD 002-R-01, SEAD 57, SEAD 46 and SEAD 007-R-01,* (Parsons, 2007) submitted to Department of Defense Explosive Safety Board;
- *Geophysical Investigation, Munitions Destruction Areas SEADs 46 & 57*, Final (Shaw, 2005);
- *Ordnance and Explosives Engineering Evaluation Cost Analysis Report (OE EE/CA)*, Final (Parsons, 2004);
- *Decision Document, Mini-Risk Assessment SEADs 9, 27, 28, 32, 33, 34, 43, 44A, 44B, 52, 26, 28, 62, 64A, 64B, 64C, 64D, 68, 69, 72, and 120B,* Final (Parsons, 2002);
- *Remedial Investigation Report for SEAD-46 and SEAD-57*, Draft (Parsons, 2001);
- *Archives Search Report (ASR), Conclusions and Recommendations, Seneca Army Depot*, Final (USACE, 1998);
- *Expanded Site Inspection, Seven Low Priority AOCs,* Draft Final (Parsons, 1996); and
- *Expanded Site Inspections, Three Moderate Priority SWMUs, SEADs 11, 13, and 57*, Final (Parsons, 1995).

A public meeting will be held during the public comment period at the Romulus Town Hall on 09 February 2017 to present the conclusions of the Completion Report, to elaborate further on the reasons for selecting the preferred remedy, and to receive public comments.

Written comments received at the public meeting or during the public comment period will be documented in the Responsiveness Summary Section of the Record of Decision (ROD), the document that formalizes the selection of the remedy.

Written comments on the Proposed Plan should be addressed to:

Mr. Randall W. Battaglia
Project Manager, New York District
Seneca Army Depot BRAC Environmental Coordinator
Seneca Army Depot Activity
Building 123, P.O. Box 9
5786 State Route 96
Romulus, NY 14541-0009

SEDA HISTORY

Prior to the construction of the Depot, the land in the area was used for agricultural and residential purposes. In June of 1941 the U.S. Government purchased the land for the Seneca Army Depot from approximately 150 families. The Depot began its primary mission of receipt, maintenance, and supply of ammunition in 1943. After the end of World War II, the Depot's mission shifted from supply to receipt, storage, distribution, maintenance, and demilitarization of general supplies, conventional ammunition, explosives, and special weapons. Implementation of the Army's mission at the SEDA involved the use of chemical materials including solvents, lubricants, oils, explosives and other materials and resulted in the generation of industrial and hazardous wastes requiring disposal.

The SEDA was nominated for listing on the National Priorities List (NPL) by the EPA on July 13, 1989; the listing was finalized on August 30, 1990, when the SEDA was listed in Group 14 of the Federal Facilities portion of the NPL. Once the SEDA was listed on the NPL, the Army, EPA, and the NYSDEC negotiated a Federal Facilities Agreement (FFA) entitled *Federal Facility Agreement under CERCLA Section 120 in the matter of Seneca Army Depot, Romulus, New York, Docket Number: II-CERCLA-FFA-00202* that broadly defines and documents the scope of the remedial actions needed at the Depot and the obligations and responsibilities of each party to address environmental contamination identified at the SEDA.

Once the SEDA was listed on the NPL, the Army, EPA, and NYSDEC identified 57 SWMUs where data or evidence indicated that hazardous substances, hazardous wastes, or other hazardous materials had been handled, and potentially released, to the environment. Each of these SWMUs was identified in the FFA, which was signed by the three parties in 1993. The number of SWMUs was subsequently expanded to include 72 AOCs (79 separate locations) once the Army finalized the *SWMU Classification Report (Parsons, 1995)* prepared pursuant to requirements of the FFA. Once the 72 AOCs were listed, the Army recommended that they be identified as areas requiring No Action or as AOCs where additional information or data was required.

In 1995, the SEDA was designated for closure under the U.S. Department of Defense's (DOD's) Base Realignment and Closure (BRAC) process. Once the SEDA was added to the 1995 BRAC list, the Army's primary objective expanded from performing remedial investigations and completing necessary remedial actions to releasing unaffected portions of the Depot to the surrounding community for reuse. The designated future use of land within the SEDA was first defined and approved by the Seneca County Local Redevelopment Authority (LRA) in 1996. In 2005, the Seneca County Industrial Development Agency (SCIDA), the entity charged with management of the transferred Depot land, revised the planned future use of property in parts of the Depot. Since 1995, more than 9,500 acres of the former Depot have been released to the SCIDA for reuse. An additional 250 acres of land at the Depot was transferred to the U.S. Coast Guard for operation of a LORAN (i.e., long range aid to navigation) Station.

DESCRIPTION OF SITE AND AOCS

The SEDA is a 10,587-acre former U.S. Army facility located in Seneca County, New York in the towns of Romulus and Varick between Seneca Lake and Cayuga Lake (**Figure 1**). The SEDA is located in an uplands area that divides the two lakes. The SEDA was owned by the United States Government and operated by the Department of the Army between 1941 and 2000 when the Army's military mission ceased.

Ground surface elevations are generally higher along the eastern and southern borders of the Depot, and lower along its northern and western borders. Regionally, four hydrologic units have been identified in Seneca County. These include two distinct shale formations, a series of limestone units, and unconsolidated beds of Pleistocene

glacial drift. The geologic material that comprises the overburden is generally Pleistocene till. Surface water primarily flows west towards Seneca Lake. Isolated portions of the Depot drain to the northeast toward the Seneca-Cayuga Canal and east toward Cayuga Lake. Reeder, Kendaia, Indian, and Silver Creeks form the primary surface water conduits to Seneca Lake. Kendig Creek flows to the northeast toward the Seneca-Cayuga Canal and an unnamed creek flows to the east toward Cayuga Lake.

Groundwater monitoring results from various locations at the SEDA indicate that the thickness of the shallow aquifer appears to be influenced by the hydrologic cycle in a seasonal variation. The overburden aquifer is thickest during the spring recharge months and thinnest during summer and early fall. During late fall and early winter, the saturated thickness increases; however, many monitoring wells dry up during certain periods of the year.

AOC discussions presented hereafter will be grouped and focused first on the Seneca AD Munitions Response Sites (SEAD-46, SEAD 003-R-01, SEAD 002-R-01 [East EOD Ranges], and SEAD 007-R-01), followed by a discussion on SEAD-70, which is not classified as a munitions response site.

SEAD-46 (Small Arms Range)

SEAD-46 (Small Arms Range), also known as the "3.5-inch Rocket Range", is a trapezoidal-shaped parcel of land that encompasses approximately 68 acres (**Figure 2** and **3**). The AOC's southern boundary is located approximately 6,000 feet north-northwest of the former Depot's main gate off of State Highway 96. The area is primarily open grassland that is occasionally interrupted and bordered by areas of dense brush and trees. SEAD-46 is bisected by an unnamed dirt road that runs southeast to northwest. The predominant feature in the area is a man-made earthen berm that is situated near the northwest corner of the AOC; the berm served as a protective barrier during range operations. From the 1940s to the 1960s, SEAD-46 was used as a function test range for 3.5-inch rocket motors. The 1998 *Archives Search Report* (USACE, 1998) indicates that the earthen berm is visible in a 1954 aerial photograph of the area. The OE EE/CA indicates that SEAD-46 was once used as a testing range for rocket motors. Review of historic files revealed at least one picture of a 3.5-inch motor fixed to a tripod in front of the berm at SEAD-46.

SEAD 003-R-01 (SEAD-57, Explosive Ordnance Detonation Training Range)

SEAD 003-R-01 (SEAD-57, the former Explosive Ordnance Disposal Area (formerly EOD-1)), is a rectangular parcel of land that encompasses approximately 72 acres in the west-northwest portion of the former Depot (**Figure 2** and **4**). SEAD 003-R-01 is adjacent to the southernmost portion of the Open Burning/Open Detonation (OB/OD) Grounds that occupy most of the land in the northwestern corner of the former Depot. The land type within SEAD 003-R-01 is primarily open grassland. A few man-made structures are located in the center of the AOC and along the northern edge of the AOC. An open, reverse "C"-shaped berm, externally measuring approximately 80 feet by 100 feet, is located in the center of the AOC. Equipment shelters, remote control shelters, and an EOD storage structure are located along the north-central edge of the AOC. An east-west oriented, unnamed dirt road transects the northern edge of the AOC, and a second, perpendicular, unnamed dirt road intersects the northern road roughly halfway across the AOC's edge. This road provides vehicular access to the area of, and surrounding, the earthen containment berm.

For more than 20 years, the 143rd Ordnance Detachment, a Department of the Army tenant organization at the Depot, performed ordnance and explosives (OE) disposal and training at SEAD 003-R-01. The area was used by EOD personnel for the disposal of and training with conventional ammunition or explosives weighing less than 5 pounds.

SEAD 002-R-01 (East EOD Ranges)

SEAD 002-R-01 includes two separate areas, EOD-2 and EOD-3, which are located in the northeastern portion of the former Depot in the vicinity of the Depot's Duck Pond and SEAD-46 (**Figures 2, 5** and **6**).

EOD-2 encompasses approximately 3 acres of land on the southwestern shore of the Duck Pond. This area is west-northwest of SEAD-46 and southeast of the intersection of Fayette Road and East-West Baseline Road. EOD-2 is comprised primarily of open grassland with small areas of brush and tree cover. A portion of the eastern boundary

of this site is defined by the shore of the Duck Pond. A portion of EOD-2 is collocated with the western portion of SEAD-13, the former Inhibited Red-fuming Nitric Acid (IRFNA) disposal area. The 1998 ASR states that explosive devices were used in EOD-2, and that non-explosive projectiles were disposed near the Duck Pond.

EOD-3 encompasses approximately 4 acres of land approximately 250 feet north of the earthen protective barrier berm in SEAD-46. EOD-3 is mostly flat with the exception of a 100 foot by 200 foot depression in the middle of the site. The area surrounding the depression is wooded. The ASR describes the AOC as a former EOD disposal area, and indicates that in the 1950s and 1960s the area surrounding the depression was clear of brush and trees.

SEAD 007-R-01 (Rifle Grenade Range)

The Grenade Range, which was constructed in the mid-1980s, encompasses approximately 28 acres of land in the northwestern portion of the former Depot, to the west and southwest of SEAD 003-R-01 (**Figures 2** and **7**). During its lifetime, the Grenade Range area contained wooden and armored vehicle targets, distance and boundary markers, and a range control tower. The Grenade Range is comprised primarily of open grassland that is surrounded by woods. The 1998 ASR states that 40mm M781 (40mm Low Velocity Practice Cartridge) and 35mm M73 sub-caliber practice rockets were used at the Grenade Range during security forces' training. There is no record (or indication at the targets) that high explosive (HE) rounds were used. Small arms (blanks) casings were reported to be present at the time of the ASR.

SEAD-70 (Former Building T2110 – Filled Area)

SEAD-70 is a historic fill area encompassing approximately 4.5 acres of land that are adjacent to the former Building T-2110 in the northwestern portion of the Depot (**Figures 2** and **8**). SEAD-70 is located south of East-West Baseline Road approximately 1,000 feet west of its intersection with North-South Baseline Road, and approximately 15,000 feet northwest of the former Depot's main gate off of State Highway 96. Prior to 2006, a wooden barn (Building T-2110) was located at this AOC, but it was demolished due to safety concerns about the aged, dilapidated structure. Building T-2110 was identified as a potential ordnance, ammunition, explosives and other warfare materials storage shed at the time of the 1998 *Archives Search Report* effort, but once site inspections and interviews were completed, this area was dismissed from further consideration for munitions response action.

SEAD-70 currently is vacant and undeveloped. The most noticeable feature in the undeveloped portion of the AOC is a kidney-shaped landfill that forms a flat topographic high area. The landfill appears to originate near the former barn and expand southeasterly. A mound is located near the southeastern corner of the former barn and an elongated vegetated mound is present along the southern perimeter of the landfill. Immediately east of the landfill is a wet area beyond which is a large stand of deciduous trees.

The topography over the extent of the landfill is relatively flat; however, the local and regional topography surrounding the landfill slopes west.

SCOPE AND ROLE OF ACTION

The Army's mission is to remediate all AOCs identified in the FFA for Seneca and transfer all property previously occupied by the Army to the community for beneficial reuse. For each AOC in the FFA, the Army is obligated to conduct investigation, as needed, to verify the presence or absence of hazardous substances, pollutants and contaminants, and to assess the potential risk that may exist due to the presence of hazardous substances if they are identified. The findings, results, and conclusions of the investigations and assessments, and the subsequent land use decisions are made available to the public for review and comment. If the results of the investigations and assessments of the AOCs indicate that risk to human health or the environment exists on account of hazardous substances, pollutants and contaminants, the Army is obligated to propose, design, implement, monitor, inspect, and report on the remedial actions used to eliminate, mitigate, or control the risk. The final remedial action for each site is made jointly by the Army and EPA or, if the Army and EPA are unable to reach agreement, then the selection of the remedial action is made by the EPA.

The remedy proposed in this Proposed Plan will be the final remedy for 5 AOCs at Seneca and, once implemented, will allow transfer of these portions of the installation out of federal control for public reuse with appropriate use restrictions for the four munitions response AOCs.

PREVIOUS INVESTIGATIONS AND ACTIVITIES AT THE AOCs

A summary of previous geophysical and environmental investigations performed at the Munitions Response AOCs is provided in the discussion below. Previous work performed at the AOCs is described in detail in the reports and documents identified under the "*COMMUNITY ROLE IN SELECTION PROCESS*" section presented earlier in this Proposed Plan.

Level-of-contamination assessments and summaries in the hazardous substance and contaminant investigations summarized in the documents listed are based on state soil clean-up objectives and federal guidance values that are no longer used by the EPA and NYSDEC. Therefore, summary presentations in this Proposed Plan were updated to reflect comparisons to the current state and federal standard and guidance values. This update is the source of differences between the data summaries presented in the aforementioned documents and those presented in this document. For example, the New York State Technical and Administrative Guidance Memorandum (TAGM) #4046 soil cleanup objectives (NYSDEC, Jan 1992) were used to compare values prior to the issue of Title 6 New York Code of Rules and Regulations (6NYCRR) Part 375-6.8 (NYSDEC, Dec. 2006) soil cleanup objective (SCO) values. Similarly, in 2008 the EPA issued and adopted the use of Regional Screening Levels (RSLs) in place of preliminary remediation goals to screen hazardous substances, pollutants and contaminants at Superfund sites in determining whether those constituents present any risk. The 2006 NYSDEC unrestricted use SCO values and the June 2011 EPA RSLs for residential soils were used as the benchmarks for soil comparisons presented in this Plan. Notably, the EPA RSLs are not soil cleanup standards, the only purpose they serve is to aid in evaluating risk and determining whether a constituent is a contaminant of potential concern (COPC) for which a risk assessment should be performed.

In addition to the state standards and federal guidance values, sample results for metal analytes were also compared to sets of values considered to be background that were developed for soil and groundwater for the Depot during the previous CERCLA investigations. Each of the background locations was identified in a work plan that was submitted to representatives of the EPA and the NYSDEC for review and approval prior to the initiation of the proposed work. Results from the group of background locations were combined to produce a background dataset for each medium of concern during risk management evaluations that are conducted within the risk assessment.

SEAD-46 (Small Arms Firing Range)

Soil Investigations

Remedial Investigation

SEAD-46 soil was characterized as part of the remedial investigation (RI) field activities conducted during 1999 and 2000. During the RI, soil from test pits, soil borings, surface soil locations, surface water drainage channels and swales (i.e., ditch soil) was collected and characterized for Target Analyte List (TAL) and Target Compound List (TCL) hazardous substances. Based on the investigation, which included locations where potential ordnance or munitions debris (MD) was found during the 2006 Munitions Response activities, no constituents of concern (COCs) were identified. (See section "Munitions Response Sampling" for a discussion of sample analyses and detected compounds.)

OE EE/CA and Geophysical Investigation

As part of the Ordnance and Explosives (OE) Engineering Evaluation/Cost Analysis (EE/CA)(Parsons, 2004), geophysical surveys and intrusive investigations were conducted over roughly 17.5 acres of SEAD-46. During the OE EE/CA investigation, 1,155 geophysical anomalies were identified and investigated; this work resulted in the identification of 478 MD items; of which 10 were identified as material potentially presenting an explosive hazard (MPPEH). The ten items included two illumination flares, three fuzes, three smoke signals, one M83 cluster bomb,

and one 40 mm practice grenade. The majority of recovered MPPEH items were located at the south boundary of the AOC, opposite the protective barrier berm.

During the Geophysical Investigation conducted by Shaw in April 2005, approximately 24 acres of SEAD-46 were digitally mapped using electromagnetic inductance and magnetometry. Anomaly density increased as the target berm was approached from the south (location of historical firing point). An approximately 1-acre area, northwest of the target berm, was noted to contain a high density of anomalies. During the geophysical investigation, 98 anomalies were investigated by Shaw. The investigation found 32 pieces of aluminum MD, six ferrous MD pieces, and 60 cultural debris pieces.

Munitions Response – Munitions Clearance

The 2006 Munitions Response investigation of SEAD-46 detected 2,054 geophysical anomalies. Of the anomalies found, 16 were identified as suspected MPPEH. To further investigate these items, all 16 items were explosively perforated to ensure that they were inert. Subsequent to the perforation, the items were determined to have been MD. They were thus reclassified as MD as they were determined to have posed no threat. Excavation of the area mapped during the geophysical investigation, and identified as containing a high-density of anomalies, yielded non-military related cultural debris including broken pottery and glass, animal bones, and rusted farm debris. This debris is believed to have been dumped prior to construction of SEDA. No identifiable complete or partial 3.5-inch rockets or rocket motors were found during the 2006 investigation. All items that posed a potential explosive hazard were disposed by detonation as part of the final process to make the items inert. Based on the results of this investigation and past investigations, SEAD-46 is considered to be clear of MPPEH and no further geophysical or munitions response action is needed.

Munitions Response Sampling

One foot of soil from the exterior surfaces of the berm at SEAD-46 was excavated and moved to a cleared location in SEAD 003-R-01. After the initial foot of soil was removed from the backstop berm, unexploded ordnance (UXO) trained personnel surveyed the berm and confirmed that only non-military items and cultural debris remained in the underlying soil. In addition, a test pit was excavated in the center of the berm structure, and the Senior UXO Supervisor (SUXOS) determined that no MPPEH was present in the remainder of the berm.

The excavated soil from the SEAD-46 backstop berm was commingled with soil that was excavated from the SEAD 003-R-01 protective berm during the metal separation process, and laid out in a one-foot soil lift on the ground in a cleared area within SEAD 003-R-01. This soil lift was surveyed and processed by UXO personnel to identify and remove MD and MPPEH. Samples of the remaining soil were collected and characterized to determine residual levels of metal contaminants. Please refer to the "Munitions Response Sampling, SEAD-46 and SEAD-57 Excavated Soil Characterization Samples" section for further discussion of sample analyses and results for the processed lift soil.

Groundwater Investigations

Monitoring well installation and groundwater sampling at SEAD-46 took place as part of the RI. Investigations included the installation, development, testing, and sampling of six monitoring wells (MW46-1 to MW46-6). Monitoring well MW46-1 was installed as a background well; the remaining five wells were installed close to the earthen berm located at the northern end of the AOC. Two rounds of groundwater samples were collected in January and April of 2000 and analyzed for TCL volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), pesticides, polychlorinated biphenyls (PCBs), TAL metals and cyanide, explosives, herbicides, total recovered petroleum hydrocarbons (TRPH), fluoride, and nitrate. The resulting groundwater data were compared to the lower of permissible concentrations promulgated in New York State Class GA groundwater standards (NYSDEC GA Standard) and EPA Maximum Contaminant Levels (MCLs).

Three metals were detected in SEAD-46 groundwater samples at concentrations above NYSDEC GA Standards and/or EPA MCLs: antimony, iron, and thallium. Antimony and thallium were both found at concentrations above their respective MCLs once, in separate wells, during the first RI sampling event. As such, these measurements are viewed as suspect and are not presumed to be indicative of a groundwater plume. It is more likely that each of

these occurrences is an artifact that occurred during first sampling of newly installed and developed monitoring wells.

Iron was detected in all of the groundwater samples collected at SEAD-46, but only four times at concentrations above the New York GA groundwater standard. All of the exceedances occurred in different wells (MW46-1 [background well], MW46-2, MW46-3, and MW46-6). However, the concentration of iron found in the groundwater at SEAD-46 is consistent with the regional groundwater quality in Seneca County and therefore cannot be distinguished from background contributions.

SEAD 003-R-01 (SEAD-57, Explosive Ordnance Range 1)

Soil Investigations

ESI and RI

The soil at SEAD 003-R-01 was characterized during the 1999 and 2000 RI and the 1993 and 1994 ESI field activities. Soil sample types include: surface soils, subsurface soil from soil borings and test pits, and ditch soil from drainage channels and swales. Metals were the principal hazardous substances detected at the AOC, but detected concentrations were generally consistent with the background soil concentration dataset values. See the section "Munitions Response Sampling" for a discussion of sample analyses and detected compounds.

OE EE/CA and Geophysical Investigation

Geophysical surveys and intrusive investigations were conducted at SEAD 003-R-01 as part of the OE EE/CA (Parsons, 2004). Approximately 15 acres were mapped, and 1,700 anomalies were investigated. Over 950 recovered items were classified as MD; of the investigated items, three were determined to be MEC (i.e., an MK2 grenade and two 20mm projectiles). During a surface sweep, a 37mm armor piercing high explosive (APHE) item was found near the abandoned ammunition disassembly area across the unpaved road at the northern end of the AOC. At the end of the OE EE/CA all MD and MEC items were disposed in accordance with approved procedures.

During Shaw's geophysical investigations in April 2005, 22.5 acres of the AOC were digitally mapped. Four MPPEH items were identified including a 75mm, a 75mm AP, a 105mm, and an unknown bomb. Following venting, these items were classified as MD.

Munitions Response – Munitions Clearance

Of the 7,485 anomalies detected during the SEAD 003-R-01 Munitions Response investigation, 47 were classified as MPPEH items. Of these 47, all but two were classified as MD after venting the items during the disposal process. The two MEC items were a fuzed 37mm projectile and a MK2 grenade, and may have been EOD training items. This determination is supported by the fact that most ferrous MD items at SEAD 003-R-01 were found north of Building T011, a known EOD training area, and outside of the 400-foot high-density radius around the SEAD 003-R-01 berm. All items that posed a potential explosive hazard were disposed by detonation as part of the final process to make the items inert. Explosive perforation of the MEC items occurred at the OD Hill to make the items inert in accordance with "Procedures for Demolition of Multiple Rounds (Consolidate Shots) on UXO Sites", approved by DDESB on 27 October 1998.

Upon the completion of the 2006 Munitions Response action, SEAD 003-R-01 is considered to be free of MPPEH and no further geophysical investigation or munitions response action is required.

Munitions Response Sampling

During the Munitions Response action, soil samples from SEAD 003-R-01 were collected from two areas:

1) The walls and floor of an excavation that removed debris and residues found in a historic burn pit inside of the protective berm, and
2) The top foot of soil on the SEAD 003-R-01 protective berm.

The foot of soil removed from the top of the berm was combined with the foot of soil removed from the backstop berm at SEAD-46 for processing; the combined soil was laid out in a one-foot thick soil lift for further UXO processing and subsequent sampling. A post-excavation sweep of the berm was then performed by UXO personnel using metal detectors and resulted in the identification of Mk25 drift signal flares and an empty 155 mm projectile. These items were removed and secured, and then the protective berm was re-swept and cleared of MPPEH and residual debris by the SUXOS.

The soil and debris removed from the historic burn pit was separately processed by UXO personnel at another location in the SEAD 003-R-01 soil lay down area. See the section "Munitions Response Sampling, SEAD-46 and SEAD 003-R-01 Excavated Soil Characterization Samples" for a discussion of the combined soil removed from SEAD-46 and SEAD 003-R-01; see the section "SEAD 003-R-01 Berm Pit Excavation" for a discussion of sample analyses and detected compounds for the material removed from the historic burn pit.

Groundwater Investigations

Three monitoring wells (MW57-1 to MW57-3), including one background well and two down gradient wells, were installed at SEAD 003-R-01 during the 1994 ESI. Four additional monitoring wells (MW57-4 to MW57-7) were installed at SEAD 003-R-01 during the 2000 RI. Three sets of samples were collected from the wells at SEAD 003-R-01: the three ESI wells were sampled at various times between 1993 and 2000, all seven monitoring wells were sampled in January 2000 and April 2000; and MW57-1 was sampled two additional times during the RI at the adjacent SEAD-12 in 2000. The resulting groundwater data were compared to the lower of permissible concentrations promulgated in NYSDEC GA Standards and EPA MCLs. Elevated metals concentrations were found during the ESI sampling event; however, these concentrations were attributed to high turbidity levels in the groundwater and were also found in the background well (MW57-1), indicating levels not related to site activities. Subsequent sampling events at SEAD 003-R-01 did not identify any COCs in groundwater.

SEAD 002-R-01 (East EOD Ranges)

Soil Investigations

OE EE/CA

A geophysical investigation was conducted at SEAD 002-R-01 as part of the OE EE/CA. Twenty-one items were recovered during the investigation; one item was classified as MEC (fuze with booster) rendered safe as per DoD protocols and removed from the site and for disposal. Any items that were classified as MD or cultural debris were identified and disposed of appropriately.

Munitions Response – Munitions Clearance

Two MPPEH items were found during the investigation at EOD-2; these two items were classified as MD after they were explosively vented to make them inert. These two items were an expended electric squibb and the fuzeless body of an M16 anti-personnel (APERS) mine. No MPPEH items were found at EOD-3. SEAD 002-R-01 is considered to be clear of MPPEH.

Munitions Response Sampling

Surface soil samples were collected at SEAD 002-R-01 as part of the Munitions Response. See the section "Munitions Response Sampling" for a discussion of sample analyses and detected compounds.

SEAD 007-R-01 (Rifle Grenade Range)

Soil Investigations

OE EE/CA

A geophysical investigation was conducted at the Rifle Grenade Range as part of the OE EE/CA. Eight hundred and sixty-five (865) geophysical anomalies were identified and 102 MPPEH items were recovered. Items classified as MPPEH were comprised of 101, 35mm sub-caliber LAW M73s, and one M407A1 Practice Rifle Grenade. All MPPEH, MD, and cultural debris were identified and disposed of appropriately.

Munitions Response – Munitions Clearance

During the 2006 Munitions Response, 218 potential MPPEH items were detected at SEAD 007-R-01. All potential MPPEH items were related to the M73 Practice LAW Rocket and 40mm practice grenade. Since none of the practice rockets found at SEAD 007-R-01 had intact motors, the practice rockets were reclassified as MD. However, since the M73 Practice Rockets potentially contained small, smoke-emitting, bursting charges, all items were disposed by detonation as part of the final process to make the items inert. Based on the munitions response survey results, findings, quality control and quality assurance procedures performed at the AOC, SEAD 007-R-01 is considered to be cleared of MPPEH and no further action is required.

Munitions Response Sampling

Surface soil samples were collected at SEAD 007-R-01 as part of the Munitions Response and CERCLA closure activities. See the section "Munitions Response Sampling" for a discussion of sample analyses and detected compounds.

SEAD-70 (Building T2110 – Filled Area)

Soil Investigations

Shallow soil samples and subsurface soil samples were collected at SEAD-70 during the 1994 ESI sampling event. Data from the soil that was removed as part of the aforementioned removal actions was eliminated from the SEAD-70 soil dataset. Analytical results from sample duplicate pairs of soil data were presented as discreet samples.

Groundwater Investigations

Four monitoring wells (MW70-1 to MW70-4) were installed at SEAD-70 during the ESI; the wells were sampled during the ESI sampling event on July 7 and July 8, 1994. Collected samples were analyzed for TAL inorganic compounds and TCL VOCs, SVOCs, pesticides, and PCBs. Results of the groundwater sampling and analysis indicated that one VOC (acetone) and 17 metals were detected in one of more of the four samples collected, but only iron and manganese were found at levels that exceeded NYSDEC GA or federal MCL levels. Iron and manganese were each found once, in separate samples at levels that exceeded identified standard levels. However, these samples were collected using bailers so it is likely that these exceedances result due to turbidity in the samples. The elevated concentrations found for iron and manganese in the SEAD-70 groundwater samples were within the range of comparable concentrations reported for iron and manganese in regional groundwater quality in Seneca County and therefore cannot be distinguished from background contributions.

Risk Assessment

The Army prepared a risk assessment for SEAD-70 based on the results of the ESI sampling event, and determined that potential carcinogenic risks for conservation/recreational receptors evaluated (i.e., park worker, construction worker, recreational visitor) were within the acceptable CERCLA risk range (i.e., 10^{-4} to 10^{-6}). However, the cancer risk for the lifetime resident was estimated as 3×10^{-4}, which is above the acceptable risk range, and was driven by arsenic found in the soil.

The non-carcinogenic hazard indices (HIs) calculated for the park worker and the recreational child were both estimated as lower than CERCLA threshold of 1, whereas the construction worker's HI was estimated at 2. The construction worker's estimated elevated HI is driven by the presence of arsenic in the soil. The risk assessment also indicated that the child resident's non-carcinogenic HI was 4, again driven by arsenic in soil.

Removal Action (2008)

Based on the results of the SEAD-70 ESI risk assessment, the Army excavated soil from the area at SEAD-70 where the highest concentrations of arsenic in soil were previously identified as part of the work performed with the demolition of Building T-2110. The initial excavation encompassed an area measured approximately 50 feet wide by 100 feet long by six inches deep, centered around the sample location where the single high value of arsenic (i.e., SB70-02, 0 to 0.2 ft bgs, 88.5 mg/Kg) had been found. Once this area was excavated, excavation perimeter, sidewall, and base confirmatory samples were collected and analyzed for arsenic content in soil. Analytical results

from the confirmatory samples were compared to New York's unrestricted use SCO for arsenic (i.e., 13 mg/Kg), which was established as the removal action's cleanup goal. Results of the initial confirmatory samples did not confirm that all locations achieved the site cleanup goals so additional excavations were advanced and additional confirmatory sampling and analyses were performed until cleanup goals were achieved. At the completion of the soil removal action, the SEAD-70 excavation expanded to encompass an area of approximately 19,250 square feet, with vertical depths varying from 1 to 6.5 feet below grade surface. In total, approximately, 720 cubic yards were excavated from the site and disposed off-site at a licensed landfill. Analytical results from the removal action were then added to the ESI dataset, and the risk assessment was rerun for the site. The results of the revised risk assessment for SEAD-70 are presented in the Risk Screening Section below.

MC Sampling Summary

The soil data presented below presents constituent maximum concentrations measured, 95th upper confidence limits (UCLs) of the arithmetic mean (hereafter referred to as 95th UCLs) values calculated, NYSDEC SCO and EPA RSL guidance values, and the number of times concentrations exceeded both the regulatory cleanup standards and the screening level guidance values. For the complete set of sampling data see the Munitions Response Report. EPA RSLs are not promulgated cleanup levels; however, comparison to the EPA RSLs is useful when determining whether a constituent is a COPC. If a constituent is a COPC, then a risk assessment would evaluate whether it is a COC for which remedial action is necessary.

SEAD-46 (Small Arms Firing Range)

The RI soil data set for SEAD-46 has been modified to reflect the removal of several shallow soil samples that were collected from the former backstop berm at SEAD-46 during the RI. During the Munitions Response action, the top foot of soil was removed from the backstop berm and transported to the SEAD 003-R-01 lay down area for MEC/MPPEH surveying and processing. Once all MEC/MPPEH was removed, residual soil was sampled and analyzed. Please refer to the "SEAD-46 and SEAD 003-R-01 Excavated Soil Characterization Samples" section for a discussion of the soil sample results for these samples.

The thirty-one confirmatory soil samples collected during the SEAD-46 RI were analyzed for TCL VOCs, SVOCs, pesticides and polychlorinated biphenyls (PCBs), TAL metals and cyanide, and nitroaromatic and nitroamine compounds. As shown in **Table 1**, ten contaminants at SEAD-46 were detected at concentrations above guidance values: one VOC, one SVOC, three pesticides, and five metals.

Table 1
SEAD-46 Soil Data

Parameter	Units	Maximum Value	95th UCL Value	NYSDEC SCO Unrestricted Use		EPA RSL Residential Soil	
				Value	# Samples Above	Value	# Samples Above
Acetone	µg/Kg	410	245	50	27	61,000,000	--
Benzo(a)pyrene	µg/Kg	30	12.4	1,000	--	15	2
4,4'-DDD	µg/Kg	12	12(*)	3.3	1	2,000	--
4,4'-DDE	µg/Kg	3.7	3.7(*)	3.3	1	1,400	--
Dieldrin	µg/Kg	46	5.1	40	2	30	2
Arsenic	mg/Kg	7.9	5.28	13	--	0.39	31
Lead	mg/Kg	73	31.9	63	1	400	--
Nickel	mg/Kg	47.4	31.9	30	12	1,500	--
Thallium	mg/Kg	3.7	2.07	NA	--	0.78	30
Zinc	mg/Kg	115	77.5	109	1	23,000	--

(*) 95th UCL value set at maximum because the compound was detected in only one sample.
NA = No guidance value defined.

Arsenic concentrations measured in SEAD-46 soil samples exceeded the EPA RSL for residential soil; however, measured levels were consistent or lower than background and the NYSDEC unrestricted use SCO levels.

Thallium was detected in 30 of 31 samples at concentrations that exceed the EPA's RSL for residential soil. The maximum and the 95th UCL values determined for thallium in soil at SEAD-46 exceeded levels found in background soil samples from the Depot, and the frequency of thallium detection in SEAD-46 soils was significantly greater than found in background soils (96% versus 16%).

Acetone was also detected in a majority of samples at concentrations that exceeded its NYSDEC SCO value; however, this finding likely reflects interferences that result from the method of sample preservation and analysis used rather than the presence of acetone in the soil at the site. Available technical literature indicates that preserving soil samples with sodium bisulfate, which was done for SEAD-46 samples, generates acetone. Hence, the measured acetone in SEAD-46 samples is likely a result of the preservation protocol not an indication of acetone in site soil. Further, there is no historic information that indicates that acetone was ever used or stored at the AOC, and its ubiquitous presence in surface samples throughout the site makes its detection suspect.

Nickel was detected 12 times in soil samples at SEAD-46 at concentrations that exceed its NYSDEC SCO value; however, the 95th UCL is only slightly above the NYSDEC SCO value of 30 mg/Kg and the results these samples are below typical background levels. Further the 95th UCL is below the EPA RSL for residential soil.

The other compounds found at concentrations above comparator values were infrequently (i.e., 1 or 2 times) detected at elevated concentrations.

SEAD 003-R-01

Approximately 120 to 125 confirmatory soil samples were collected from SEAD 003-R-01 during the ESI and RI and were analyzed for TCL VOCs, SVOC, pesticides and PCBs, TAL metal and cyanide, and nitroaromatic and nitroamine compound content. As shown in **Table 2**, 17 compounds were detected that exceeded one or more of the regulatory guidance values: one VOC, two SVOCs, four pesticides, and 10 metals.

Table 2
SEAD 003-R-01 Soil Sample Data

				NYSDEC SCO Unrestricted Use		EPA RSL Residential Soil	
Parameter	**Units**	**Maximum Value**	**95th UCL Value**	**Value**	**# Samples Above**	**Value**	**# Samples Above**
Acetone	µg/Kg	700	148.8	50	87	61,000,000	--
Benzo(a)pyrene	µg/Kg	76	28.57	1,000	--	15	8
Dibenz(a,h)anthracene	µg/Kg	24	17	330	--	15	3
4,4'-DDD	µg/Kg	54	3.76	3.3	5	2,000	--
4,4'-DDE	µg/Kg	32	3.80	3.3	7	1,400	--
4,4'-DDT	µg/Kg	23	5.52	3.3	5	1,700	--
Dieldrin	µg/Kg	27	10.21	5	5	30	--
Arsenic	mg/Kg	17.8	5.12	13	1	0.39	110
Cadmium	mg/Kg	28.6	1.91	2.5	6	70	--
Chromium	mg/Kg	32.1	20.6	30	2	120,000	--
Cobalt	mg/Kg	29.7	11.0	NA	--	23	1
Copper	mg/Kg	2,930	95.14	50	2	3,100	--
Lead	mg/Kg	1,860	103	63	2	400	1
Manganese	mg/Kg	2,580	625	1,600	5	1,800	3
Nickel	mg/Kg	54.1	28.1	30	37	1,600	--
Thallium	mg/Kg	6.7	2.31	NA	--	0.78	95
Zinc	mg/Kg	1,250	108	109	11	23,000	--

Acetone was the most frequently detected compound other than metals and has the most concentrations in excess of its NYSDEC unrestricted use SCO value; nevertheless, acetone was never found at a concentration above the EPA RSL for residential soil. As previously discussed, preserving soil samples with sodium bisulfate can generate acetone that is not otherwise present in site soils. Therefore, it is believed that its presence in samples at elevated levels is an artifact of the preservation and analysis process used and not indicative of acetone in the SEDA soil.

Benzo(a)pyrene was detected in eight samples at levels above the EPA RSL for residential soil; the 95th UCL for benzo(a)pyrene is above the EPA residential soil RSL, as well. However, none of the sample concentrations were detected at levels above the NYSDEC SCO of 1000 µg/Kg. Similarly, dibenz(a,h)anthracene was detected three times in SEAD 003-R-01 soil at concentrations in excess of the EPA RSL for residential soil, but never at a concentration in excess of the NYSDEC unrestricted use SCO value.

Arsenic had the most samples with concentrations above the EPA RSL for residential soil. Nevertheless, only one sample had a concentration above the NYSDEC SCO value. Also, the 95th UCL for arsenic at the site is less than the background for arsenic.

Thallium was detected next most frequently at concentration levels in excess of the EPA RSL for residential soil, and the computed 95th UCL value for this compound also was higher than the EPA's RSL for residential soil. NYDSDEC does not publish an unrestricted use SCO value for this metal.

Nickel was detected 37 times in soil samples at SEAD 003-R-01 at concentrations that exceed the NYSDEC SCO value for nickel; however, the 95th UCL is below the NYSDEC SCO value. None of the nickel results exceeded the EPA RSL for residential soil; these samples are below typical regional background levels.

Zinc, cadmium, and manganese were found at concentrations that exceed their respective NYSDEC SCOs, but the 95th UCL for each metal is lower than NYSDEC SCOs. None of these metals were found at concentrations that exceed EPA RSLs for residential soil.

SEAD-46 and SEAD 003-R-01 Excavated Soil Characterization Samples

One foot of soil from the exterior surfaces of the SEAD-46 earthen berm and the SEAD 003-R-01 protective enclosure berm was excavated and processed by UXO personnel to remove MD and MPPEH. The excavated soils were laid out in a one foot lift on a cleared portion of SEAD 003-R-01. Once the soil was cleared of munitions, samples were collected and analyzed for TCL and TAL analytes. As shown in **Table 3,** six metals exceeded guidance values.

Table 3
SEAD-46 and SEAD 003-R-01 Excavated Soil Characterization Data

				NYSDEC SCO Unrestricted Use		EPA RSL Residential Soil	
Parameter	**Units**	**Maximum Value**	**95th UCL Value**	**Value**	**# Samples Above**	**Value**	**# Samples Above**
Arsenic	mg/Kg	8.9	7.3	13	--	0.39	6
Chromium	mg/Kg	30.1	27.7	30	1	120,000	--
Copper	mg/Kg	58.2	45.0	50	1	3,100	--
Lead	mg/Kg	132	99.4	63	1	400	--
Nickel	mg/Kg	45.7	39.4	30	4	1,500	--
Zinc	mg//Kg	182	140	109	1	23,000	--

Arsenic was detected in all soil samples collected from the excavated soil removed from SEAD-46 and SEAD 003-R-01 at concentrations that exceeded the EPA RSL for residential soil. However, all arsenic concentrations are consistent with or below background levels and below the NYSDEC unrestricted use SCO value.

Nickel was detected in four samples at concentrations that exceed the NYSDEC unrestricted use SCO value; however, nickel concentrations do not exceed the EPA RSL for residential soil, and concentrations measured in these samples are below typical background levels.

Each of the other metals that exceeded its NYSDEC unrestricted use SCO value does so only once; further, none of the metals exceeds its respective EPA RSL for residential soil.

SEAD 003-R-01 Berm Pit Excavation

Six soil samples were collected from the walls and floor of an excavation in a historic burn pit found within the confines of the SEAD 003-R-01 earthen berm. After sampling the soil from the burn pit, the soil was processed with the soil that was excavated from the SEAD-46 backstop berm and the SEAD 003-R-01 protective berm that was placed in the soil lay down area at SEAD 003-R-01.

Six confirmatory samples were collected from the burn pit excavation at SEAD 003-R-01 and analyzed for TCL VOCs, SVOCs, pesticides, PCBs, TAL metals, and nitroaromatics and nitroamines. As shown in **Table 4**, four metals were detected in soil samples at concentrations that exceeded either the EPA or NYSDEC soil guidance values in one or more of the samples characterized.

Table 4
SEAD 003-R-01 Berm Pit Soil Data

Parameter	Units	Maximum Value	95th UCL Value	NYSDEC SCO Unrestricted Use		EPA RSL Residential Soil	
				Value	# Samples Above	Value	# Samples Above
Arsenic	mg/Kg	4.7	4.0	13	--	0.39	6
Chromium	mg/Kg	31.1	30.4	30	1	120,000	--
Nickel	mg/Kg	59.2	53.0	30	6	1,500	--
Zinc	mg/Kg	124	124(Φ)	109	5	23,000	--

(Φ) Recommended 95th UCL exceeds maximum detected concentration due to the limited number of available samples (6).

Arsenic was detected in all soil samples collected from the berm area burn pit at SEAD 003-R-01 and all samples had concentrations that exceeded the EPA RSL for residential soil. However, all arsenic concentrations measured were consistent with or below background levels and below the NYSDEC unrestricted use SCO value.

Concentrations of nickel in all six samples exceeded the NYSDEC unrestricted use SCO value but were below the EPA RSL for residential soil and were consistent with the background values. Similarly, five of the six samples for zinc are above the NYSDEC unrestricted use SCO value but below the EPA RSL for residential soil.

SEAD 002-R-01 (East EOD Ranges)

EOD-2

Twelve surface soil samples were collected from EOD-2 during the 2006 Munitions Response action. As shown in **Table 5**, eight compounds exceeded one or both of their state or federal guidance values: one VOC, five SVOCs, and three metals.

Table 5
SEAD 002-R-01 (EOD-2) Soil Data

Parameter	Units	Maximum Value	95th UCL Value	NYSDEC SCO Unrestricted Use		EPA RSL Residential Soil	
				Value	# Samples Above	Value	# Samples Above
Acetone	µg/Kg	100	74	50	8	61,000,000	--
Benzo(a)anthracene	µg/Kg	410	358(Φ)	1,000	--	150	1
Benzo(a)pyrene	µg/Kg	310	390(Φ)	1,000	--	15	2
Benzo(b)fluoranthene	µg/Kg	230	282(Φ)	1,000	--	150	1
Dibenz(a,h)anthracene	µg/Kg	59	59(Φ)	330	--	15	1
Indeno(1,2,3-cd)pyrene	µg/Kg	150	187(Φ)	500	--	150	--
Arsenic	mg/Kg	4.5	3.6	13	--	0.39	12
Manganese	mg/Kg	2,770	1,512	1,600	1	1,800	1
Nickel	mg/Kg	49.9	30.8	30	3	1,500	--

(Φ) Recommended 95th UCL exceeds maximum detected concentration due to limited number of samples and limited number of detected results.

Arsenic was detected in all soil samples collected from EOD-2 at concentrations that exceeded the EPA RSL; however, arsenic concentrations measured in these samples are below background levels and the NYSDEC unrestricted use SCO value for arsenic.

Acetone was found in eight samples at concentrations above the NYSDEC unrestricted use SCO; however, as previously discussed, acetone detected in these samples is likely a byproduct of sample preservation and analysis procedures used and does not result from the release of this hazardous substance at the site.

Other detected compounds exceeded their state or federal soil guidance values in less than one-quarter of the samples characterized, and in most cases (exclusive of manganese), noted exceedances only were observed against one of the guidance values.

EOD-3

Nine surface soil samples were collected from EOD-3 during the Munitions Response actions. As shown in **Table 6**, two compounds exceeded either their state or federal soil guidance value: one VOC and one metal.

Table 6
SEAD 002-R-01 (EOD-3) Soil Data

Parameter	Units	Maximum Value	95th UCL Value	NYSDEC SCO Unrestricted Use		EPA RSL Residential Soil	
				Value	# Samples Above	Value	# Samples Above
Acetone	µg/Kg	260	138	50	6	61,000,000	--
Arsenic	mg/Kg	5.1	4.3	13	--	0.39	9

Arsenic was detected in all soil samples at EOD-3 at concentrations that exceeded the EPA RSL for residential soil; however, arsenic concentrations in these samples are below background levels and the NYSDEC unrestricted use SCO value for arsenic.

Acetone concentrations in six samples exceeded the NYSDEC unrestricted use SCO value. As discussed however, acetone is a byproduct of the sample preservation and extraction procedure used for the analysis, and it is believed that the acetone in these samples does not result from releases that have occurred at EOD-3.

SEAD 007-R-01 (Rifle Grenade Range)

Soil samples were collected at SEAD 007-R-01 during the Munitions Response action. Forty-two samples were analyzed for TCL VOCs, SVOCs, pesticides, PCBs, TAL metals, and nitroaromatic and nitroamine compounds. As shown in **Table 7**, seven compounds exceeded regulatory guidance values: one VOC, and six metals.

Table 7
SEAD 007-R-01 Soil Data

Parameter	Units	Maximum Value	95th UCL Value	NYSDEC SCO Unrestricted Use		EPA RSL Residential Soil	
				Value	# Samples Above	Value	# Samples Above
Acetone	µg/Kg	290	120.1	50	32	61,000,000	--
Arsenic	mg/Kg	9.3	3.9	13	--	0.39	42
Cobalt	mg/Kg	23.5	11.1	NA	--	23	1
Manganese	mg/Kg	1,880	632	1,600	1	1,800	1
Nickel	mg/Kg	31.9	24.1	30	3	1,500	--
Selenium	mg/Kg	4.4	2.5	3.9	2	390	--
Zinc	mg/Kg	110	83.1	109	1	23,000	--

Acetone and arsenic had the most exceedances of regulatory guidance values at SEAD 007-R-01. None of the acetone concentrations at SEAD 007-R-01 exceed the EPA RSL for residential soil, but 32 concentrations exceeded

the NYSDEC unrestricted use SCO value. As previously discussed, acetone is a known byproduct of sample preservation and analysis procedures used and the validity of the detected acetone concentrations is questionable.

Arsenic was detected in all soil samples collected from SEAD 007-R-01 at concentrations that exceeded the EPA RSL for residential soil; however, arsenic concentrations detected in these samples are below background levels and the NYSDEC SCO value for arsenic.

Although other chemicals detected in SEAD 007-R-01 exceed state or federal soil guidance values, residual concentrations, as measured by the 95th UCL, are below established guidance concentrations.

SEAD-70

Forty-six surface soil samples were collected from SEAD-70 during the 2006 Munitions Response actions; of these samples, 33 were analyzed only for arsenic, while 11 were analyzed for a larger set of TCL and TAL analytes. As shown in **Table 8**, four compounds exceeded their state or federal soil clean-up guidance values: one VOC, and three metals.

Table 8
SEAD-70 Soil Data

				NYSDEC SCO Unrestricted Use		EPA Residential Soil	
Parameter	**Units**	**Maximum Value**	**95th UCL Value**	**Value**	**# Samples Above**	**Value**	**# Samples Above**
Acetone	µg/Kg	79	NA(Φ)	50	1	61,00,000	--
Arsenic	mg/Kg	15.2	8.49	13	2	0.39	46
Nickel	mg/Kg	52.4	38.7	30	8	1,500	--
Zinc	mg/Kg	116	80.1	109	1	2,300	--

(Φ) No 95th UCL is available as only one detection of acetone was found in the dataset.

Arsenic was detected in all soil samples collected from SEAD-70 at concentrations that exceed its EPA RSL for residential soil; however, arsenic concentrations reported in these samples were below background levels and the NYSDEC unrestricted use SCO value.

Acetone was detected in only one sample, and this concentration exceeded it NYSDEC unrestricted use SCO value. As previously discussed however, acetone is a byproduct of the sample preservation and extraction procedure, and it is believed that the acetone in these samples does not result from releases that have occurred at SEAD-70.

Nickel and zinc were found at concentrations that exceed their respective NYSDEC unrestricted use SCOs; however, neither of these metals was found at concentrations that exceeded EPA RSLs for residential soil.

RISK SCREENING

To estimate potential carcinogenic and non-carcinogenic effects to potential future human receptors that could result due to continuing presence of hazardous substances at the AOCs, human health risk assessments were conducted for SEAD-46, SEAD 003-R-01, SEAD 002-R-01, SEAD 007-R-01, and SEAD-70. Contaminants of potential concern (COPCs) evaluated in the risk assessment were selected based on their detection in sampled media at concentrations in excess of EPA's RSLs for residential soil and tap water. Soil RSLs were adjusted to a level of one-tenth the listed value for contaminants classified by the EPA as not posing potential carcinogenic risk, and left at full value for carcinogenic compounds. Exposure point concentrations (EPCs) used in the risk assessment were either equal to the contaminant's recommended upper confidence limit of the arithmetic mean (e.g., 95th UCL) as computed by EPA's ProUCL software or set to the contaminant's maximum concentration when too few detections were recorded in the sample dataset to allow for the calculation of the appropriate UCL value. A reasonable maximum exposure (RME) scenario was evaluated in each case. The key document documenting the risk characterization process and results for the Munitions Response AOCs is titled *Risk Assessment: Munitions Response AOCs* (Parsons, October 2009) and is available in the Administrative Record.

Risk Assessment Methodology

Risk assessments, which are performed at sites where hazardous substances have been detected, identify if the concentrations of the substances pose a threat to current or future human or ecological receptors at the site. Risk assessments are inherently conservative, purposely biased to prompt an action if risk is identified.

Human health risk assessments follow a four-step process that includes hazard identification, exposure assessment, toxicity assessment, and risk characterization. These four steps are used to assess potential site-related human health risk for RME scenarios that exist or could exist if no action were taken to eliminate or mitigate them.

1. Hazard Identification: Chemicals of Potential Concern in the various media at the site are identified and selected based on factors such as toxicity, concentration detected versus regulatory standards, frequency of detection, fate and transport in the environment, mobility, persistence, and bioaccumulation.

2. Exposure Assessment: Different exposure pathways through which existing or future receptors might be exposed to the COPCs are evaluated. Possible exposure pathways include ingestion, dermal contact, or inhalation. Factors relating to the exposure assessment include concentrations that receptors may encounter, and the duration and frequency of the potential exposure. The RME scenario is calculated to estimate the highest level that could be expected to occur at the site.

3. Toxicity Assessment: The types of adverse effects associated with exposure to COPCs, and the relationship between the magnitude of the exposure and the severity of potential effects, are determined. Potential effects are COPC-specific and may include risks of developing cancer or other changes in normal organ function (non-carcinogenic effects).

4. Risk Characterization: The level of risk is assessed by combining the outputs of the exposure assessment and toxicity assessment. Carcinogenic and non-carcinogenic risk is estimated. Current guidelines for acceptable individual lifetime excess cancer risk are established as 1 in 10,000 to 1 in 100,000 or less (i.e., $1x10^{-4}$ to $1x10^{-6}$). The non-cancer risk, expressed as a "hazard index" (HI), represents the sum of individual exposure levels to corresponding reference doses. A non-cancer HI threshold level of less than 1 is set as the reference point, and this level may be applied to the body as a whole or allocated amongst individual target organs (e.g., heart, lungs, etc.) or systems (e.g., endocrine system, central nervous system, etc.).

Future land use in each of the subject AOCs is currently designated as either Conservation/Recreation (SEAD 003-R-01, SEAD-70, SEAD 007-R-01) or Residential/Resort (SEAD-46, SEAD 002-R-01 [EOD-2 and EOD-3]) by the Seneca County Industrial Development Agency. Based on the current and foreseeable land use at the sites, five future human receptors were selected for evaluation in the risk assessment evaluations: construction worker, park worker, recreational child visitor, adult resident, and child resident. The adult and child resident scenario is hypothetical, but was included in the risk assessment evaluations to evaluate potential risks to receptors under the Residential/Resort and to address NYSDEC's requirement to evaluate the unrestricted use scenario.

Potential non-carcinogenic hazard and carcinogenic risk due to soil exposure and ambient air exposure was evaluated at all AOCs; potential carcinogenic and non-carcinogenic effects due to groundwater exposure were evaluated at SEAD-46, SEAD 003-R-01, and SEAD-70 only. Groundwater exposure was not evaluated at SEADs 002-R-01 (East EOD Ranges) or SEAD 007-R-01 (Rifle Grenade Range). Comparison of soil data for these sites suggests that there is a limited potential for contamination of the groundwater due to the frequency of detection and concentration of contaminants found in the soil at these AOCs.

Soil exposure pathways analyzed in the individual AOC risk assessments are the ingestion of soil, dermal contact with soil, and inhalation of ambient dust. Groundwater exposure pathways analyzed in these risk assessments are the ingestion of groundwater, inhalation of groundwater, and dermal contact with groundwater. Although groundwater pathways are analyzed, it is unlikely that groundwater under the affected land will be used as a future potable water source. The shallow aquifer that underlies the Depot has been shown not to be productive enough to supply sufficient capacity to fulfill potential potable water needs of future occupants. Further, the Depot has an existing alternate potable water source that is currently in use and that is derived from a non-groundwater source and supplied by a municipal entity. Nevertheless, as a conservative approach, the aforementioned groundwater exposure pathways were evaluated in the risk assessments for SEAD-46, SEAD 003-R-01 and SEAD-70. Based on lines of evidence, i.e., limited amount of MEC items found at these AOCs (only one item found at SEAD 002-R-

01 and none found at SEAD 007-R-01); the exclusive use of practice munitions (which do not contain a large amount of explosive filler) at SEAD 007-R-01; and no COPCs found in surface soils at both AOCs, a general consensus was reached among the BRAC Cleanup Team (EPA, NYSDEC and the Army) that a release to groundwater related to past military operations at these AOCs did not occur. Thus, an effort to quantify impact to groundwater at these AOCs was deemed unnecessary.

SEAD-46 (Small Arms Firing Range)

Projected non-carcinogenic hazard indices (HIs) for the park worker and the recreational child visitor at SEAD-46 are below the CERCLA limit of 1; projected non-carcinogenic HIs for the construction worker, adult resident, and resident child are above 1. Projected carcinogenic risks for all receptors, with the exception of the lifetime resident, are within the CERCLA risk range (i.e., 1×10^{-4} to 1×10^{-6}).

Table 9
SEAD-46 Summary of Human Health Risk Assessment

Receptor	Hazard Index	Cancer Risk
Park Worker	0.42	1.8×10^{-5}
Construction Worker	1.1	1.3×10^{-6}
Recreational Child Visitor	0.24	2.0×10^{-6}
Resident Adult	1.6	6.3×10^{-5}
Resident Child	6.0	6.1×10^{-5}
Lifetime Resident	--	1.2×10^{-4}

Non-carcinogenic HIs for the construction worker and the adult and child residential receptors are estimated to be above the CERCLA limit; however, for each receptor the elevated HI is attributed to SEAD-46 contaminant EPCs that are consistent with or below residential or unrestricted use guidance limits or standard levels and identified background concentrations.

For example, the Army evaluated contaminants in three exposure pathways, ingestion of soil (57%), inhalation of dust in air (24%), and ingestion of groundwater (17%), which comprises approximately 98% of the HI predicted for the construction worker. Six metal contaminants (aluminum [7.9%], arsenic [17.7%], cobalt [14.6%], iron [26.6%], manganese [26.7%], and thallium [6.4%]) pose more than 99% of the construction worker's estimated HI at SEAD-46. As is summarized in **Table 10** (shown below), the soil EPCs used in the risk assessment for aluminum, cobalt, iron and manganese are all lower than the EPA's residential soil RSL, and the EPCs for arsenic and manganese are below NYSDEC's unrestricted use SCO levels. Finally, EPC concentrations for the five primary metal COPCs contributing to the construction worker's elevated HI are consistent with background soil concentrations found at the Depot, each being within one standard deviation of the average background concentration found in samples. Similar determinations also apply to the HIs calculated for the adult and child residents. Therefore, the estimated HIs are attributable to COPC levels that cannot be differentiated from metal analyte levels that exist in native soil or that would be allowed under prevailing environmental laws and regulations as acceptable concentrations.

Table 10
SEAD-46 Soil EPCs versus Guidance and Background Levels

Analyte	EPC (mg/kg)	USEPA RSL (mg/kg)	NYSDEC SCO (mg/kg)	SEDA Soil Avg. (mg/kg)	SEDA Std. Dev. (mg/kg)
Aluminum	14,000	77,000	NA	13,206	4,159
Arsenic	5.3	0.39	13	5.2	2.8
Cobalt	12	23	NA	11	4
Iron	27,000	55,000	NA	24,661	6,854
Manganese	670	1,800	1,600	609	335
Thallium	2.07	0.78	NA	0.26	0.23

NA = none available

As is indicated, EPA's acceptable non-carcinogenic hazard index is used initially to evaluate total exposure. If the HI is above the acceptable value of 1, then effects on target organs/systems are evaluated to determine if the hazard index for individual organs or systems are elevated above the acceptable value. With reference to the six largest components of the SEAD-46 construction worker's non-carcinogenic HI: manganese's primary effect is on the central nervous system; iron's primary target organs are the heart, liver, or endocrine glands, with secondary effects to the lungs; arsenic's primary target organ is the skin; cobalt's primary effect is on the lungs with a secondary effect on the heart; aluminum's is to neuro-development of the brain; and thallium's is to the liver, blood, and hair. A summary of the construction worker's target organ/body system HIs estimated based on the listed primary metal contaminants at SEAD-46 is presented below in **Table 11**.

Table 11
Construction Worker Target Organ / Body System HI impacts

Target Organ or Effect	Estimated HI	Contributing COPCs
Central Nervous System or Neuro Development	0.37	Aluminum and Manganese
Skin	0.20	Arsenic
Lungs	0.45	Cobalt and Iron
Heart	0.45	Cobalt and Iron
Liver	0.36	Iron and Thallium
Endocrine Glands	0.29	Iron

As is noted, the maximum effect that is anticipated to impact any single body organ would be toward either the construction worker's heart or lungs where the hazard quotients determined for iron, cobalt and the other unassigned COPCs amount to a total of approximately 0.45. Therefore, the construction worker's apparent non-carcinogenic HI is not above the EPA's limit at the target organ/system level.

As is indicated, non-carcinogenic HIs for the adult (1.6) and child resident (6.0) receptors also exceed the EPA's acceptable limit of 1, and again each of these elevated HIs are again driven by the exposure pathways ingestion of soil (17% adult resident; 41.9% child resident), inhalation of dust in air (47.9% adult resident; 25.6% child resident), and, ingestion of groundwater (34% adult resident; 31.4% child resident); nonetheless, the total HI contribution represented by these three exposure pathways closely mirrors that of the construction worker (98.8% versus 98.9% adult resident and 98.9% child resident).

As such, approximately 65% of the adult and child resident's estimated HI results from the ingestion or inhalation of soil that contains primary metals at concentrations that are consistent with background, and at levels that are

consistent with EPA residential soil RSLs (exclusive of thallium) and NYSDEC's unrestricted use SCO values. The remainder of both residential receptors' estimated HI results from the ingestion of groundwater that has arsenic and thallium.

The carcinogenic risk estimated for the lifetime resident (1.2×10^{-4}) is estimated to be above the EPA's acceptable upper limit (1×10^{-4}), but results primarily (1.1×10^{-4} out of 1.2×10^{-4}) from the intake of arsenic in groundwater (**Table 9**). However, the concentration of arsenic measured in groundwater at SEAD-46 is below the EPA MCL and the State of New York's GA groundwater standard for arsenic. As such, the cancer risk level for the SEAD-46 lifetime resident overestimates the actual risk that exists at the site. Therefore, environmental conditions at SEAD-46 do not pose an unacceptable level of risk to future receptors.

As was reported earlier, three metals, antimony, iron, and thallium were detected in groundwater samples at concentrations that exceeded New York GA or federal MCL standard levels. Results of the SEAD-46 risk assessment indicate that neither antimony nor iron in groundwater contribute to the risk or hazards that are determined for potential receptors at the AOC because they were below their respective SEDA background concentrations (**Table 12**). Thallium in groundwater does contribute roughly 10 to 11 percent to the noted HIs that are determined for the adult and child residents. At this level, thallium is not a significant component of the overall hazard measured. Additionally, thallium was found during the first round of sampling and in only 1 of the 12 groundwater samples collected. As noted above, thallium may be an artifact of entrained silt in the newly developed wells.

Table 12
SEAD-46 Groundwater EPCs versus Guidance and Background Levels

Analyte	EPC (µg/L)	USEPA MCL (µg/L)	NYSDEC GA Standard (µg/L)	SEDA GW Background (µg/L)	SEDA Std. Dev. (µg/L)
Antimony	5.5	6	3	8.2	13.9
Iron	568	26,000	300	4,476	13,429
Thallium	4	2	2	1.5	1.2

SEAD 003-R-01 (EOD Range 1)

A review of all available analytical data was conducted prior to the performance of the risk assessment for SEAD 003-R-01. During this data evaluation step, inconsistencies were noted between the analytical results obtained during the ESI and RI groundwater sampling events. Further assessment indicated that elevated concentrations of certain key COPCs were present only during the ESI sampling event and were absent or significantly lower during the two subsequent RI sampling events. For example, ESI groundwater samples were collected using bailers, whereas RI groundwater samples were collected using bladder pumps using low-flow purge and pump techniques. Since the repetitive raising and lowering of a bailer into a well during sample collection is a more invasive sampling technique than the one-time lowering of the bladder pump prior to sample collection, it is noted that the concentration discrepancies for several of the key COPCs may result due to their presence in the sediment and silt that exists at the bottom of monitoring wells prior to sampling. The presence of suspended soil/silt in the sample is substantiated by the reporting of turbidity values in excess of 5 NTUs in the three samples collected during the ESI at SEAD 003-R-01. Based on this determination, the inordinately high groundwater concentrations noted for bis(2-ethylhexyl)phthalate, antimony, and cobalt in the ESI sampling events were eliminated from the data set prior to the performance of the final risk assessment.

A summary of the estimated risks and hazards is shown below. Estimated cancer risk levels for the park worker, the construction worker, and the recreational child visitor are all within the EPA acceptable range (i.e., 1×10^{-4} to 1×10^{-6}). Estimated cancer risk levels for the adult, child, and lifetime residential receptors at SEAD 003-R-01 are also within the EPA acceptable range (i.e., 1×10^{-4} to 1×10^{-6}) for carcinogenic risk.

Estimated non-carcinogenic HIs at SEAD 003-R-01 for the park worker, construction worker, and the recreational child visitor receptors are below the EPA acceptable limit (i.e., 1). Estimated non-carcinogenic hazard indices for the adult and child residential receptors at SEAD 003-R-01 are above the EPA acceptable limit of 1.

Table 13
SEAD 003-R-01 Summary of Human Health Risk Assessment

Receptor	Hazard Index	Cancer Risk
Park Worker	0.38	1.4×10^{-5}
Construction Worker	0.95	1.1×10^{-6}
Recreational Child Visitor	0.23	1.6×10^{-6}
Resident Adult	1.3	5.0×10^{-5}
Resident Child	5.8	4.9×10^{-5}
Lifetime Resident	--	9.8×10^{-5}

The levels of the potential adult and child residents' target organ or body system non-carcinogenic impacts due to exposure to SEAD 003-R-01 COPCs are summarized below.

Table 14
Allocation of Adult/Child Resident's HI to Target Organs/Systems

Target Organ or Effect	Estimated HI	Contributing COPCs
Central Nervous System or Neuro Development	Adult, 0.33 | Child, 1.12	Aluminum and Manganese
Skin	Adult, 0.32 | Child, 1.20	Arsenic
Lungs	Adult, 0.13 | Child, 0.96	Cadmium and Cobalt
Heart	Adult, 0.19 | Child, 1.62	Cobalt and Iron
Liver	Adult, 0.30 | Child, 1.83	Cadmium, Iron, Thallium
Endocrine Glands	Adult, 0.11 | Child, 1.10	Iron
Enzymes	Adult, 0.42 | Child, 0.37	Vanadium
Gastro-intestinal	Adult, 0.41 | Child, 1.50	Antimony, Cadmium, Thallium

None of the adult resident's target organs are subjected to an HI in excess of 1; therefore, the estimated aggregate HI for the adult is considered a conservative estimate of the potential non-carcinogenic hazard that is likely to exist at the site. However, several of the child's organs or body systems continue to show potential effects at levels in excess of 1.

Intake of groundwater represents approximately 40% of the child resident's overall non-carcinogenic HI. Further examination of the hazard quotients contributing to the child resident's HI from their exposure to groundwater shows that intake of arsenic represents 43%, antimony 31%, and thallium 26% of the estimated HI. The estimated effects due to intake of arsenic and antimony are associated with EPCs (i.e., 3.1 µg/L and 3.0 µg/L, respectively) that are below federal MCLs for drinking water (i.e., 10 µg/L and 6 µg/L, respectively) for these two analytes (**Table 15**). These values are considered conservative and overestimate the HI that exists for the child's consumption of groundwater at the SEAD 003-R-01 site.

Table 15
SEAD 003-R-01 Groundwater EPCs versus Guidance and Background Levels

Analyte	EPC (µg/L)	USEPA MCL (µg/L)	NYSDEC GA Standard (µg/L)	SEDA GW Background (µg/L)	SEDA Std. Dev. (µg/L)
Antimony	3.0	6	3	8.2	13.9
Arsenic	3.1	10	25	1.7	2.2
Thallium	6.7	2	2	1.5	1.2

After the elimination of the groundwater pathway, the estimated target organ/system HI for the child's neuro development/central nervous system, heart, liver, and endocrine glands remain above 1 due to their exposure to soil or dusts containing certain metals (i.e., aluminum, cobalt, iron, and manganese). The table below summarizes and compares the applicable EPCs for these metals versus guidance values and background concentrations seen in the vicinity of the Depot.

Table 16
Comparison of SEAD 003-R-01 COPC EPCs to Guidance Values

Analyte	EPC (mg/kg)	EPA RSL (mg/kg)	NYSDEC SCO (mg/kg)	95th UCL of Background Dataset (mg/kg)
Aluminum	14,450	77,000	NA	14,315
Cobalt	11	23	NA	13
Iron	24,890	55,000	NA	26,469
Manganese	679	1,800	1,600	701

NA = not available

As shown in Table 16, the EPC for each metal is below the applicable EPA RSL for residential soil. Further, in the case where NYSDEC has identified an unrestricted use SCO value for the metal (i.e., manganese), the SCO value identified is higher than the EPC calculated for the SEAD 003-R-01 soil. Finally, three (i.e., cobalt, iron, and manganese) of the EPCs used as the basis of the risk calculations are below their respective 95th UCL background concentration. Further, the EPC concentration for aluminum is less than 1 percent higher than its comparable 95th UCL background soil concentration indicating that risks from AOC-specific soils and background soils are indistinguishable. The concentrations observed at SEAD 003-R-01 are just as likely to be associated with natural soil, and not attributable to contamination that has occurred at the site during its historic use. Therefore, the potential non-carcinogenic impact associated with exposure to these metals cannot be separated from that which is likely to occur due to exposure to native soils and these metals are not considered COPCs.

SEAD 002-R-01 (EOD Area 2)

Projected non-carcinogenic HIs for the park worker and the recreational child visitor at EOD-2 are below the EPA's acceptable limit of 1; projected non-carcinogenic HIs for the construction worker, adult resident, and child resident are above the acceptable limit. Projected carcinogenic risks for all receptors are within, or below, the EPA acceptable range (i.e., 1×10^{-4} to 1×10^{-6}).

Table 17
EOD Area 2 Summary of Human Health Risk Assessment

Receptor	Hazard Index	Cancer Risk
Park Worker	0.38	3.6×10^{-6}
Construction Worker	1.1	5.4×10^{-7}
Recreational Child Visitor	0.20	4.3×10^{-7}
Resident Adult	1.4	7.0×10^{-6}
Resident Child	5.1	1.0×10^{-5}
Lifetime Resident	--	2.0×10^{-5}

The construction worker's target organ/system HIs are summarized below. As is noted, there is no target organ or body system that is likely to be affected at a level in excess of the EPA's acceptable limit of 1.

Table 18
Allocation of Construction Worker's HI to Target Organs/Systems

Target Organ or Effect	Estimated HI	Contributing COPCs
Central Nervous System or Neuro Development	0.44	Aluminum and Manganese
Skin	0.04	Arsenic
Lungs	0.16	Cobalt
Heart	0.43	Cobalt and Iron
Liver	0.27	Iron
Endocrine Glands	0.27	Iron

The adult and child resident's target organ/body system HI distributions are summarized below. Target organ/system HIs in excess of the EPA's acceptable limit of 1 are possible for the adult's and child's central nervous systems, and the child's heart, liver, and endocrine glands.

Table 19
Allocation of Adult and Child Resident's HI to Target Organs/Systems

Target Organ or Effect	Estimated HI	Contributing COPCs
Central Nervous System or Neuro Development	Adult, 1.12 | Child, 3.21	Aluminum and Manganese
Skin	Adult, 0.18 | Child, 0.17	Arsenic
Lungs	Adult, 0.12 | Child, 0.65	Cobalt
Heart	Adult, 0.23 | Child, 1.75	Cobalt and Iron
Liver	Adult, 0.11 | Child, 1.10	Iron
Endocrine Glands	Adult, 0.11 | Child, 1.10	Iron

The predominant components of the elevated hazard quotients are associated with soil that contains aluminum, cobalt, iron, and manganese. The soil EPCs generating the elevated HIs are summarized below.

Table 20
Comparison of EOD Area 2 COPC EPCs to Guidance Values

Analyte	EPC (mg/kg)	EPA RSL (mg/kg)	NYSDEC SCO (mg/kg)	95th UCL of Background Dataset (mg/kg)
Aluminum	16,097	77,000	NA	14,315
Cobalt	12	23	NA	13
Iron	25,037	55,000	NA	26,489
Manganese	1,512	1,800	1,600	701

Manganese is the COPC that is the largest contributor to both the adult's and child's elevated HI. Review of the EPC for manganese at EOD Area 2 suggests that the value used is elevated compared to soil concentrations found in background levels, but the EPC is still below the guidance concentrations identified as acceptable by the EPA for residential soil and by NYSDEC for unrestricted use.

Inhalation of dusts containing manganese is also the largest individual hazard quotient component estimated for both the adult and child residents. The inhalation hazard quotient calculated for manganese is based on a reference concentration (RfC) derived from an industrial study of battery manufacturing workers that were exposed to manganese dioxide. While soil at EOD-2 may contain some amount of manganese dioxide, it is unlikely that all manganese found exists solely in the form of manganese dioxide. Furthermore, the RfC derived from this study is 4,000 times more stringent than the American Conference of Governmental Industrial Hygienists' (ACGIH's) recommended threshold limit value (TLV) for manganese in industrial applications, which further highlights the conservative nature of this calculation.

With reference to two other major COPCs (i.e., cobalt and iron), each of these is found in the soil at EOD-2 at concentrations that are below EPA residential soil RSL guidance values, and at concentrations that are below background levels. The EPC used for aluminum at EOD-2 is approximately 12.5 percent above the 95th UCL background soil concentration and still within the range of the dataset. This corresponds to an increased HI of 0.015 for the adult and 0.005 for the child resident. Both of these values are insignificant when compared to the level of uncertainty (probable over-estimation) that is associated with the reference dose used for manganese. This suggests that the concentrations observed at EOD-2 are just as likely to be associated with natural soil, and not attributable to contamination that has occurred at the site due to its historic use.

Based on these findings, environmental conditions that remain at EOD-2 pose no unacceptable non-carcinogenic hazard or carcinogenic risk to Conservation/Recreational receptors or Residential receptors.

SEAD 002-R-01 (EOD Area 3)

Non-carcinogenic HIs for all receptors, with the exception of the resident child's, are below the EPA acceptable limit of 1. Projected carcinogenic risks for Conservation/Recreation receptors (i.e., parker worker, construction worker, and recreation child visitor) and Residential/Resort receptors (adult, child and lifetime resident) are within, or below, the EPA acceptable range (i.e., 1×10^{-4} to 1×10^{-6}).

Table 21
EOD Area 3 Summary of Human Health Risk Assessment

Receptor	Hazard Index	Cancer Risk
Park Worker	0.23	2.1×10^{-6}
Construction Worker	0.73	3.5×10^{-7}
Recreational Child Visitor	0.13	2.7×10^{-7}
Resident Adult	0.78	4.6×10^{-6}
Resident Child	3.2	8.2×10^{-6}
Lifetime Resident	--	1.3×10^{-5}

The summary of potential effects to the child resident's target organs or body systems suggests that hazard indices in excess of EPA's acceptable limit of 1 are estimated for the child's central nervous systems and for the heart. The largest components of the identified hazard quotients are associated with soil that contains aluminum, cobalt, iron, and manganese.

Table 22
Allocation of Child Resident's HI to Target Organs/Systems

Target Organ or Effect	Estimated HI	Contributing COPCs
Central Nervous System or Neuro Development	Child, 1.55	Aluminum and Manganese
Skin	Child, 0.20	Arsenic
Lungs	Child, 0.51	Cobalt
Heart	Child, 1.46	Cobalt and Iron
Liver	Child, 0.95	Iron
Endocrine Glands	Child, 0.95	Iron

The soil EPCs generating the elevated hazard indices are summarized below.

Table 23
Comparison of EOD Area 3 COPC EPCs to Guidance Values

Analyte	EPC (mg/kg)	RSL (mg/kg)	NYSDEC Soil Obj. (mg/kg)	95th UCL of Background Dataset (mg/kg)
Aluminum	15,559	77,000	NA	14,315
Cobalt	9.5	23	NA	13
Iron	22,138	55,000	NA	26,489
Manganese	600	1,800	1,600	701

As is noted, the EPC for each of the identified metals is below its listed EPA RSL for residential soil. The EPC for manganese is also below its respective New York unrestricted use SCO value, and the EPC used for cobalt and iron are lower than 95th UCL background soil concentrations. The hazard quotient derived for manganese is overly conservative as it is based on inhalation of manganese dioxide, which is not the only form of manganese that is likely to be found at the site. Aluminum again is observed at an EPC that is about nine percent higher than its background soil 95th UCL concentration and again within the range of the dataset, but for the child resident this only amounts to a potential HI increase of 0.04, which is insignificant when compared to the uncertainty that is associated with the HI determined for manganese.

Therefore, the observed risk associated with metals at EOD-3 is due to background conditions and cannot be distinguished from effects that may be associated with the natural setting at the Depot. Thus, it is likely that the

elevated non-carcinogenic hazard for the resident child overestimates the hazards that actually exist at EOD-3. The observed risks associated with metals at EOD-3 are due to background conditions and are not associated with any site contamination.

SEAD 007-R-01 (Rifle Grenade Range)

Projected non-carcinogenic HIs for all receptors, with the exception of the resident child's, at SEAD 007-R-01 are below the EPA preferred limit of 1. Projected carcinogenic risks for all receptors are within, or below, the EPA acceptable range (i.e., 1×10^{-4} to 1×10^{-6}).

Table 24
SEAD 007-R-01 Summary of Human Health Risk Assessment

Receptor	Hazard Index	Cancer Risk
Park Worker	0.26	2.1×10^{-6}
Construction Worker	0.82	3.2×10^{-7}
Recreational Child Visitor	0.14	2.6×10^{-7}
Resident Adult	0.93	4.7×10^{-6}
Resident Child	3.6	7.8×10^{-6}
Lifetime Resident	--	1.3×10^{-5}

With reference to the child resident's elevated non-carcinogenic HI, the analysis of the potential impacts to target organs or body systems is summarized below. As is noted, there are estimated hazard indices in excess of 1 noted for the child's neuro-development/central nervous system and their heart.

Table 25
Allocation of Child Resident's HI to Target Organs/Systems

Target Organ or Effect	Estimated HI	Contributing COPCs
Central Nervous System or Neuro Development	Child, 1.82	Aluminum and Manganese
Skin	Child, 0.18	Arsenic
Lungs	Child, 0.62	Cobalt
Heart	Child, 1.61	Cobalt and Iron
Liver	Child, 0.99	Iron
Endocrine Glands	Child, 0.99	Iron

The ingestion of soil (60%) and the inhalation of dust (39%) primarily drive the elevated HI estimated for the child resident receptor. Five metals (aluminum, arsenic, cobalt, iron, and manganese) contribute to the elevated hazard; however, as is shown below, each metal is found at the AOC at an EPC that is below its respective EPA RSL for residential soil. The EPCs for arsenic and manganese are also below their respective New York State SCO value for unrestricted use.

Table 26
Comparison of SEAD 007-R-01 COPC EPCs to Guidance Values

Analyte	EPC (mg/kg)	RSL (mg/kg)	NYSDEC SCO (mg/kg)	95th UCL of Background Dataset (mg/kg)
Aluminum	15,771	77,000	NA	14,315
Arsenic	3.9	0.39	13	6.0
Cobalt	11.1	23	NA	13
Iron	23,107	55,000	NA	26,489
Manganese	632	1,800	1,600	701

Further, the EPC concentrations used for four of the metals of concern are lower than comparable background soil 95th UCL levels, while the soil EPC concentration for aluminum is roughly 10 percent above its 95th UCL background level and as such within the range of the background data set. Therefore, as was found for other AOCs discussed above, potential non-carcinogenic impacts to the child resident arising from exposure to soil at SEAD 007-R-01 (Grenade Range) cannot be differentiated from those that would occur due to soils at residential sites or to other background areas in the vicinity of the Depot.

Considering the above discussion, environmental conditions at the Grenade Range do not pose an unacceptable level of hazard or risk to Conservation/Recreation or Residential/Resort receptors.

SEAD-70

Projected HIs for all conservation/recreation receptors are below the EPA acceptable limit of 1; the projected HI for the adult resident is also below the acceptable limit whereas the projected HI for the child resident is above the EPA acceptable limit. Projected cancer risk levels for all conservation/recreation and residential/resort receptors are within, or below, the EPA acceptable range (i.e., 1×10^{-4} to 1×10^{-6}).

Table 27
SEAD-70 Summary of Human Health Risk Assessment

Receptor	Hazard Index	Cancer Risk
Park Worker	0.27	4.1×10^{-6}
Construction Worker	0.85	6.6×10^{-7}
Recreational Child Visitor	0.16	5.3×10^{-7}
Resident Adult	0.89	8.2×10^{-6}
Resident Child	4.0	1.6×10^{-5}
Lifetime Resident	NA	2.4×10^{-5}

The potential effects to the child resident's target organs or systems are summarized below. As is seen, elevated effects are projected for the child's central nervous system, heart, liver and endocrine glands.

Table 28
Allocation of Child Resident's HI to Target Organs/Systems

Target Organ or Effect	Estimated HI	Contributing COPCs
Central Nervous System or Neuro Development	Child, 1.17	Aluminum and Manganese
Skin	Child, 0.39	Arsenic
Lungs	Child, 0.63	Cobalt
Heart	Child, 2.45	Cobalt and Iron
Liver	Child, 1.82	Iron
Endocrine Glands	Child, 1.82	Iron

Three exposure pathways, ingestion of soil, inhalation of dust in ambient air, and intake of groundwater account for 98% of the overall non-carcinogenic HI projected for the child receptor. The hazard quotients estimated due to exposure to groundwater via either ingestion or dermal contact are derived from a sample set that consists of four samples of groundwater. Each of these samples was collected using a bailer during the ESI. The iron EPC (2.14 mg/L) for groundwater is the maximum concentration measured in the groundwater and was found in the sample that contained the highest level of turbidity (325 NTUs). Each of the other three samples contained lower levels of turbidity (less than 50 NTUs) and all of the other iron concentrations in groundwater were below New York's GA standard of 300 µg/L.

The ingestion of soil represents approximately 60% of the HI estimated for the child receptor, while the inhalation of dust accounts for approximately 22% of the estimated HI. As discussed for each of the other AOCs, five metal COPCs (aluminum, arsenic, cobalt, iron, and manganese) account for the ingestion hazard. As shown in the table below, each of the EPCs, exclusive of the one for arsenic, are below the EPA RSLs for residential soil. The EPCs for arsenic and manganese are also below their respective NYSDEC SCO values. Further, the EPCs for aluminum, cobalt, iron, and manganese are less than their 95th UCL background soil concentrations at the Depot. Arsenic was found at an EPC that is slightly above its 95th UCL background soil level, but at a concentration that is within the range of concentrations that are in the Depot's background dataset. Furthermore, the estimated arsenic contribution to the child's HI is not at a level in excess of the EPA acceptable value of 1 at the target organ level.

Table 29
Comparison of SEAD-70 COPC EPCs to Guidance Values

Analyte	EPC (mg/kg)	RSL (mg/kg)	NYSDEC SCO (mg/kg)	95th UCL of Background Dataset (mg/kg)
Aluminum	12,400	77,000	NA	14,315
Arsenic	8.5	0.39	13	6.0
Cobalt	12	23	NA	13
Iron	26,300	55,000	NA	26,489
Manganese	465	1,800	1,600	701

Based on the findings of the investigation, the preferred remedy for SEAD-70 (Building T2110 – Filled Area) is NFA, with release of the property for unrestricted use and unlimited exposure.

SUMMARY OF REMEDIAL GOALS AND REMEDIAL ACTION OBJECTIVES

Based on the CERCLA investigations (e.g., ESIs, RI, Munitions Response Sampling activities) performed at each of the AOCs, there are data that document that residual levels of chemical hazardous substances, and other chemical pollutants and contaminants of potential concern remain at each of the sites. However, based on risk

assessments and risk management evaluations, performed in accordance with CERCLA guidance, that have been completed for each of the AOCs, residual concentrations of hazardous substances, pollutants, and contaminants are such that they are either consistent with, and undistinguishable from background; are present at levels that do not pose unacceptable risks or hazards to human health or the environment; or in the case of groundwater, levels are below state and federal MCLs.

Based on the outlined munitions response actions performed by the Army, the *Munitions Response Completion Report* concluded that the Seneca AD Munitions Response Sites are free of detected anomalies. Notwithstanding this determination, there is a possibility given the prior use of the four munitions response AOCs (i.e., SEAD-46, SEAD 003-R-01, SEAD 002-R-01, and SEAD 007-R-01) that MEC may be encountered on the property in the future.

The remedy proposed for the Seneca AD Munitions Response Sites is needed because there is the potential that MEC may remain undetected at the sites at locations that could not be identified using currently available geophysical and intrusive investigative and clearance technologies. Current characterizations of the environmental media in the four munitions response AOCs indicates that residual levels of hazardous substances and other chemical pollutants and contaminants are not sufficient to warrant any further mitigation or remediation efforts.

Remedial action objectives (RAOs) are site-specific goals for protecting human health and the environment and serve as a guide for development and evaluation of remedial alternatives. Because of the residual risk of a receptor encountering a MEC item that remains, RAOs were developed for the four Seneca AD Munitions Response Sites. The RAO for the four Seneca AD Munitions Response Sites is as follows:

- Reduce the risk associated with any MEC potentially remaining on-site by reducing likelihood of exposure and educating potential receptors on risk associated with the potential presence of MEC.

SUMMARY OF REMEDIAL ALTERNATIVES

Considering the RAO and the fact that the sites have already undergone munitions response investigation and removal, the following remedial alternatives were developed:

- Alternative 1: No Action
- Alternative 2: Land Use Controls (LUCs)

Alternative 1: No Action

Evaluation of the No Action alternative is required under CERCLA as a baseline to reflect current conditions without response actions. This alternative is used for comparison purposes only. This alternative does not include any removal, containment, treatment, modeling, treatability studies or LUCs.

Alternative 2: Land Use Controls

This alternative involves the implementation, maintenance, and monitoring of LUCs that will:

- prohibits residential housing, elementary and secondary schools, childcare facilities or playgrounds; and
- require the Army (or Army contractor) to conduct an annual 3R Explosives Safety Education Program for property owners of the Seneca AD Munitions Response Sites.

The Army will prepare a LUC Implementation Plan (LUC Remedial Design), which will require an environmental easement to implement these LUCs for the Seneca AD Munitions Response Sites. The environmental easement will conform to the applicable requirements of the New York State Environmental Conservation Law (ECL) Article 71, Title 36: Environmental Easements. The Army will conduct an annual inspection to ensure compliance with the LUCs and report to the NYSDEC and EPA the status of the Sites.

The LUCs will require property owners or persons desiring to conduct prohibited activities within the area encompassing the Seneca AD Munitions Response Sites to obtain approval of the Army, EPA, and NYSDEC in

accordance with the requirements set forth in the ROD, the LUC Implementation Plan and the environmental easement prior to conducting otherwise prohibited activities.

Further, the Army intends to obtain from property owners an agreement that the latter will be responsible for contracting commercial construction support for appropriate disposition of any MEC items found if they are needed to address MEC that potentially remains on the surface of the ground or in the subsurface. However, the ultimate responsibility remains with the Army for addressing any remaining MEC should the owner or owners fail to agree to such an arrangement or fail to satisfy their agreed upon responsibilities. "Construction support" is defined as support by UXO-qualified personnel that may assist during any intrusive or ground-disturbing construction activities at the Seneca AD Munitions Response Sites, and more specifically it is UXO-qualified personnel assistance for prohibited activities to address potential MEC risks to construction and maintenance personnel.

The Army also intends to obtain from property owners an agreement that the latter will be responsible for attending the 3R Explosives Safety Education Program provided by the Army.

At the Five Year Review, the Army will evaluate the continued need for the LUCs and recommend to EPA and NYSDEC cessation of the LUCs if the Army believes it is justified. The MEC recognition and safety training (3R Explosives Safety Education Program) will likewise be evaluated as part of the five-year review process to determine if the training program needs to continue. If further evaluation indicates that this LUC is no longer necessary, the program may be discontinued with the approval of the Army, EPA and NYSDEC.

To implement the selected remedy, a LUC Remedial Design (RD) plan will be prepared. The LUC RD Plan will include: a Site Description, the IC Land Use Restrictions, the IC Mechanism to ensure that the land use restrictions are not violated in the future, and Reporting/Notification requirements. For compliance with the State's ECL, upon transfer of these sites out of federal control, an environmental easement for each of the Seneca AD Munitions Response Sites, consistent with Section 27-1318(b) and Article 71, Title 36 of ECL, in favor of the State of New York, with rights therein in favor of the Army and EPA, will be recorded.

In accordance with the FFA and CERCLA §121(c), the remedial action (including LUCs) will be reviewed no less often than every 5 years. After such reviews, modifications to the remedial action may be implemented, if appropriate.

COMPARATIVE ANALYSIS OF REMEDIAL ALTERNATIVE

A detailed analysis was completed for the various remedial alternatives developed to address the MEC hazards identified. The purpose of this detailed analysis was to evaluate and compare the range of remedial action alternatives against the baseline condition (no action) and to select one preferred alternative that was considered the most suitable to address the hazards and/or risks present. The preferred alternatives are presented here for review by the public.

The detailed analysis involved evaluating each identified remedial alternative against nine criteria, as defined by CERCLA. These nine criteria fall into three groups: threshold criteria, primary balancing criteria, and modifying criteria. A description and purpose of the three groups of criteria follow:

Threshold criteria are requirements that each alternative must meet in order to be eligible for selection and include (a) overall protectiveness of human health and the environment and (b) compliance with **applicable or relevant and appropriate requirements (ARARs).**

Balancing criteria are used to weigh major trade-offs among alternatives and include:

- long-term effectiveness and permanence,
- reduction of toxicity, mobility, and volume (TMV) of contaminants through treatment,
- short-term effectiveness,

- implementability, and
- cost.

Modifying criteria include (a) state/support agency acceptance and (b) community acceptance, and require review of the remedial alternatives by stakeholders. For this reason, while these criteria may be considered to the extent that information is available during the FS, they can only be fully considered after public comment is received on the Proposed Plan. In the final balancing of trade-offs between alternatives upon which the final remedy selection is based, modifying criteria are equally important as the balancing criteria.

The details of the nine evaluation criteria are explained further in **Table 30** below.

Summary of ARARs

There are no ARARs associated with either Alternative 1 or Alternative 2.

The following sections provide a comparative analysis of the remedial alternatives using the threshold and balancing criteria.

Table 30
Evaluation Criteria for Remedial Action Alternatives

Threshold Criteria	**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.
	Compliance with ARARs evaluates whether the alternative meets cleanup levels and remedial requirements based on relevant Federal or State environmental statutes or regulations, or whether a waiver is justified.
Balancing Criteria	**Long-term Effectiveness and Permanence** considers the ability of an alternative to maintain protection of human health and the environment over time.
	Reduction of 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.
	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.
	Implementability considers the technical and administrative feasibility of implementing the alternative, including factors such as the relative availability of goods and services.
	Cost includes estimated capital and annual operations and maintenance costs, as well as present worth cost. Total present value (TPV) 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 percent.
Modifying Criteria	**State/Support Agency Acceptance** considers whether the State agrees with the Army's analyses and recommendations, as described in the RI/FS and Proposed Plan.
	Community Acceptance considers whether the local community agrees with Army's analyses and preferred alternative. Comments received on the Proposed Plan are an important indicator of community acceptance.

ALTERNATIVES EVALUATION

Alternative 1: No Action

Alternative 1, the no action alternative (also referred to as No Further Action under CERCLA), does not protect human health and the environment because it does nothing to reduce MEC hazards. This alternative is included as a baseline alternative to compare with the remaining remedial alternatives. This alternative is the least costly of the group and does not pose short term hazards to workers or the surrounding area if implemented. However, it does not protect human health or the environment and, therefore, is not suitable for implementation.

Alternative 2: Land Use Controls

Implementing Alternative 2 protects human health and the environment. This alternative achieves RAOs by limiting human interaction with potential MEC hazards through the use of an environmental easement and increasing awareness of MEC hazards through public awareness measures through the required annual 3R Explosives Safety Education Program for property owners.

Alternative 2 is easily implementable and poses no hazards to site workers. However, Alternative 2 does not reduce TMV of wastes. Furthermore, Alternative 2 could be implemented with minimal effort because services and materials required for implementation are readily available.

Costs

For those alternatives whose life-cycle is indeterminate or exceeds 30 years, and consistent with the process of evaluating and comparing alternatives as specified in EPA's Remedial Investigation/Feasibility Study Guidance (EPA 1988), a period of 30 years is used for estimating long-term operation and maintenance (O&M) costs. For the Seneca AD Munitions Response Sites, the life-cycle is indeterminate; therefore, long-term O&M costs were estimated over a period of 30 years. Capital and long-term O&M costs for implementing and maintaining LUCs under the LUC Alternative are estimated at a total of approximately $8,000 for the reuse areas within the Seneca AD Munitions Response Sites. Capital and long-term O&M costs for implementing and maintaining Long- Term Management Measures are estimated at approximately $7,000 for the reuse areas within the Seneca Army Depot Munitions Response Sites. Therefore, the total estimated 30-year Net Present Value cost of the remedy is approximately $56,400.

Table 31 Detailed Analysis of Alternatives for Munitions and Explosives of Concern

edial tion native	Threshold Criteria		Primary Balancing Criteria					Modifying Criteria	
	Overall Protection of Human Health and Environment	Compliance with ARARs	Long-Term Effectiveness	Reduction in TMV of Wastes	Short-Term Effectiveness	Implementability	Cost [1]	State / Support Agency Acceptance	Commu Accepta
ative 1: tion	Not protective of human health or environment	N/A - No ARARs	Not effective over long-term	No reduction in TMV of wastes (*no MEC removal*)	Not effective over the short-term area	Readily implementable (*no actions required*)	$0	State and EPA acceptance unlikely due to lack of risk reduction.	To be evaluate based or commen the Prop Plan
ative 2: ment	Protective of human health	N/A – No ARARs	Effective over long-term	No additional reduction in TMV of wastes (*no additional MEC removal*)	Low short-term hazards to workers and surrounding area	Readily implementable; MEC clearance already performed so likely to gain approval	$56,400	Likely acceptance since munitions clearance already completed and risk reduced.	To be evaluate based or commen the Prop Plan

) Costs shown are 30-year costs as a total present value (TPV). The TPV is based on a discount rate of 7 percent.

ading shows alternative desirability with respect to that criterion:

Most acceptable	Significantly acceptable	Moderately acceptable	Least acceptable

THE PREFERRED ALTERNATIVE

Based on the detailed and comparative analysis of remedial alternative using the CERCLA nine criterial presented in this Proposed Plan, the most effective alternative to achieve the remedial objectives for the Seneca AD Munitions Response Sites is Alternative 2 (LUCs).

COMMUNITY PARTICIPATION

Public Comments

The Army is the lead agency for investigating, reporting, and taking remedial actions at the Seneca Army Depot Activity. The documents provided in the Administrative Record describe the site history, details of previous investigations, the associated risk assessments and their conclusions. These documents and this Proposed Plan are part of the SEDA Administrative Record and are available for review at the repository listed below.

Public comments are considered before any action is selected. Written and oral comments on this Proposed Plan will be accepted throughout a public comment period between **01 February 2017** and **02 March 2017**. Correspondence should be postmarked no later than **23 February 2017** and should be sent to the attention of **Mr. Randall W. Battaglia** (see below).

Contact Information

Mr. Randall W. Battaglia
Project Manager, New York District
Seneca Army Depot BRAC Environmental Coordinator
Seneca Army Depot Activity
Building 123, P.O. Box 9
5786 State Route 96
Romulus, NY 14541-0009
607-869-1523
Randy.W.Battaglia@usace.army.mil

Administrative Record

Copies of applicable documents for the Seneca AD MRSs and SEAD-70 are available at the following location:

Seneca Army Depot Activity
Building 123
Romulus, New York 14541
(607) 869-1523
Hours: Monday – Thursday, 8:30 am to 4:30 pm

GLOSSARY OF TERMS

Anomaly – Any item that is detected as a subsurface irregularity after geophysical investigation. This irregularity should deviate from the expected subsurface ferrous and non-ferrous material at a site (i.e., pipes, power lines, etc.).

Applicable or relevant and appropriate requirements (ARAR) – The Federal and State environmental laws that a selected remedy will meet. These requirements may vary among sites and alternatives.

Constituent of Concern (COC) – COCs are defined as the **constituents of potential concern (COPCs)** that are present at sufficient concentrations to pose a risk to human health or the environment.

Constituent of Potential Concern (COPC) – COPCs are defined as any MC that are present at elevated concentrations with regard to local conditions. COPCs are carried forward for evaluation in the risk assessment to determine whether or not they are COCs.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, commonly known as Superfund) – A federal law that addresses the funding for and remediation of abandoned or uncontrolled hazardous waste sites. This law also establishes criteria for the creation of key documents such as the Remedial Investigation, Feasibility Study, Proposed Plan, and Decision Document.

Decision Document – A report documenting the final action, approved by the regulatory agencies, that is required at CERCLA sites.

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.

Munitions Constituents (MC) – Any materials originating from unexploded ordnance, discarded military munitions, or other military munitions, including explosive and non-explosive materials, and emission, degradation, or breakdown elements of such ordnance or munitions.

Munitions Debris (MD) – Remnants of munitions (e.g., penetrators, projectiles, shell casings, links, fins) remaining after munitions use, demilitarization, or disposal. Munitions debris is confirmed inert and free of explosive hazards by technically qualified personnel.

Munitions and Explosives of Concern (MEC) – This term, which distinguishes specific categories of military munitions that may pose unique explosives safety risks, means: (a) **unexploded ordnance**; (b) **discarded military munitions**; or (c) Explosive MC (e.g., TNT, RDX) present in high enough concentrations to pose an explosive hazard.

Munitions Response Site (MRS) – A discrete location that is known to require a munitions response.

Preferred Alternative(s) – The alternative(s) that, when compared to other potential alternatives, was/were determined to best meet the CERCLA evaluation criteria and is proposed for implementation at an MRS.

Proposed Plan – A plan that identifies the preferred remedial alternative(s) for a site and is made available to the public for comment.

Remedial Investigation (RI) – Exploratory inspection conducted at a site to define the nature and extent of contamination present, and to assess potential related hazards and risks.

Superfund – See Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) above.

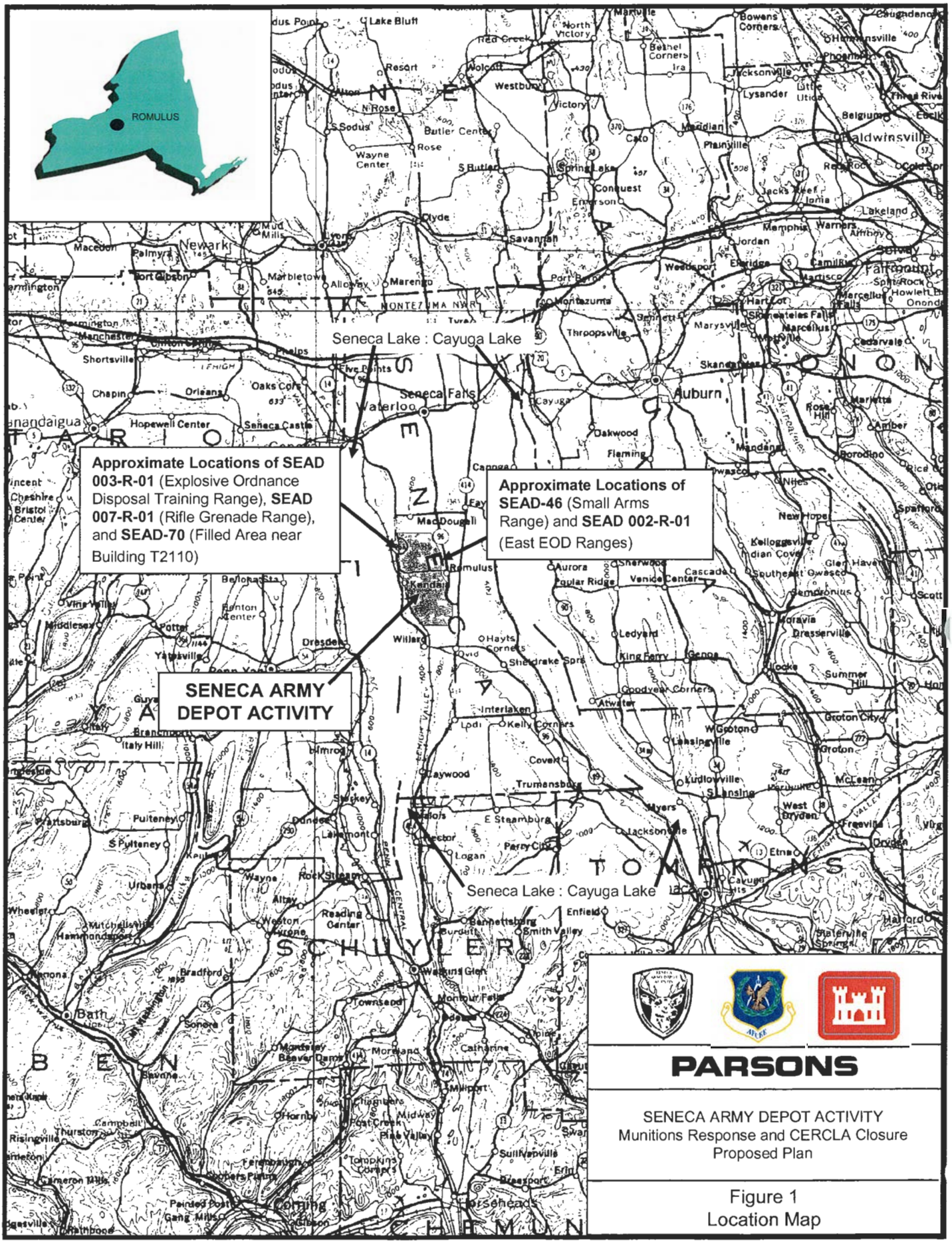
Total Present Value (TPV) - The amount needed to be set aside at the initial point in time (the "base year," or "Year 0") to ensure funds will be available in the future as they are needed.

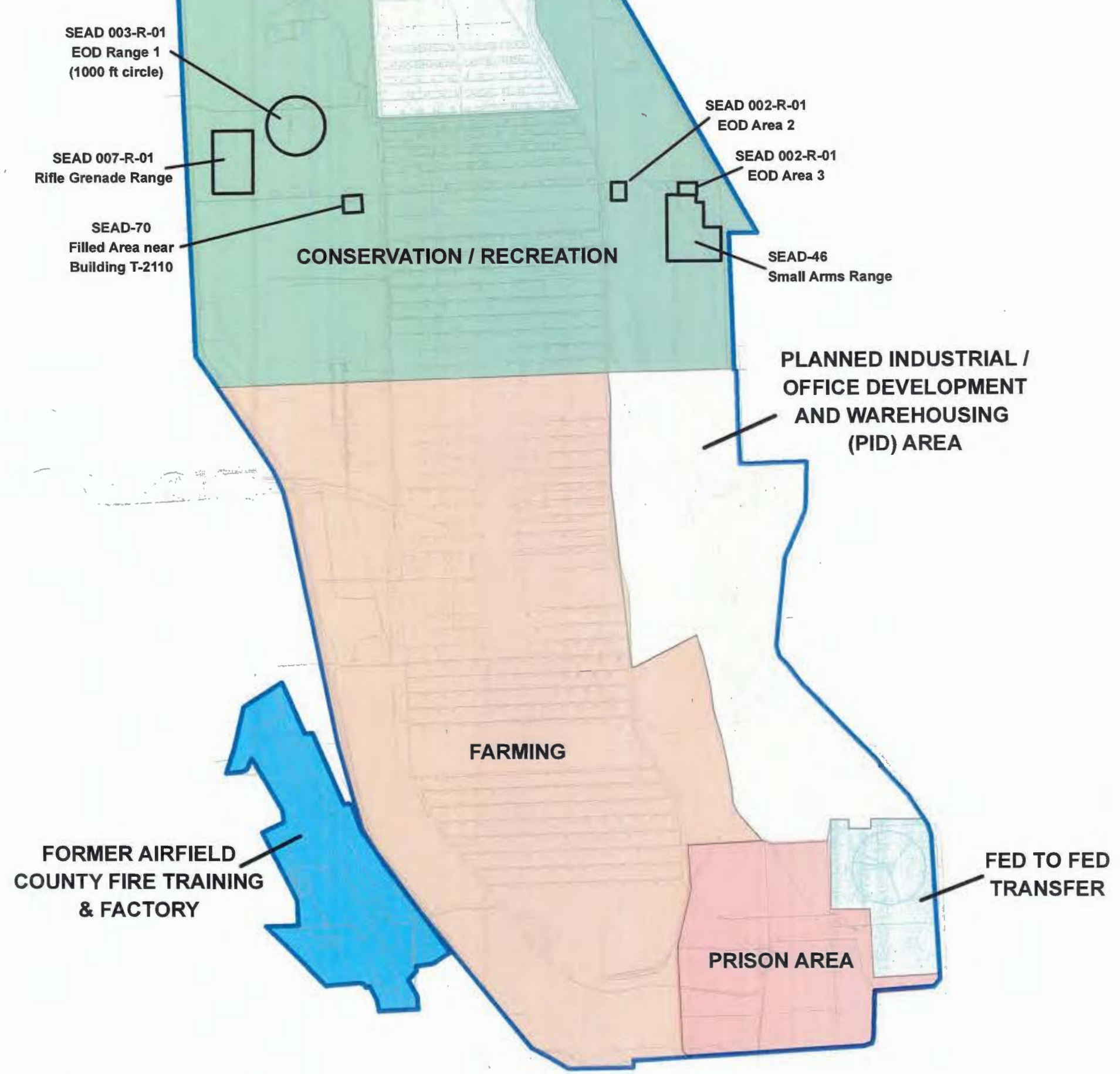
Unexploded Ordnance (UXO) – Military munitions that: (a) have been primed, fuzed, armed, or otherwise prepared for action; (b) have been fired, dropped, launched, projected, or placed in such a manner as to constitute a hazard to operations, installations, personnel, or material; and (c) remain unexploded either by malfunction, design, or any other cause.

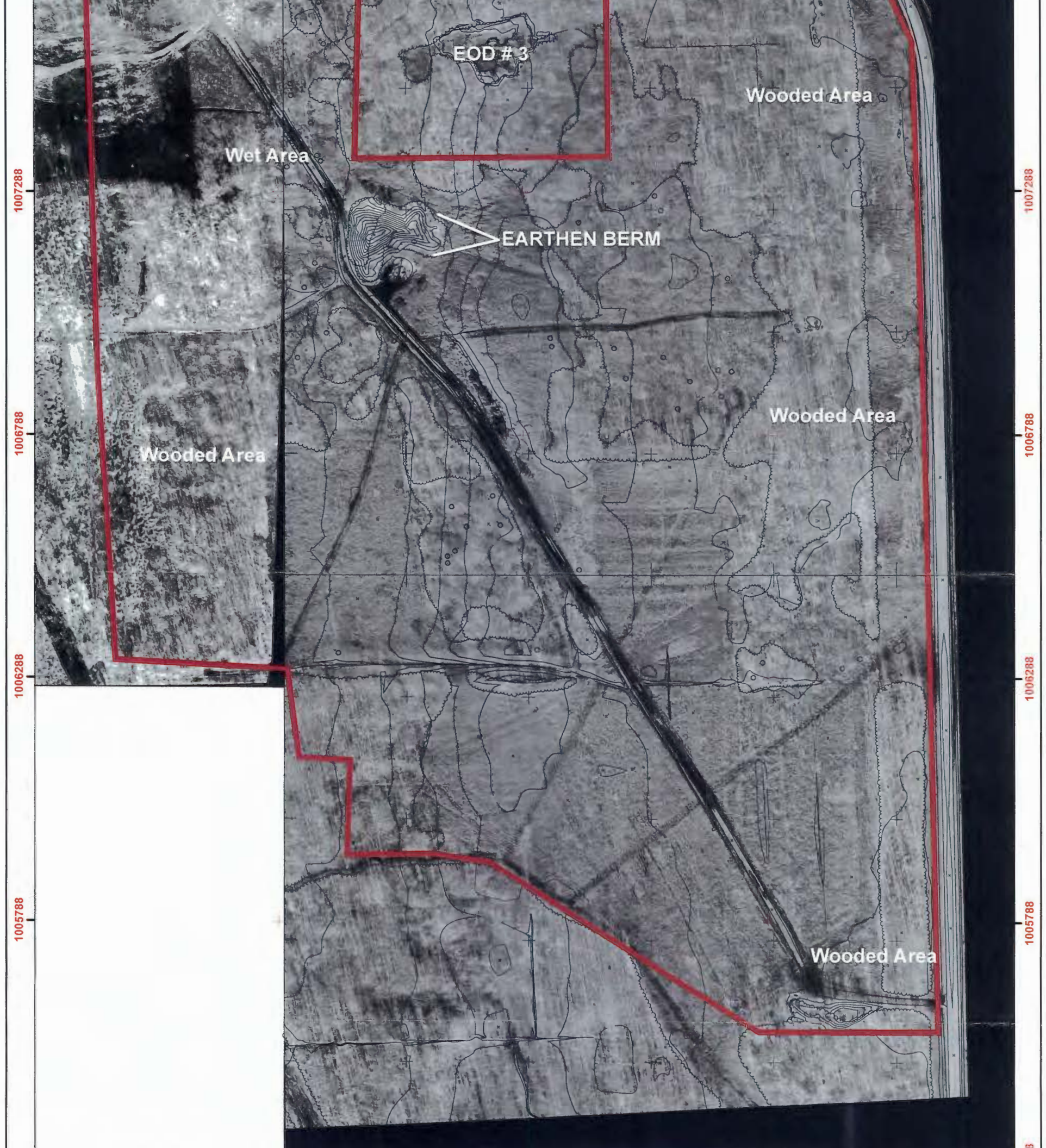
ACRONYMS AND ABBREVIATIONS

AOC	area of concern
ARAR	applicable or relevant and appropriate requirement
ASR	Archives Search Report
bgs	below the ground surface
BRAC	Base Realignment and Closure
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	contaminant of concern
COPC	contaminant of potential concern
CSM	conceptual site model
DGM	digital geophysical mapping
DoD	Department of Defense
EE/CA	Engineering Evaluation Cost Analysis
EOD	Explosive Ordnance Disposal
EPC	exposure point concentration
ESI	Expanded Site Inspection
FFA	Federal Facilities Agreement
FS	feasibility study
FUDS	formerly used defense site
GPS	global positioning system
HA	Hazard Assessments
HD	high density
HE	high explosive
HI	hazard index
HHEA	Human Health Exceedance Area
HHRA	Human Health Risk Assessment
HRA	historical records review
INPR	Inventory Project Report
LUC	land use control
MC	munitions constituents
MCL	maximum contaminant levels
MD	munitions debris
MEC	munitions and explosives of concern
MMRP	Military Munitions Response Program
MPPEH	material potentially presenting an explosive hazard
MRS	munitions response site
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NFA	no further action
NPL	National Priorities List
NYSDEC	New York State Department of Environmental Conservation
OB/OD	Open Burning/Open Detonation
OE	Ordnance and Explosive
PCB	polychlorinated biphenyls
RAO	remedial action objective
RCRA	Resource Conservation and Recovery Act
RfC	reference concentration
RI	remedial investigation
RME	reasonable maximum exposure
ROD	Record of Decision

RSL	Regional Screening Levels
SCIDA	Seneca County Industrial Development Agency
SCO	soil cleanup objective
SEDA	Seneca Army Depot Activity
SI	site inspection
SUXOS	senior UXO supervisor
SVOC	semi-volatile organic compound
SWMU	Solid Waste Management Unit
TAGM	New York State Technical and Administrative Guidance Memorandum
TAL	target analyte list
TCL	total compound list
TLV	threshold limit value
TMV	toxicity, mobility, or volume
TPP	technical project planning
TPV	total present value
TRPH	total recovered petroleum hydrocarbons
UCL	upper confidence level
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
UXO	unexploded ordnance
VOC	volatile organic compound


ROMULUS
Seneca Lake : Cayuga Lake
Approximate Locations of SEAD 003-R-01 (Explosive Ordnance Disposal Training Range), SEAD 007-R-01 (Rifle Grenade Range), and SEAD-70 (Filled Area near Building T2110)
Approximate Locations of SEAD-46 (Small Arms Range) and SEAD 002-R-01 (East EOD Ranges)
SENECA ARMY DEPOT ACTIVITY
Seneca Lake : Cayuga Lake
PARSONS
SENECA ARMY DEPOT ACTIVITY
Munitions Response and CERCLA Closure
Proposed Plan
Figure 1
Location Map


SEAD 003-R-01
EOD Range 1
(1000 ft circle)
SEAD 007-R-01
Rifle Grenade Range
SEAD-70
Filled Area near
Building T-2110
SEAD 002-R-01
EOD Area 2
SEAD 002-R-01
EOD Area 3
SEAD-46
Small Arms Range
CONSERVATION / RECREATION
PLANNED INDUSTRIAL /
OFFICE DEVELOPMENT
AND WAREHOUSING
(PID) AREA
FARMING
FORMER AIRFIELD
COUNTY FIRE TRAINING
& FACTORY
FED TO FED
TRANSFER
PRISON AREA


EOD # 3
Wooded Area
Wet Area
EARTHEN BERM
Wooded Area
Wooded Area
Wooded Area
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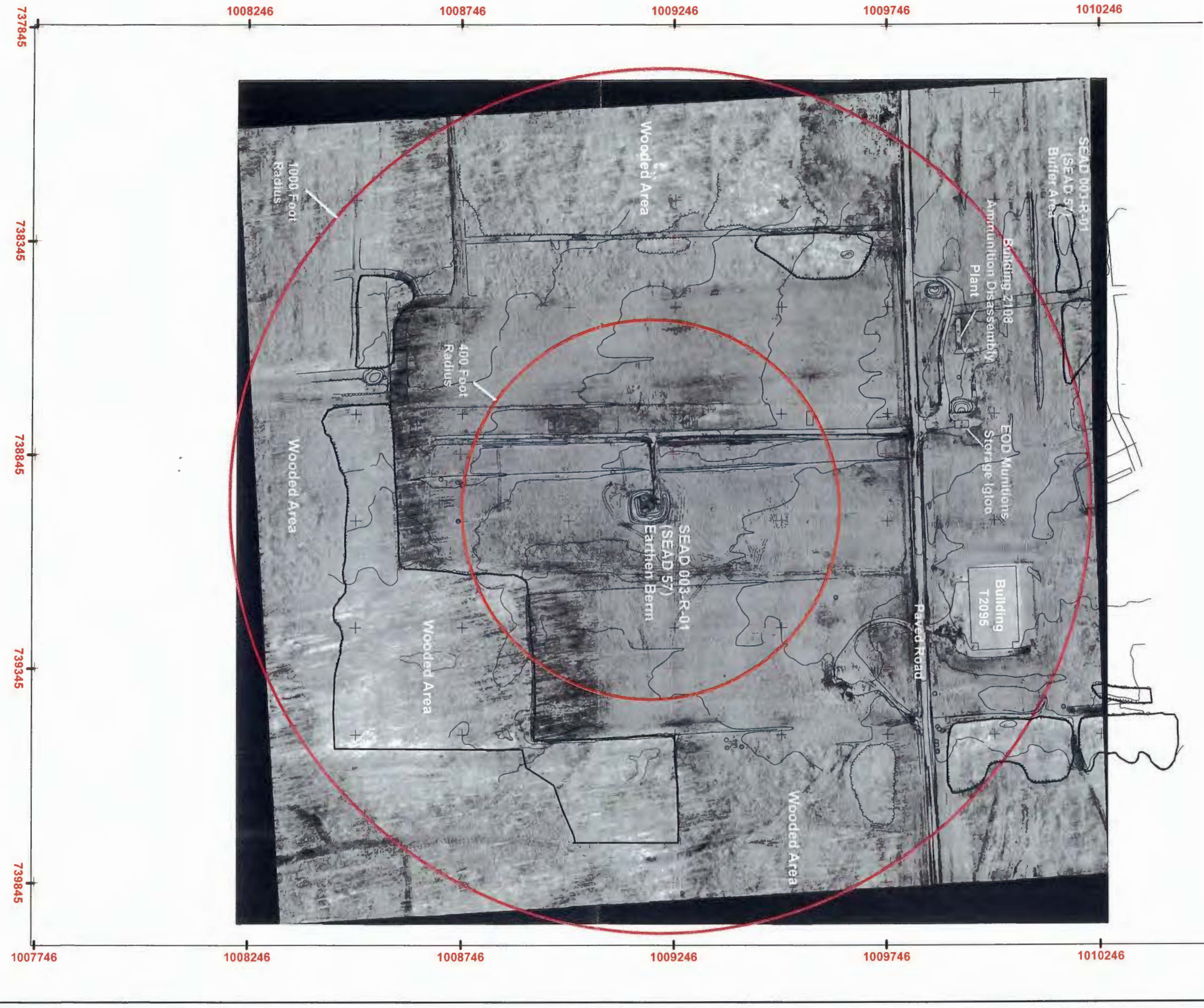
1006788
1006288
1005788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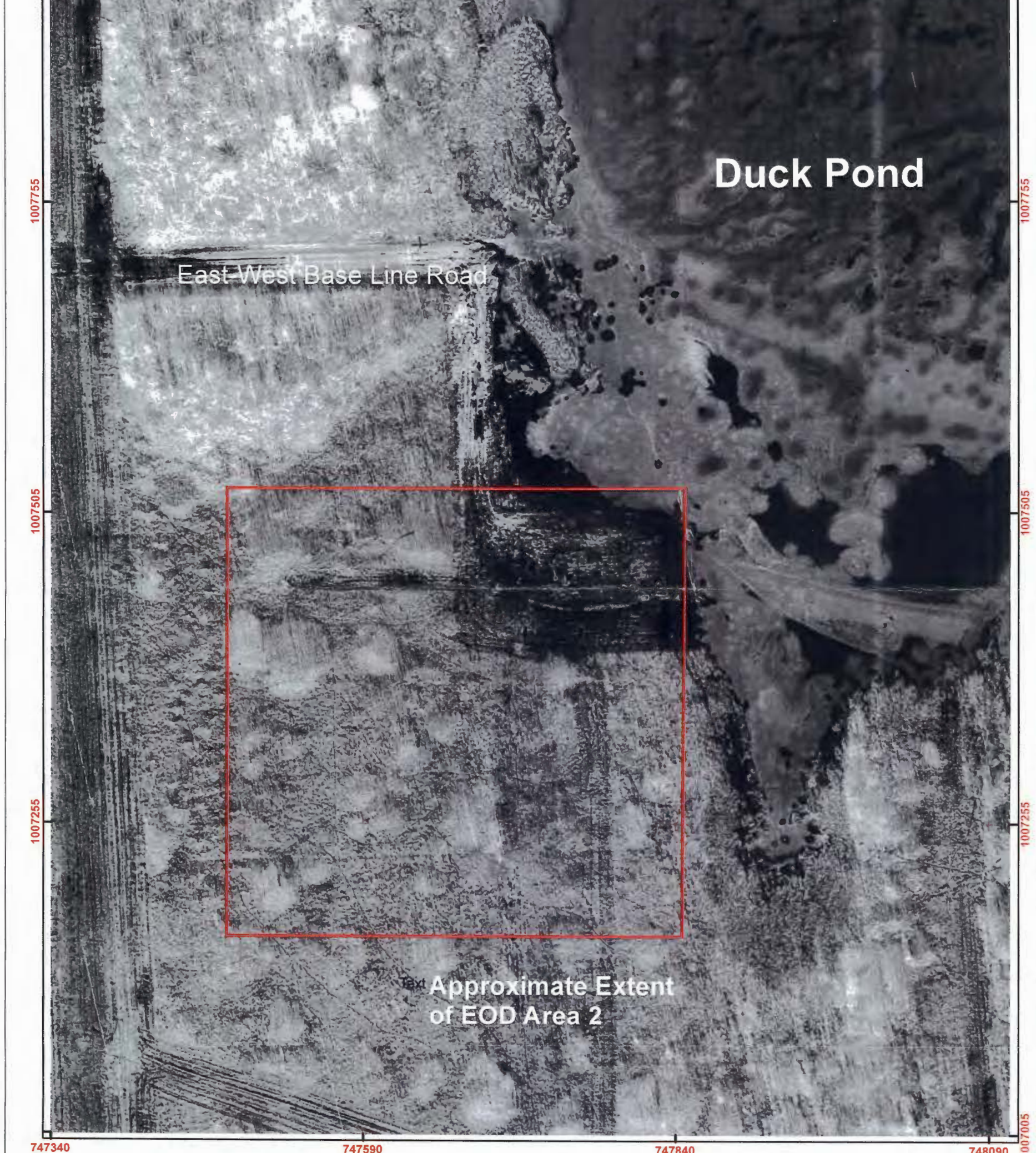
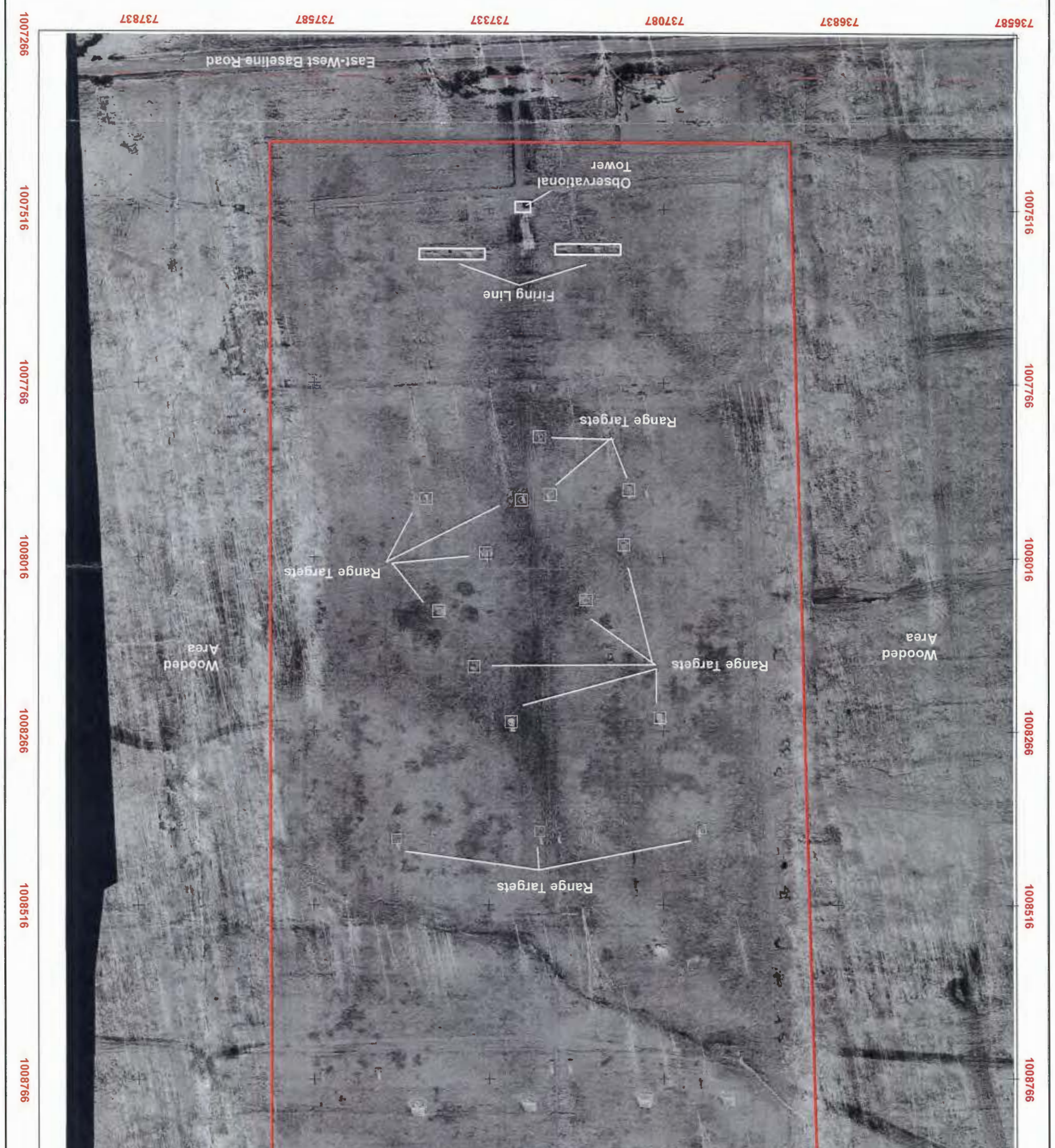
739345
739845
1007746
1008246
1008746
1009246
1009746
1010246
1000 Foot Radius
400 Foot Radius
Wooded Area
Building 2108
Ammunition Disassembly Plant
EOD Munitions Storage Igloo
Building T2095
Paved Road
SEAD 003-R-01 (SEAD 57) Earthen Berm
SEAD 003-R-01 (SEAD 57) Buffer Area


Duck Pond
East-West Base Line Road
Approximate Extent
of EOD Area 2
1007755
1007505
1007255
1007005
747340
747590
747840
748090


East West Base Line Road
EOD Area 3
Approximate Extent
of EOD Area 3
SEAD 46
Backstop
Berm
1007755
1007505
1007255
1007005


East-West Baseline Road
Observational Tower
Firing Line
Range Targets
Range Targets
Range Targets
Range Targets
Range Targets
Wooded Area
Wooded Area
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1007516
1007766
1008016
1008266
1008516
1008766
736587
736837
737087
737337
737587
737837

Approximate Extent
Of Site

N
W E
S

PARSONS

SENECA ARMY DEPOT ACTIVITY
Munitions Response and CERCLA Closure

Figure 8
Filled Area near Building T-2110, SEAD-70