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ORDNANCE AND EXPLOSIVES ENGINEERING EVALUATION/ COST ANALYSIS REPORT – RESPONSE TO COMMENTS

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and
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NEW YORK DISTRICT
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TABLE OF CONTENTS

SECTION 1
RESPONSES TO COMMENTS

GENERAL COMMENTS

1. The definition of Ordnance/Explosives (OE) provided in EPA (2002) indicates that soil with greater than 10 percent by weight is considered to be explosive soil and presents an explosive hazard. The EE/CA does not indicate whether sampling of either soil and/or water was conducted to determine whether explosive soil is present in any of the investigated areas. This is a particular concern at open burn/open detonation (OB/OD) areas and ranges with high amounts of usage. In these areas, chunks of bulk explosives and munitions constituents can be widely dispersed. Much of SEDA will be conservation/recreation that may include camping with campfires. The EE/CA should state whether sampling for explosives has been or will be conducted at any of the sites investigated.

   Response to EPA:
   The purpose of the OE EE/CA was to determine the presence and delineate the extent of OE at suspect sites. As such, HTRW sampling was not a goal of the effort. As OE removals are performed at each site, however, HTRW sampling will be performed as well. At joint HTRW/OE sites, investigation/confirmation sampling will be performed to meet the requirements of the CERCLA program (ESI, RI/FS, etc). At OE sites, HTRW sampling will be proposed in general to determine that no HTRW problems were caused by past DOD use.

   Soils with a 10% by weight ordnance related composition might represent an explosive hazard, but the hazard is for burning/deflagration; the soils will not explode. The USACHPPM studied OB/OD ranges across the country in the 1980's, and these studies were provided to EPA. High concentrations of explosives in soils are not typically found at OB/OD ranges. The high concentrations occur at manufacturing plants. The soils at Seneca Army depot will be managed as containing explosive contaminant (HTRW) rather than ordnance.

   Sampling for PEP materials was conducted thoroughly at the Seneca OBOD facility. Soil concentrations of PEP materials were not found at either the OB, OD, or Washout Plant sites at Seneca. The is no apparent situation in which 'chunks of explosives' could come in contact with a camp fire.

2. The methodologies used in this investigation do not appear to include any attempt to confirm and/or determine the boundaries of the contamination within each area of investigation (AOI). Lack of acceptable boundary information greatly adds to

the uncertainty in the determination of the cost and sufficiency of the remedies proposed in Section 9.

In addition, the rationale for placement and investigation of grids was not provided. The rationale for selecting grids and specific methodology should be provided for all investigation techniques, including "mag and flag", grid-based, and meandering path investigations. In addition, the rationale for investigating with the selected technology should be included in the text (i.e., provide results of a geophysical prove-out).

Response to EPA: A description of the methodology used to characterize contamination boundaries has been added to Section 3. This description provides the rationale for grid placement, the use of meandering path, and the use of "mag and Flag" techniques.

3.1.2.1 Prior to the start of fieldwork, a system of 100-foot by 100-foot grids was developed for the majority of the AOIs to be surveyed. The size of the grid system for each AOI was determined by USACE based on historical records and an area delineated in the ASR. Each system of grids was, generally, centered on a prominent feature such as a detonation pit, building, or firing range. In order to calculate a statistically significant (90% confidence) UXO density for each AOI, only a percentage of the existing grids in each area needed to be surveyed. The number of grids to be surveyed was determined by USACE and supplied with the scope of work. Exactly which grids were to be surveyed was defined in the workplan. The workplan sought to ensure full representative coverage of the grids present in each AOI, from the immediate vicinity of the feature in question to the outskirts of the area identified in the ASR. Field crews made every effort to survey grids in patterns that allowed for the best coverage at concentric distances from the assumed point of detonation (building, berm, impact area). In some cases, investigation of the lateral extent of contamination was limited by site conditions outside of those selected for investigation. Thick woods and standing water were generally the greatest impediments to the collection of truly representative grid patterns.

3.1.2.2 Grid-based geophysical data were collected along parallel survey lines spaced 2.5 feet apart in grids with dimensions of 100 feet by 100 feet. During the surveys, individual lines were traversed over a known distance with data being collected incrementally with distance (EM-61) or time (G-858). EM measurements were collected each time the instrument's tire rotated a specified distance, while magnetic measurements were collected every 0.2 seconds. Fiducial marks were inserted by the operator every 50 feet and were used in post processing to correct data line length by compressing or expanding the recorded measurement locations for each line so that the lines covered the actual distance traveled. This operation was required to compensate for variations in the terrain along the survey line in the case of the EM-61 or walking speed with the G-858. The survey data were then rotated and translated from the local coordinate

system they were collected in (where the southwest corner of the grid surveyed was assigned a coordinate of 0E, 0N) to the New York State Plane coordinate system.

3.1.3.1 As previously stated, grid-based surveys were generally used to survey the area in the immediate vicinity of the feature being investigated. However, in SEADs-45 and –57, and in the Grenade Range, it was believed that OE may have been present, to a lesser degree, outside of the gridded areas. "Meandering path" geophysical surveys were conducted in SEADs-45 and –57 in an attempt to survey as far as the USACE provided kick-out radius of 1800 feet from the detonation berms. In both of these areas, transects were cut through moderately forested areas using a hydro-axe. Where possible, these transect were cut at 100-foot intervals; although, the actual location of many of the paths was determined by the density of trees and brush. Data were generally collected along the transects heading both away from and then back towards the detonation berms. At the Grenade Range, meandering path data were collected between the gridded area, which was believed to be the impact area, and the firing line of the range. Is this case, data were collected in a truly "meandering" path, with no set lines. There was only an attempt to collect data in a relatively uniform pattern across this area of the range.

The prove-out report will be included as an appendix. Section 3.2.1 already describes the use of the EM-61 based on the results of a geophysical prove-out.

3.2.1 Geonics® EM-61 TDMD

The majority of the data acquired at SEDA were collected using a Geonics® EM-61 TDMD. This instrument was chosen based on the results of the Geophysical Prove-out Survey conducted in January 2000. The EM-61 generates an electromagnetic pulse that triggers eddy currents in the subsurface. Decay of these eddy currents produces a secondary magnetic field that is monitored by a receiving coil and recorded by the attached data logger. The EM-61 instrument consists of a frame that contains both the transmitting and receiving coils, an electronics backpack, and a hand-held data logger. The transmitter and receiver electronics and controls are mounted in the backpack, which is connected to the hand-held data logger.

3. A discussion of uncertainties inherent in the investigation was not provided. For example, regardless of the resources expended on an investigation, it is impossible to identify 100 percent of OE on a range. The text should discuss the uncertainties associated with this investigation. The discussion should include measures taken to reduce uncertainties, such as grid investigation strategy. In addition, if the risk was deemed acceptable, the text should state the rationale for this decision.

Response to EPA: A brief discussion of the uncertainties inherent in any geophysical investigation is included in Section 7.2.1.4. A more detailed description of the rationale behind declaring SEAD-53, Indian Creek, and the Demo Range as NFA is included in Section 8.1.2.

7.2.1.4 Geophysical equipment cannot usually distinguish OE items from other metallic objects located below the surface. "Cultural interference," such as underground utility lines, construction debris, or metal bearing rock, can produce a signature to the equipment similar to OE. Therefore, it is necessary for the geophysical survey team to carefully document any known cultural interference prior to beginning the survey. Another limitation to the equipment is that metallic objects have to be larger when at greater depths so that the geophysical equipment can obtain a reading. Due to these limitations, no geophysical equipment will detect every buried OE item on a site. However, no equipment or process can, at present, be guaranteed to detect and remove 100 percent of OE on a site. The use of geophysical equipment and surveys has proven to be one of the most cost effective methods currently available to detect subsurface OE.

8.1.2 No OE was recovered from three sites investigated during the EE/CA - the SEAD-53 ditches, the Demo Range, and Indian Creek. As stated in Section 7.2.1.4, no method currently available can guarantee that OE is not present on a site. However, due to the lack of any detected OE combined with a lack of any substantive proof that these areas were ever used for OE burial or disposal, SEAD-53 and Indian Creek are being considered NFA sites. Most of the Demo Range is also being considered NFA for the same reasons. Due to its proximity to SEAD-57, however, a part of the Demo Range will be included in the response action for that AOI. No other response alternatives will be evaluated for these three sites.

Section 3.1 describes the grid investigation strategy, Section 3.3 describes instrument QC, and Section 3.7.1.6 describes the QC of the intrusive investigation. All of these procedures were performed to reduce investigation uncertainties.

Applicable portions of Section 3.1 included in response to comment #2.

3.3 Instrument Check

Prior to beginning each grid, the geophysical survey teams checked the EM-61 and G-858 instruments against a baseline to ensure that the equipment was operating properly. Metal spikes were driven into the ground to a prescribed depth, generally on the first line of the grid (line 0). At least 100 feet of the line was then collected in a check file. The manually operated EM-61 or G-858 was pulled directly over the line and the maximum spike response recorded on survey sheets and compared to initial responses (standard responses) established for each instrument. The entire grid was then collected, including the check line without the spike. Finally, after completion of the grid, the check line was

collected, again with the spike included. Any discrepancies were investigated to ensure that the instruments were functioning properly. Grids with failed check files were re-surveyed later in the project.

3.7.1.6 Following the intrusive investigation of a grid, a QC check was performed by the UXO QC Specialist (UXOQCS). The UXOQCS re-investigated 10% of the anomalies that had been dug to ensure that the identified anomalies had been found during the intrusive investigation. Many of the grids investigated were also re-checked using the instrument that had collected the geophysical data. Ten percent of each grid included in this QC check was resurveyed with the EM-61. Anomalies identified in the QC survey were compared to anomalies identified in the original survey. Any QC anomalies that could not be matched to original anomalies or could be matched anomalies that should have been removed were intrusively investigated.

4. A detailed description of various land features that could affect unexploded ordnance (UXO)/OE disposition was not provided. The following items should be added to the text and/or figures, and their affect on the disposition of UXO/OE should be discussed:

- Background levels of ferrous metals in soil;
- Location, composition, and depth of bedrock;
- Location of frost line;
- Soil type and moisture content;
- Depth and movement of ground and surface water;
- Location of surface water, floodplains, and wetlands;
- Depth of sediments in wetlands, ponds, and other flooded areas; and
- Topography and vegetative cover.

Response to EPA: Paragraph 2.2.2.2 of the report discusses for each area the land features that may affect OE disposition. Depth of bedrock and location of frostline have been added in Section 2.2.2.2.1. Background levels of ferrous material are also discussed in relation to the geophysical testing. Issues related to groundwater movement are HTRW concerns and not directly related to OE characterization

2.2.2.2.1 Geologic Characteristics – All 11 Sites

Characteristics specific to each site, such as topography and vegetation, are described below. However, the geologic characteristics of the 11 sites are fairly similar. As described in Section 2.2.1, the shale bedrock at SEDA is overlain by highly weathered shale and glacial till. Soil borings conducted during previous investigations at a number of the areas included in the OE EE/CA show that the till is typically 5 to 10 feet deep, with only 1 to 2 feet of weathered shale below. None of the components of the till are particularly iron rich, and the effects of

native soil on geophysical instruments is minimal. Finally, frost depths in New York State can reach to 4 feet, meaning that frost heaving of any OE remaining in the ground is a concern at all of the sites discussed below.

5. The effect of standing water on the geophysical investigation was not stated. It is unclear whether geophysical investigations were performed in wet areas. The text should state whether geophysical investigations were performed in wet areas. If wet areas were avoided, the location of these areas should be included in the figures in Section 3, and a reason should be provided. In addition, the text should provide an analysis of technologies that can detect UXO/OE in these areas.

Response to EPA: The only AOI where a wet area prevented the collection of geophysical data was EOD #2. Section 2.2.2.2.8 states that much of the area delineated as EOD #2 has been flooded and is called the "duck pond".

2.2.2.2.9 EOD Area #2

A 1963 aerial photo shows EOD Area #2 as a small open area approximately ½-mile to the west of EOD Area #3. Since this photo was taken, the area has been flooded and has become known as the "duck pond" (Figure 2.2). Originally, the area was rumored to be an EOD range where explosive devices were used. Subsequent to the flooding of the area it has been rumored that non-explosive metal projectiles were thrown into the water. Based on comparison of the 1963 aerial photograph with a 1991 photograph, the area occupied by EOD Area #2 should actually be to the northwest of the position indicated in the ASR. This revised location was the one surveyed during the EE/CA fieldwork.

The duck ponds are wetlands created by the Army as habitat improvement in the late 1970's. The duck ponds are state and EPA regulated wetlands. Section 3.8.7.1 states that standing water prevented the collection of geophysical data, and Figures 3.17 to 3.19 (Appendix A of this document) show the location of the "duck pond". No current technology, past the draining of the pond, is currently available to detect OE in this area. The State has not taken a stand on draining the pond.

3.8.7.1 Approximately 10, 100-foot by 100-foot grids were surveyed in EOD Area #2 using the EM-61 (Figure 3.17). This acreage represents 46% of the 5-acre AOI. Dense woods and standing water prevented complete geophysical coverage of EOD Area #2. A total of 89 anomalies were identified in the area surveyed, all of which were investigated. Forty-three (48.3%) of the anomalies were designated as "false positives". Due to the thick woods present in this area, grids surveyed were cleared with the Hydro-Ax prior to the geophysical investigation. As stated in Paragraph 3.7.1.3, brush-cutting activities typically contributed to the large number of "false positives" in some areas. The large, linear anomalies seen in this area were not intrusively investigated; however, all of them either

connect to each other or lead to a fire hydrant that was present in this area. It is assumed that they are underground water lines.

6. The Engineering Evaluation/Cost Analysis (EE/CA) does not include a general schedule for the removal. The schedule should include the estimated start and completion times.

Response to EPA: A schedule for removal will not be developed until after an Action Memorandum has been approved.

SPECIFIC COMMENTS

1. **Section 2.2.2.2, pages 2-2 through 2-5.** This section provides a summary of activities that occurred at the various AOIs. This section should be revised to reflect a valid Conceptual Site Model (CSM) that includes the criteria that were used to make decisions on whether an area was to be investigated further. The CSM should include all the hypotheses for each area and the proper boundary delineations and the uncertainty associated with this determinations, a graphical representation, table listing the ordnance related activity, the primary source of the expected contamination, etc., and should include a full narrative of each area.

Response to EPA: Conceptual Site Models have been developed and are included in Appendix A of this document.

2. **Section 2.2.2.2.2, page 2-3.** The description for SEAD-44A (QA Function Area) indicates that 40mm rifle-fired grenades were tested in this area. The description of this area does not mention a range or burial area associated with this area. The grenades were tested by firing; therefore, a range is likely present. In addition, burial areas are generally associated with these areas because of the nature of testing. The text should indicate efforts to locate these areas.

Response to EPA: The site has been remediated for UXO/OE IAW DOD procedures and is being transferred for unrestricted use. The removal (EODT, 2000;Weston, 2001-2002) included the stripping and sifting of one foot of soil off the presumed site, followed by geophysical verification sampling of the acreage and some periphery. Such sampling has the capability to locate burial areas and additional extent of the site (if present).

3.8.8.1 Approximately 60, 100-foot by 100-foot grids were surveyed using the EM-61 (Figure 3.20). This acreage represents 55% of the 25 acres inside the fence surrounding the AOI. The 55% of the area surveyed was skewed to the northern half of the site, which was where any former range present at the site

would have been located. The rest of the area surveyed would have been outside or on the boundaries of the 15 acre site described in the ASR.

3. **Section 2.2.2.2.8, page 2-4.** The text states that based on a comparison of aerial photographs, the area occupied by EOD #2 should actually be to the northwest of the position indicated by the Archive Search report. It is unclear which area was investigated. The text should clarify that the correct area was investigated for the EE/CA.

Response to EPA: The text has been revised accordingly – revisions have moved the description of EOD #2 to Section 2.2.2.2.9.

2.2.2.2.9 EOD Area #2

A 1963 aerial photo shows EOD Area #2 as a small open area approximately ½-mile to the west of EOD Area #3. Since this photo was taken, the area has been flooded and has become known as the "duck pond" (Figure 2.2). Originally, the area was rumored to be an EOD range where explosive devices were used. Subsequent to the flooding of the area it has been rumored that non-explosive metal projectiles were thrown into the water. Based on comparison of the 1963 aerial photograph with a 1991 photograph, the area occupied by EOD Area #2 should actually be to the northwest of the position indicated in the ASR. This revised location was the one surveyed during the EE/CA fieldwork.

4. **Section 2.7.7, page 2-9.** This section states that SEAD-43 was declared a No Defense Action Indicated (NDAI) site. This terminology is not appropriate. This term only applies, under USACE policy (versus DoD policy) to Formerly Used Defense Sites (FUDS). This is a Base Realignment and Closure (BRAC) site, and therefore this term does not apply and should be revised to the proper CERCLA terminology.

Response to EPA – Agree. The term "No Defense Action Indicated" and the acronym "NDAI" shall be replaced throughout the EE/CA Report with the term "No Further Action" and the acronym "NFA", respectively, when the report text refers to a Base Realignment and Closure (BRAC) site. It has also been stated that these sites will no longer be considered ordnance sites based on this classification. The one exception will be at SEAD-43, which was declared an "NDAI" by CEHNC personnel in a memo dated April of 2000. Section 2.2.2.2 has been amended to state the following:

The last area, the Liquid Propellant Storage Area (SEAD-43) was declared a No DOD Action Indicated (NDAI) site in a memorandum by the Director of the Huntsville Corps of Engineers Ordnance and Explosive Team based on the results of a 1999 investigation.

Section 7 required widespread changes of NDAI to NFA, therefore, the entire section is included as Appendix B of this document. The following sections have also had NDAI changed to NFA:

8.1.2 It was rumored that SEAD-53 ditches and Indian Creek were used for OE burial, disposal, and/or other OE-related activities, although no substantive proof of these rumors has been found. Nonetheless, EE/CA sampling was performed in these areas. During sampling, no OE or OE-related scrap was recovered from these sites. Therefore, NFA is the recommendation for SEAD-53 and Indian Creek. No other response alternatives will be evaluated for these sites, and it is recommended that these areas no longer be under consideration as ordnance sites. There was also no OE or OE-related scrap recovered at the Demo Range during the EE/CA. However, due to its proximity to SEAD-57, a part of the Demo Range will be included in the response action for SEAD-57. Based on the results of the previous chapter, the remaining response alternatives for the areas where OE was recovered include:

9.2.1 INSTITUTIONAL CONTROLS

Institutional controls were not chosen for any of the individual AOIs. However, base wide controls should be implemented in order to properly educate the public about the potential residual hazards of OE that may exist on site. The Institutional Controls recommended in Section 5 are the ones that should be considered for implementation, and Appendix F analyses the effectiveness of all the institutional controls considered for SEDA. Although the Demo Range, the ditches in SEAD-53, and the rumored Indian Creek Burial area have been considered NFA sites, the base-wide Institutional Controls will cover these areas as well.

5. **Section 2.8, page 2-9.** This section indicates that previous removal actions occurred at SEAD-44A and SEAD-23. Additional information on these investigations should be provided. A brief description of the removal and the findings should be provided in the text.

Response to EPA: This EE/CA provides the results of sampling and the conclusions drawn at various sites. Subsequent removal results completed at the SEAD-44A and OB Grounds sites will be provided as part of their respective completion reports.

6. **Section 3.1.3, page 3-2.** This section provides information on the meandering path surveys. More information on the methodology for this type of survey is required, such as path spacing and how the spacing was determined. More detail should be added to this section.

Response to EPA: More detail of the methodology behind the meandering path surveys has been added.

Please see response to General Comment #2 for added meandering path detail

7. **Section 3.6, page 3-4.** This section provides a general, qualitative description of the anomaly reacquisition process. In order to assess the uncertainty associated with this aspect of the investigation, the following information should be provided:

- The search radius used by the reacquisition team around the anomaly waypoint provided by the geophysical analyst, including an indication of whether this radius was increased for the meandering path (single transect) investigations; and
- A quantification of the term "close agreement" in the statement "...or if the response of the EM-61 over the pin-flag was not in close agreement with the geophysicist's pick...".

Response to EPA: Section 3.6 has been amended as suggested.

If the anomaly had not been found with the Schonstedt® or Foerster® or if the response of the EM-61 over the pin-flag was not within approximately 80 percent of the signal response of the geophysicist's pick, an attempt was made to find the anomaly with the EM-61 or G-858. A radius of approximately 6 feet from the flagged location was surveyed in two perpendicular directions. If the corresponding anomaly was found with either of these instruments, the pin-flag was moved to what was assumed to be the correct location.

3.7.1.2 ...If again no anomaly was identified, the location was assumed to be a "false positive"; however, 10% of the "false positives" were excavated to 18 inches and re-checked using the Schonstedt® and Foerster for QC purposes. No OE was ever found in locations where "false-positive" digs were performed.

8. **Section 3.7.2, page 3-7.** The text does not indicate whether holes were "cleared" after removal of the suspected anomaly source (i.e. whether a geophysical detection device was used to determine whether the first metal item recovered in an excavation was in fact the only source of the anomalous response of the original geophysical survey). The text should indicate whether and how this procedure was applied to the intrusive investigation process.

Response to EPA: Section 3.7.2 has been amended as suggested. Section 3.7.16 has also been changed to discuss the QC of the intrusive investigations.

3.7.1.6 Following the intrusive investigation of a grid, a QC check was performed by the UXO QC Specialist (UXOQCS). The UXOQCS re-investigated 10% of the anomalies that had been dug to ensure that the identified anomalies had been found during the intrusive investigation. Many of the grids investigated were also re-checked using the instrument that had collected the geophysical data. Ten percent of each grid included in this QC check was resurveyed with the EM-61. Anomalies identified in the QC survey were compared to anomalies identified in the original survey. Any QC anomalies that could not be matched to original anomalies or could be matched anomalies that should have been removed were intrusively investigated.

3.7.2 Intrusive Excavation

Geophysical data was evaluated by the Site Geophysicist and the anomalies were selected for intrusive investigation. Anomaly Dig Sheets were prepared and provided to the reacquisition teams with location coordinates. The reacquisition teams flagged the individual anomaly locations in the field. Intrusive investigation teams, comprised of qualified UXO personnel, subsequently excavated the flagged anomalies and documented the findings. Each anomaly was treated as a suspect UXO until it was determined otherwise. Following the identification and removal of the item, the excavation area was re-checked with a Schonstedt® magnetometer to ensure that all anomalous material had been removed. Once a hole was cleared, it was backfilled and restored to its original pre-intrusive condition. All excavated material was segregated and stored onsite pending disposal via a local scrap metal dealer. All UXO discovered within the AOIs was disposed of following protocol outlined in the approved WP.

9. **Section 3.7.4, page 3-8.** This section describes the results of the investigation in SEAD-45. This section fails to describe the 250-pound bomb (anomaly ID 45L11-11) that was recovered in this area. This section should be checked for completeness against the tables in Appendix C. This section should also indicate whether the items recovered during the investigation reflect the items expected from the archive search report.

Response to EPA: A section has been added to Section 3.7.4 describing the discovery of the bomb bodies.

3.7.4.18 250lb Bomb

Three concrete-filled 250lb bomb bodies were recovered from SEAD-45. There was nothing inherently dangerous about the bodies themselves; so, due to the extreme weight of these objects, they were left in place.

Section 3.7.4.1.1 now says that the source for the activities that took place at the Depot was the ASR. As previously stated in that section, the items found

at SEAD-46 were somewhat inconsistent with the activities reported in the ASR.

3.7.4.1.1 A variety of OE-related items were recovered during the EE/CA investigation of SEDA. A complete list of these items can be found in Appendix C. As SEDA was an ammunition storage depot, a large variety of ordnance was stored there over the years. None of the items recovered during the project were inconsistent with the activities that took place at the Depot as reported in the ASR. However, a number of items found in SEAD-46 were somewhat inconsistent with the activities that were reported to have taken place in that AOI. This fact will be addressed further in the discussion of the OE recovered from SEAD-46 (Section 3.9.8).

10. **Section 3.8.6, page 3-13.** This section provides information on the investigation conducted at EOD Area #3. Text on page 2-5 indicates that an ordnance disposal pit and ditch were present at the site. The pit is visible on Figure 3.15, and was not geophysically investigated, adding to the uncertainty associated with the response action. Efforts to investigate the pit and ditch at this site should be discussed in the text. In addition, these features should be labeled on Figures 3.15 and 3.16. These areas should be investigated if they can be located.

Response to EPA: There is only one feature in this area, which had been referred to as both a pit and a ditch in Section 2. Section 2.2.2.2.9 has been revised to refer to the area in question as a pit in all instances.

2.2.2.2.9 EOD Area #2

A 1963 aerial photo shows EOD Area #2 as a small open area approximately ½-mile to the west of EOD Area #3. Since this photo was taken, the area has been flooded and has become known as the "duck pond" (Figure 2.2). Originally, the area was rumored to be an EOD range where explosive devices were used. Subsequent to the flooding of the area it has been rumored that non-explosive metal projectiles were thrown into the water. Based on comparison of the 1963 aerial photograph with a 1991 photograph, the area occupied by EOD Area #2 should actually be to the northwest of the position indicated in the ASR. This revised location was the one surveyed during the EE/CA fieldwork.

Section 3.8.6 has been amended to say that the pit was located in the area that could not be surveyed due to thick woods/brush. In part because of this, the proposed response action at EOD #3 is a clearance to depth. Included in the estimated cost for this response action (page G-3) is the heavy brush cutting necessary to investigate the remainder of this AOI. The only more extensive response action would be a scrape and sift. It is highly unlikely that such a process would be necessary in this area judging by the scarcity of OE surrounding the suspected pit.

3.8.6.1 Sixteen 100-foot by 100-foot grids were surveyed in EOD Area #3 using the EM-61 (Figure 3.15). This acreage represents 80% of the 5-acre AOI. Four grids in this area, including the actual location of the suspected disposal pit, were not surveyed due to thick woods that could not be cleared using the brush cutting tools available.

The suspected disposal pit has been labeled on Figures 3.15 and 3.16. The figures are included in Appendix A.

11. **Section 3.8.8.2, page 3-15.** This section states that the soil that was scraped off of SEAD-44A was mechanically sifted to remove all UXO and OE, and the soil was replaced. Other sections of the report indicate that this soil was stockpiled and has not been sifted. This inconsistency should be corrected. If the soil had been sifted to remove UXO and OE, the results of the sifting, including quantities of UXO and OE, should be provided in the text. In addition, the area that was scraped should be clearly shown on Figures 3.20 through 3.22

This section also provides the amount of UXO and OE found below the scraped area. OE depths are provided. It is unclear whether the depths provided are below the one-foot scrape or below the original ground surface. This should be clarified in the text and Appendix C.

Response to EPA: Parsons has no accurate survey data indicating what was and was not scraped inside the fenced area of SEAD-44A. The text has been revised to indicate that stockpiled dirt was still present when Parsons finished fieldwork. It also now indicates that all recovery depths are below the scraped surface.

3.8.8.2 Geophysical data were collected in SEAD-44A immediately after 1-foot of soil was scraped off of sections of the AOI. Geophysical anomalies were intrusively investigated in an effort to remove any possible UXO below the foot of soil that had been scraped off. In portions of the site, the sifted soil was replaced after all geophysical anomalies were investigated. However, at the time of completion of the EE/CA fieldwork, large piles of scraped soil were still present on site needing to be sifted.

12. **Section 3.8.9, page 3-15.** This section describes the investigation for SEAD-46. Text on page 2-4 indicates that rockets were fired into a berm in this area. The text does not mention this berm, and Figure 3.23 indicates that the berm was not investigated geophysically. The text should clarify whether the berm was investigated. If it was not investigated, specific reference to the berm and expected overshot areas should be included in Section 9.

Response to EPA: The text in Section 3 clarifies that the berm was not investigated, and a paragraph has been added to Section 9.2.3, stating that the response action for SEAD-46 will include the investigation of the berm. It was known that ordnance was fired into the berm, therefore, the EE/CA focused on delineating the area surrounding the berm to determine the extent of OE contamination.

3.8.9.3 Although the ASR described this AOI as a 3.5" Rocket Range, no rockets or rocket motors were found during the EE/CA investigation. While the suspected target berm was not investigated due to the thick brush covering it, the lack of any rockets or rocket parts in the immediate vicinity suggests that it is unlikely that the predominant use of this AOI was as a rocket range. None of the OE pieces recovered during the project (fuzes, 40mm rifle grenades, flares, a CS grenade, a cluster bomb, and a mortar shell) were related to 3.5" rockets.

13. **Section 3.8.12, page 3-16.** This section describes the investigation for SEAD-57. Text on page 2-4 indicates that shot holes were present in this area. The text on page 3-16 does not mention the shot holes. The text should clarify whether the shot holes were present and whether they were investigated.

Response to EPA: The text now reflects that the shot holes were surveyed.

3.8.12.1 Sixty-one 100-foot by 100-foot grids were surveyed in SEAD-57 using the EM-61 (Figure 3.29). These grids included both the berm and the suspected shot holes present in this area and represent 23.3% of the 60 acres contained in the AOI.

14. **Section 3.8.14.** This section states that the magnitude of buried material in SEAD-45 was large so that only the 20 highest amplitude anomalies were picked for each grid, and that after two UXO items were found in one grid, excavation of that grid ceased. It is unclear whether an estimate of the buried material present was done. This information is important to determine reasonable costs for the removal.

Response to EPA: While no formal estimate of the amount of metal in the ground was completed, the costs for the scrape and sift operation in this area are believed to be reasonable for areas with large amounts of metal underground as a result of open detonation operations. The following has been added to the response discussion in Section 9.2.4.2:

Although no formal estimate has been made as to the amount of underground metal present in the area to be scraped, the costs used for this operation were derived from the actual costs incurred during the scrape and sift operation at SEAD-23, directly adjacent to SEAD-45.

15. **Figure 3.10.** This figure provides the area investigated in the Indian Creek Burial Area. The figure does not provide an overlay of site features as on the other figures. Site features should be overlain so that the area of investigation can be clearly identified.

In addition, the northern boundary of the area of investigation is as much as 60 feet south of Indian Creek Road. Burial pits or trenches could be clustered in the area directly adjacent to the road, therefore, justification should be provided for not extending the area of investigation north to Indian Creek Road.

Response to EPA: No topographic overlay exists for this area. However, another figure (Figure 3.10A) has been added to the report. This figure, included in Appendix A of this document, shows the aerial photo with nothing overlaying it other than the outline of the area covered by a 1999 EM-31 survey. It is this survey that gives the justification for moving the survey area away from the Indian Creek road. Section 2.7.8 has also been added to the Previous Investigations section of the report. This new section gives a brief description of the EM-31 survey performed at the Indian Creek site.

2.7.8 GEOPHYSICAL INVESTIGATION AT INDIAN CREEK BURIAL AREA

In January of 1999, NAEVA Geophysics, Inc. performed an EM-31 survey over the suspected Indian Creek Burial Area. The EM-31 is an instrument used primarily to detect changes in ground conductivity. Any conductivity anomalies present in a survey may indicate the existence of a contaminant plume, trench, pit, or other excavation, or buried metal. No significant anomalies were present in the area surveyed.

16. This figure provides the area investigated in SEAD-17. Linear anomalies are present in grids 17A-3 and 17B-2. The nature of these anomalies should be explained in the text.

Response to EPA: Section 3.8.5.2 now discusses these features.

The intrusive investigation also determined that the linear anomaly seen trending NW to SE across grids 17A-3 and 17B-2 in Figure 3.13 is an underground water line.

17. This figure provides the area investigated in EOD Area #2. Two linear anomalies are present on this figure. The nature of these anomalies should be explained in the text.

Response to EPA: The anomalies have been explained in Section 3.8.7.1.

The large, linear anomalies seen in this area were not intrusively investigated; however, all of them either connect to each other or lead to a fire hydrant that was present in this area. It is assumed that they are underground water lines.

18. **Figures 3.24 and 3.25.** These figures provide the location of UXO and OE items recovered in SEAD-46. The majority of UXO and OE items were recovered in the southern portion of the area investigated. Three UXO and seven OE items were recovered from grids along the southern boundary of the area investigated. Therefore, the southern boundary of this area was not fully characterized. Based on this information, the area of removal should be extended further south of the area investigated.

Response to EPA: The removal action proposed for SEAD-46 had extra acreage built into it for this reason. This is now stated in Section 9.

9.2.3.2 In both EOD Area #3 and SEAD-46, major features were not surveyed due to a lack of suitable brush cutting equipment and man power. In EOD Area #3, thick brush and trees prevented the investigation of the suspected disposal pit; and the suspected target berm in SEAD-46 was not investigated for the same reason. The response actions suggested for these two areas (Figures 9.3 and 9.4) take brush-clearing considerations into account and will allow for the complete investigation of these features. The response action for SEAD-46 also calls for 39 acres to be surveyed, which is in addition to work already competed. It should be noted that the total area surveyed will be larger than what was originally assumed to be the extent of this area (40 acres) and that this proposed area covers un-surveyed land to the south of EOD Area #3. It is believed that this extra acreage will be sufficient to define and clear the southern boundary of the AOI.

19. **Figures 3.27 and 3.28.** These figures provide the location of the UXO and OE items recovered in the grenade range. One UXO and twenty-one OE items were recovered from grids along the northern boundary or the area investigated, while twenty-three OE items were recovered from grids bordering the eastern boundary. Therefore, the northern boundary and eastern boundary of this area was not fully characterized. Based on this information, the area of removal should be extended further north and east of the area investigated.

Response to EPA: Section 9.2.3.4 (formerly 9.2.3.3) already stated that this would be done.

9.2.3.4 At the Grenade Range, the recommended alternative also includes the clearance to 6 inches of 19 acres surrounding the Grenade Range (Figure 9.6). This recommendation is based on the occurrence of OE within grids on the edge of the Grenade Range. A clearance to 6 inches will alleviate any OE concerns in this area, and will reduce the need for brush clearance in the heavily wooded areas beyond the Grenade Range. Unlike previously discussed areas, all of the grids surveyed during the EE/CA fieldwork will be re-surveyed, as most contained at least some anomalies that were not investigated intrusively.

20. **Figure 3.29.** This figure provides the geophysical results for SEAD-57. The meandering path investigation that was conducted for this area appears to extend north of this figure. If the primary objective of this investigation was another area, this area should be labeled on the figure; otherwise, the entire meandering path investigation should be shown on Figures 3.29, 3.30, and 3.31.

Response to EPA: The entire length of the meandering path survey is now shown on Figure 3.29 (Appendix A of this document). No applicable data (OE or UXO locations) is missing from the other two figures, and they have not been changed.

In addition, linear anomalies are present in grids 57E-17 (adjacent to an access road) and 57K-17. These anomalies should be explained in the text.

Response to EPA: The anomalies have been explained in Section 3.8.12.1.

The large, linear anomalies seen away from the berm in this area (grids E-17 and K-17) were not intrusively investigated. However, it is apparent that they are due to a large, reinforced concrete bunker (E-17) and a utility line; most likely an electric line (K-17).

21. **Figure 3.32.** This figure provides the investigation area for SEAD-45, which includes a 1,800-foot radius around the demolition berm to the north and west. The text should explain why the investigation radius was not extended to completely surround the berm.

Response to EPA: Section 3.8.15.1 has been amended to describe the reasons that data were not collected to the east or south of the grids in SEAD-45.

3.8.15.1 Approximately 3.5 acres of meandering path data were collected in SEAD-45 using the EM-61 (Figure 3.32). This data was all collected to the west and north of the grids surveyed in SEAD-45. Due to extremely thick brush and forest to the east of the gridded area of SEAD-45 no meandering path data were collected in this direction. No data were collected to the south of the grids as that

area, SEAD-23 (the Open Burning grounds), was already undergoing an OE removal action.

22. **Section 4, page 4-1.** This section provides the qualitative risk assessment performed for the EE/CA. This section should be re-titled as "Ordnance and Explosive Risk Management" instead of the current title of "Risk Assessment", because there is no approved risk assessment methodology within DoD, nor has one been proposed for DoD-wide use by any outside agency. Re-titling this section to a less "policy type title" will lend itself to a better overall acceptance and general consensus because this section should provide an "Ordnance and Explosive Safety Hazard Assessment (ESHA)" with factors for land use etc., that will be used in a "Risk Management Decision." This technique has been used and proposed for other sites. Additionally, the term "risk" should be verified when used in this section to ensure that it contextually involves a "management decision point." This section should also reference the critical data elements that were used and the Data Quality Objectives for determinations of the various variables.

Response to EPA: Disagree. The methodology and terminology used on this project is approved by USACE.

23. **Section 4, page 4-1.** The terms UXO and OE are being used indiscriminately within this section. It should be reviewed to verify that the correct terminology is being used in the correct context. OE includes all ordnance, unexploded ordnance and explosive residue: whereas, UXO only includes ordnance that has been "primed, armed, fuzed, employed and has failed to function as designated." Conversely, at SEAD-45 (Open Detonation Area), the UXO definition may only include ordnance that has "undergone unsuccessful demilitarization" and the status of the fuzing (armed/unarmed) can no longer be determined.

Additionally, there is no discussion or assessment of the hazards of explosive residues that do pose a long-term problem as opposed to the immediate problem that UXO poses. This discussion should be provided in the text.

Response to EPA: All references to UXO and OE have been reviewed to ensure that they are being used in the context defined by CEHNC during the course of this project. The purpose of the OE EE/CA is to evaluate OE, and did not include discussion or assessment of the hazards of explosive residues potentially posing a long-term problem.

24. **Section 4.2.2.4, page 4-3.** This section describes the UXO density risk assessment factor. The methodology used to define "density" should be explicitly defined because the only DoD/USACE density calculations are based on an

assumption of "homogeneity" in a given area of concern (AOC). This assumption has been shown by EPA's Risk Methodology Lab (Las Vegas) not to be valid, and DoD has not been able to produce any site where "homogeneity" has been conclusively shown. Ordnance and UXO are, by the nature of their deployment, heterogeneous. The potential for recovering OE should be explained by way of a valid CSM.

Response to EPA: Disagree. The methodology used for this project has successfully undergone peer testing and been approved by USACE. See also response to Specific Comment 1.

25. **Table 4.2, page 4-2.** This table provides OE sensitivity definitions. This table should be revised to include a more accurate definition of the explosive safety hazards associated with all OE on the site. This table should conform to standard safety forms found in MIL-STD-882d. This table could then be expanded to a proper OE depth matrix with valid depth profiles to include the "frost heave" of the area, the proper clearance depth (based on DoD 6055.9, Chapter 12 table on clearance depths as adjusted with valid rationale to site specific conditions) and tied to land use and the proper level of activity of the area.

Response to EPA: Disagree. The current approved USACE procedure was used for this risk assessment.

26. **Section 4.2.3, page 4-3.** This section provides risk assessment factors associated with site characteristics. This section should be revised to implicitly delineate how determinations were made on accessibility. In addition, the section should include categories of engineering controls that will have to be maintained versus environmental controls.

Response to EPA: The accessibility determination factors are now discussed in Section 4.3.7.

4.3.7 SITE ACCESSIBILITY

Access to nine of the 11 AOIs at Seneca Army Depot are considered unlimited or unrestricted under the site accessibility risk factor definitions shown in Table 4.3. The accessibilities were based on the intended future use of most of the site land as a public conservation park. If the base fences are opened or removed to allow the public unrestricted movement across park land, there are few natural barriers which would prevent access to any of the sites. In fact, roads currently pass through or immediately adjacent to all of the AOIs currently planned for use as conservation land. Only two sites of the original 11 AOIs are planned to have limited restriction due to their intended use by private parties. Seads-16 and –17 are intended for industrial use, although it is unclear at present exactly what form

this use will take; and SEAD-44A has been transferred to the prison and is entirely within the boundaries of at least one fence.

Section 5 and Appendix F, the Institutional Analysis, discuss in detail the engineering controls assumed for this site including the associated costs and effectiveness of those controls. Please refer to these sections in the copy previously provided.

27. Section 4.3.3, page 4-5. This section states that all UXO contained standard fuzing and the ordnance sensitivity level in all AOIs with UXO is considered Category 2. Table 4.6 indicates that Category 3 (higher sensitivity) UXO items were recovered in SEAD-45, SEAD-46, and SEAD-57. This inconsistency should be corrected in the text, in Table 4.6, and Table 4.7.

Additional information on what fuzing was stored and used at SEDA is required. This information should include all of the 29 types of fuzes in the inventory and the types of weapons systems with which they were used.

Response to EPA: All references to category types have been removed throughout this section. The substituted terms should clarify that all OE and UXO recovered during the project contained standard (less sensitive) fuzing. The updated Section 4 is contained in Appendix C of this document.

28. Section 4.3.5, page 4-5. This section discusses OE depth. This section should include a valid depth matrix that also should relate to a valid geophysical prove-out and geophysical process validation of the selected geophysical instrument. This should also be referenced to the graphical and pictorial representation of the valid CSM for the site.

Response to EPA: Disagree. The current approved USACE procedure was used for this risk assessment.

29. Table 4.6, page 4.6. This table indicates that the most sensitive ordnance item in SEAD-44A was identified as a 40mm grenade 6g high explosive (HE) spotting charge, but does not provide the nomenclature of the item recovered. The item description implies that it was a training round with an RDX spotting charge, but without explicit nomenclature the hazard severity category cannot be readily determined because 40mm grenades normally contain an "all ways acting fuze". To date, no one with adequate and appropriate knowledge of ordnance would identify this as standard fuzing. The text should be revised.

Response to EPA: A few types of training rounds were found at SEAD 44A. All are included in the description of the 40-MM currently contained on page

3-24, including the mention of the point detonating fuze. The figure is included in Appendix A of this document.

30. **Table 4.7.** This table provides a summary of the qualitative risk assessment. A summary of overall risk based on a summation of all factors was not provided. This summary should be provided to easily determine the relative risk between sites.

Response to EPA: The factors in this table are identified in the Screening Criteria as part of the Effectiveness criteria (Protection of Public Safety and the Human Environment) in Paragraph 7.5.1. They are then evaluated for each alternative in the Impact Analyses of Tables 7.1 through 7.8. Please see Section 7 in document previously provided. Section 4 is now included as Appendix C of this document.

31. **Section 5.3.2, page 5-2.** This section states that there is no current established stakeholder for any parcels that include areas investigated for this EE/CA. However, Figure 2.3 indicates that the area surrounding SEAD-43 and SEAD-44A is allocated for a prison. Therefore, the governmental body charged with building the prison is a stakeholder and should be discussed in the text throughout Section 5.

Response to EPA: The prison has been added as a stakeholder in Section 5.

5.3.2 SIGNS

Signs are typically posted to inform people that entry is prohibited or that activities within the property are restricted in some manner. Defiance of these restrictions may subject the trespasser to disciplinary legal action. Warning signs are typically one element of an overall institutional control plan that uses the concept of respect for property rights in order to limit the access of people to an OE-contaminated site. With this alternative, signs informing the public of potential dangers could be created and posted along the perimeter of each OE-impacted area to discourage entry. New York trespass laws are the key regulatory element of this alternative, along with the cooperation of the future stakeholder and those individuals who visit the property. In the absence of warning signs, simple trespass laws cannot be enforced without a civil action by the courts. Signs are only effective with the cooperation of the potentially effected individuals, together with the funding and technical support provided by the future stakeholder. At this time the federal government maintains control of the Seneca Army Depot Activity. Once the property is divested it will be the future landholder that will have the responsibility of maintaining the signs in order to ensure the future effectiveness of this alternative. Since there is currently no established stakeholder anywhere other than the current prison site, any

enforcement actions associated with trespassing on the former army depot or maintenance actions associated with any posted signs would be extremely difficult to establish at this point at many of the AOIs. The prison property, which contains SEADs-43 and –44a, is already completely fenced; and it is anticipated that the prison will keep this fence in workable condition for the foreseeable future. It is also anticipated that there will be more enforcement of trespassing restrictions on the prison property than there will be on the un-transferred portions of the depot.

5.3.3 FENCING

As with warning signs, fencing is typically one element of an overall institutional control plan that uses the concept of physical restriction and respect for property rights to ensure that the chance that an OE accident is minimized. Under this alternative, a chain link fence would be installed around each OE-impacted area to provide a physical barrier to inadvertent entry. The presence of the fencing in combination with signs would make it easier to enforce posted trespassing restrictions. Again, New York trespass laws are the key regulatory element for enforcement, along with the cooperation of the future stakeholder. The federal government currently owns the Seneca Army Depot Activity and will have to rely on the enforcement powers of the county sheriff to enforce the trespass laws at this time. The future owner would also have a responsibility to maintain the signage, fencing and enforcement of trespass regulations in order to ensure the future effectiveness of this alternative. Other than the prison, as previously discussed, there is currently no established future landowner for the base, meaning most enforcement and maintenance actions associated with fencing would be extremely difficult.

32. **Section 6, page 6-1.** This section identifies response action objectives. The scope of the response action was not clearly defined. An example scope would be OE clearance to the extent practicable. A response action scope should be clearly stated in the text.

In addition, the response action objectives are defined in this section. The objectives appear to pertain to the EE/CA investigation and not to the response action. The response action objectives should be revised to pertain to the response action. Refer to page 32 of EPA (1993) for additional guidance on preparing the response action scope and objectives.

Response to EPA: Section 6.1 has been revised as suggested.

6.1 RESPONSE ACTION OBJECTIVES

None of the AOIs within SEDA investigated as part of this EE/CA were identified as warranting an immediate (time-critical) OE response action. However, non-

time-critical OE response actions were evaluated for applicability at each of the individual AOIs. The goal of a non-time-critical OE response action is public safety, which can be achieved by reducing the explosive threat posed by the UXO that potentially remains on the property. While the overall goal of the chosen response action is assuring public safety, a number of factors must be considered to establish more specific objectives for the response action. The objectives had to take into consideration the State and Federal applicable or relevant and appropriate requirements (ARARs) identified below, while still being realistic and achievable in terms of cost. To attain the goal of reducing the explosive threat posed by the potential for UXO remaining at the AOIs within the Camp, the objectives identified had to be effective, implementable, and economical.

The objectives identified included:

- *Remove OE from each AOI to the extent practicable;*
- *Mitigate the hazard presented by any OE not removed;*
- *Provide a plan to manage OE that may pose more of a problem in the future based on changes to the physical characteristics of a site (erosion, frost heaving, etc.) or changes to the planned use of a site.*

Based on these objectives, a number of response actions were generated for evaluation at each AOI. The criteria of effectiveness, implementability, and cost were then used to evaluate the potential OE response actions in accordance with USAESCH guidance.

33. **Section 7.3, page 7-4.** This section provides a description of the response action alternatives. The description of each of the alternatives involving clearance should include the establishment of an ordnance- free "buffer" around each of the AOIs. The investigation performed for this EE/CA was not sufficient to determine the actual boundaries of the contamination within any of the AOIs.

Response to EPA: A "buffer" has already been added to areas that were deemed to need it. The size and an explanation of the necessity of each buffer are contained in Section 9.2. Section 8.4 has been revised to indicate that the cost for the buffer has already been included in the estimated costs. As each buffer zone will be dealt with in the manner as the rest of the AOI, they will not be called out in the description of the response action alternatives.

8.4 COST

Tables 8.17 through 8.24 summarize the estimated costs for each of the remaining alternatives at each site. Included in these cost estimates are any upkeep and maintenance fees, if applicable, over a 30-year period following implementation of the alternative. In addition, if the boundary of OE contamination was not

clearly defined during the EE/CA, more area has been added to the AOI in question. The amount of extra area was based on a reasonable assumption of where the boundary of contamination should occur. The cost of surveying and clearing this added area has been factored into the estimated costs.

9.2.2 CLEARANCE TO DEPTH OF 6 INCHES

The Clearance to a Depth of 6 Inches Alternative has been chosen for two areas, SEADs-16 and –17 and EOD Area #2. At both of these areas, OE was found no deeper than 6 inches below the ground surface. Therefore, it is not considered necessary to investigate any deeper than this depth. A complete investigation of the area not cleared during the EE/CA for each AOI (Figures 9.1 and 9.2) using this alternative will be sufficient to remove the majority of the OE that is present in the areas. Should any OE be discovered after the initial survey, possibly due to natural occurrences (i.e. freeze/thaw), the survey may be repeated as part of the recurring reviews.

9.2.3 CLEARANCE TO DEPTH OF DETECTION

9.2.3.1 This alternative is recommended for four of the AOIs that were investigated during the EE/CA fieldwork: EOD Area #3, SEAD-44A, SEAD-46, and the Grenade Range. At each of these areas, OE or UXO items were found below a depth of 6 inches; so a clearance to a depth of 6 inches would not be sufficient to clear the OE that may be present on site. Therefore, geophysical equipment will be used to survey all grids not cleared in the EE/CA. As stated in Section 7.8.4, the geophysical equipment typically used in these types of surveys should be able to detect most OE buried in these AOIs.

9.2.3.2 In both EOD Area #3 and SEAD-46, major features were not surveyed due to a lack of suitable brush cutting equipment and man power. In EOD Area #3, thick brush and trees prevented the investigation of the suspected disposal pit; and the suspected target berm in SEAD-46 was not investigated for the same reason. The response actions suggested for these two areas (Figures 9.3 and 9.4) take brush-clearing considerations into account and will allow for the complete investigation of these features. The response action for SEAD-46 also calls for 39 acres to be surveyed, which is in addition to work already competed. It should be noted that the total area surveyed will be larger than what was originally assumed to be the extent of this area (40 acres) and that this proposed area covers un-surveyed land to the south of EOD Area #3. It is believed that this extra acreage will be sufficient to define and clear the southern boundary of the AOI, which was not clearly delineated during the EE/CA.

9.2.3.3 It should be noted that OE clearance operations have begun in SEAD-44A. Parsons estimates that approximately 35,000 cubic yards of soil remain to be sifted, and 11 acres of follow up clearance to depth remain to be performed.

The complete response alternative for SEAD-44A (Figure 9.5) includes completion of these two tasks.

9.2.3.4 At the Grenade Range, the recommended alternative also includes the clearance to 6 inches of 19 acres surrounding the Grenade Range (Figure 9.6). This recommendation is based on the occurrence of OE within grids on the edge of the Grenade Range. A clearance to 6 inches will alleviate any OE concerns in this area, and will reduce the need for brush clearance in the heavily wooded areas beyond the Grenade Range. Unlike previously discussed areas, all of the grids surveyed during the EE/CA fieldwork will be re-surveyed, as most contained at least some anomalies that were not investigated intrusively.

9.2.4 CLEARANCE TO DEPTH BY MEANS OF EXCAVATION AND MECHANICAL SORTING

9.2.4.1 This alternative is recommended in two areas, SEAD-45 and SEAD-57. Portions of each of these AOIs contain very high concentrations of buried metal, such that individual anomalies cannot be identified in geophysical data. Therefore, it is necessary to completely excavate these areas and sift the soil in order to remove any remaining OE. Once these areas have been excavated, geophysical surveys will be conducted over the excavated portions of the site in order to remove any remaining metal. Areas beyond the excavated sectors should be cleared to depth of detection or to a depth of 6 inches.

9.2.4.2 The recommended response action in SEAD-45 includes the removal, sifting, replacement, and restoration of 255,000 cubic yards of soil. This estimate assumes excavation of 70 acres to a depth of 2 feet, as shown in red on Figure 9.7. Also, the existing demolition berm is included in the total volume of soil to be sifted. After the material is removed, the recommended response action includes 100% confirmation sampling in this area to assure the complete removal of residual OE/UXO. Outside of the excavated area, a total of 220 acres of geophysics will be performed out to a distance of 2000 feet from the Demolition Berm. This includes all of the area outside of the excavated section as very few grids were completely investigated intrusively during the EE/CA. The Clearance to Depth of 6 Inches Alternative is recommended for the 160 acres between the 2000-foot radius and 2500-foot radius from the Demolition Berm. The approximate areas over which each type of operation should be performed are shown on Figure 9.1.

9.2.4.3 Clearance to depth by means of excavation and mechanical sorting is also recommended for SEAD-57 due to high concentrations of metallic debris near the demolition berm. Parsons estimates that 12,000 cubic yards of soil would be excavated over 7 acres to a depth of 1 foot, as shown on Figure 9.8. Confirmation sampling would be required to remove residual ordnance below the depth of excavation. Clearance to depth of detection would be performed on any grids not cleared during the EE/CA that are outside of the excavated area to encompass the 41 acres of the Former EOD range that are accessible with

minimal brush cutting. Clearance to depth of 6 inches would be performed on the 20 acres of heavily wooded areas within SEAD-57.

34. **Section 7.3.4, page 7-6.** This section provides details on the clearance to depth of detection alternative. The depth of clearance should not be based on the capability of a not-yet-specified geophysical detection system, but rather on the intended future use of the area. Specifically, the required clearance depth should be determined for each AOI, based on its future use, and then a geophysical technology and/or methodology then selected to obtain this depth of clearance. The text should be revised.

Response to EPA: As explained in 7.8.4.1, the most effective geophysical instrument – most likely an EM-61 as decided in the original prove-out, would be effective in clearing OE to whatever depth was necessary. As none of the AOIs are to be surface use only, this seems to be an appropriate methodology for clearing OE in any area not saturated by metal debris.

7.8.4.1 Effectiveness: For this alternative, clearance personnel would perform a one-time OE removal to the depth of detection of the geophysical equipment chosen as ideal for the site during a geophysical prove-out. It is assumed that the geophysical instrumentation chosen for this task will detect the majority of the OE present in any of the AOIs to at least the specific depth of penetration for each item. For example, while most geophysical instruments will not detect a 20mm projectile to deeper than approximately 18", these items are not expected to be present at a depth greater than this. While larger items may penetrate farther than 18", their larger mass makes them detectable to deeper depths. The results of the EE/CA support the assumption that the OE present at SEDA is within the detection depths of commonly used geophysical equipment. As with Alternative 3, Alternative 4 would have favorably impact the overall protection of public safety and the human environment at each of the AOIs where OE was recovered (see Tables 7.1 through 7.8). Alternative 4 would be effective in both the long term and the short term.

35. **Section 7.8.1, page7-10.** This section states that the Indian Creek Burial Area, SEAD-53, and the Demo Range are designated for NFA. SEAD-53 encompasses over 6,000-acres, all of which will become conservation/recreation with unrestricted access. One ditch was investigated within this area. While there is some (small) chance that ordnance may have been dropped or abandoned along the ditch that was investigated, there is a much greater chance that ordnance may have been left in the storage igloos themselves. Additionally, if any of these igloos were used to store black powder, bulk explosives, or rocket propellant, then there is a potential for residual contamination in and around these buildings. This area has not been investigated thoroughly enough to qualify for NFA.

In addition, the Demo Range was indicated for NFA because no UXO or OE was recovered in this area. Text on page 2-4 indicates that a 75mm projectile was recovered during the investigation for the Archive Search Report. Table 3.1 indicates that 48 percent of the area within this range was investigated. Further justification for NFA should be provided for this area.

Response to EPA: Further justification has been added for the Demo Range NFA classification. This section has also been revised to include the statement that a portion of the Demo Range may be cleared as part of a response action for SEAD-57.

7.8.1 ALTERNATIVE 1: NO DOD ACTION INDICATED

Effectiveness: The NFA alternative does not have an impact on the overall protection of public safety and the human environment at the AOIs where UXO and/or OE items have been recovered (Tables 7.1 through 7.8). It will, therefore, not be considered in SEADs-16 and -17, -44A, -45, -46, -57, the Grenade Range, or EOD Areas #2 or #3. This alternative is a possibility in the three areas where no OE or UXO was recovered during the EE/CA, the Indian Creek Burial Area, SEAD-53, and the Demo Range. In addition to a lack of OE recovered, there is little more than rumor to suggest that any of these areas was actually involved in any ordnance demolition or burial. However, while the Demo Range may not have been involved in any ordnance related activities as a separate area, it is in relatively close proximity to the demo berm in SEAD-57. Any response action applied to a certain radius around this berm will include a portion of the Demo Range.

During a previous RAB meeting, it was agreed that since the ditch demonstrated "hits" during the ASR site visit, this area needed to be reinvestigated as part of the EE/CA. This was done, no OE was found and NFA was added as a recommendation. As for HTRW in the Igloos, the igloos have been certified as being explosive free. No further testing will be done.

36. **Section 9.2, page 9-1.** This section provides the recommended response actions for each AOI. Figures were provided for SEAD-45 and SEAD-57 to indicate the area of response/clearance. Figures for other AOIs were not provided. For example, SEAD-16 and SEAD-17 are proposed for clearance to 6 inches. It is unclear whether all grids will be cleared, or only the grids not cleared during the EE/CA investigation. This should be clarified in the text. Figures should be provided for each AOI indicating the area of clearance.

Response to EPA: Only grids not cleared during the EE/CA will be re-surveyed. This will be clarified in the text. Figures have been added to

Section 9 depicting the proposed for clearance at each AOI. The figures are included in Appendix A of this document.

9.2.4 CLEARANCE TO DEPTH OF 6 INCHES

The Clearance to a Depth of 6 Inches Alternative has been chosen for two areas, SEADs-16 and –17 and EOD Area #2. At both of these areas, OE was found no deeper than 6 inches below the ground surface. Therefore, it is not considered necessary to investigate any deeper than this depth. A complete investigation of the area not cleared during the EE/CA for each AOI (Figures 9.1 and 9.2) using this alternative will be sufficient to remove the majority of the OE that is present in the areas. Should any OE be discovered after the initial survey, possibly due to natural occurrences (i.e. freeze/thaw), the survey may be repeated as part of the recurring reviews.

37. **Section 9.2.1, page 9-1.** This section states that while institutional controls were not chosen for any individual AOIs, basewide institutional controls should be implemented. The components for basewide institutional controls are not provided. These controls should be provided in the text.

In addition, due to the density and aerial extent of UXO/OE items in SEAD-44A, SEAD-46, the Grenade Range, and SEAD-45, it is unlikely that these areas can be cleared sufficiently to warrant unrestricted access. Institutional controls should be implemented for these individual AOIs.

Response to EPA: A complete list of the Land Use Controls (LUCs) recommended for implementation is contained in Section 5. The Institutional Analysis (Appendix F) also covers this topic at length. Please refer to these sections in the copy previously provided.

38. **Section 9.2.2, page 9-1.** This section states that SEAD-16 will be cleared to 6 inches. Text on page 3-13 states that the area inside the fence surrounding SEAD-16 was not investigated due to cultural interference, such as drums, scrap metal, etc. The text should evaluate the detection technology for this area to determine whether the cultural interference can be eliminated of whether there is a detection technology that can reliably detect OE with the cultural interference in place. The cost estimate should also take this work into account.

Response to EPA: An estimate of the cost to clear all metallic debris from SEAD-16 is now included. Please see cost table included in Appendix D of this document.

39. **Section 9.2.3.3, page 9-2.** This section states that 19 acres surrounding the grenade range will be cleared to 6 inches based on the occurrence of OE within the grids on the edge of the grenade range. This statement can not be

substantiated because individual OE items were not differentiated as to their location for the meandering path investigation in Appendix C. Additional test or tables are required to justify the 6-inch clearance.

Response to EPA: Although they are known, the locations of each OE/UXO item found in the meandering path investigation should have no bearing on this decision, as none were found below 6 inches.

40. **Figure 9.2.** This figure provides the area for excavation and mechanical sorting for SEAD-57. Other clearance methods, including clearance to 6 inches and clearance to depth were proposed for other areas within this AOI. These areas are not shown on Figure 9.2. These areas should be added to the figure.

Response to EPA: The requested changes have been made, and the figure is included in Appendix A of this document.

41. **Appendix C, Anomaly Investigation Results.** This appendix provides a log of all UXO and OE items recovered. All anomalies, including false positives, should be represented in order to provide a more complete understanding of the past activities at the site. Also, it is not clear whether results from the "mag and flag" surveys have been included in these tables. This information should be added to the text or the Appendix.

Response to EPA: The "mag and flag" items were present. They can be easily discerned by the fact that they had no exact northings and eastings associated with them. This fact has been added to the explanation at the end of the appendix.

EXPLANATION OF ANOMALY IDs

GRIDS

Format: AOI Prefix & Grid ID – Anomaly No., e.g. 44H6-61 (SEAD-44A, Grid H6, Anomaly 61)
Note: Mag and flag anomalies have no associated northings or eastings.

MEANDERING PATH

Format: AOI Prefix & MP – Anomaly No., e.g. GRMP-7 (Grenade Range Meandering Path, Anomaly 7)

Area of Interest (AOI) Prefixes:

17 SEADs 16 & 17
44 SEAD-44A
45 SEAD-45
46 SEAD-46
57 SEAD-57
EA2 EOD AREA #2
EA3 EOD AREA #3
EM GRENADE RANGE MAG/EM COMPARISON TEST (GRIDS G7, G8, G9)
GR GRENADE RANGE

The sheer quantity of non-OE/UXO recovery anomalies listed in text form is not thought to provide the reader a more complete understanding of the past activities at the site.

APPENDIX A

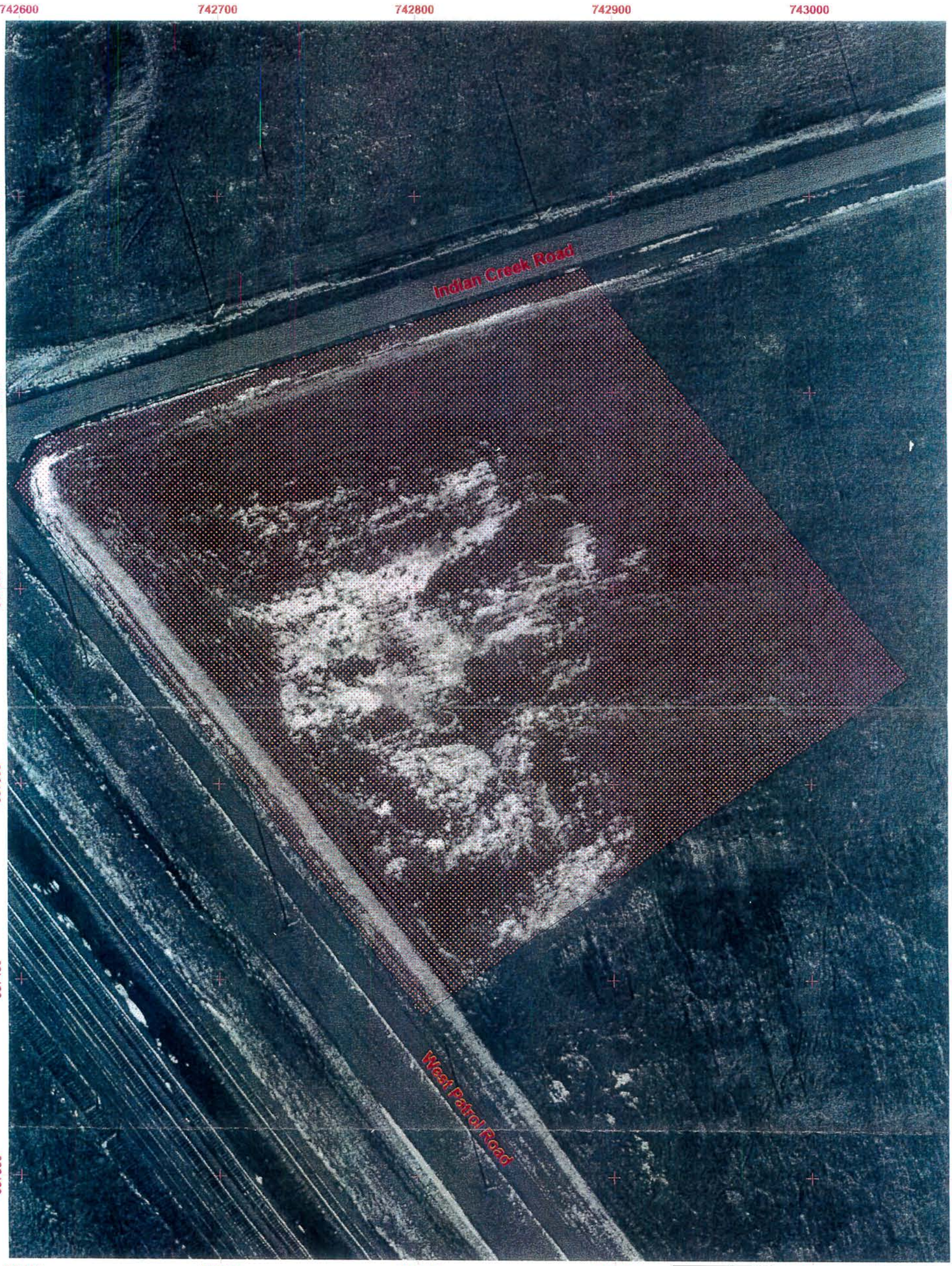
REVISED FIGURES

Conceptual Site Model
Seneca Army Depot Activity EE/CA, Romulus, NY

Site	Acreage	Site Type	Past DoD Activities	OE Related Items Found Since Closure	Post-DoD Land Use and Current Land Use	Geophysical Investigations	OE Recovered during EE/CA
1. SEAD-43 Liquid Propellant Storage Area	16	OE	Storage of liquid propellant drums, missile propellant testing, and pesticide and herbicide storage and mixing	None known	Former liquid propellant storage area. Missile propellant test lab, pesticide and herbicide storage and mixing facility. On site of state maximum security prison	None	N/A – Site no longer under consideration as an ordnance site
2. Burial Area near Indian Creek	2	OE	Reported burial of ordnance and non-ordnance	None known	Reportedly used as a burial area for any items that could not be destroyed. No current activities.	All of suspected burial area examined geophysically	M-16 magazine believed related to National Guard activities– Site no longer under consideration as an ordnance site
3. SEAD-53 Muntions Storage Area	3000	OE	Munitions storage	None known. Schostedt hits in ditched beside road.	500+ igloos were used for storage of all types of ammunition. The igloos are still present, although they are now empty.	2.9 acres of meandering path data collected along drainage ditches in the "D" row of igloos.	No OE recovered – Site no longer under consideration as an ordnance site
4. Demo Range	40	OE	Suspected demolition of projectiles	75mm projectile (split open)	Area is described as a demo range on a 1988 site map. Uncertain if "demo" stood for demolition or demonstration. Assumed demolition. No current land use.	19 acres investigated in 100' x 100' grids. 63 surveyed using EM-61, 20 surveyed using White's all metals-detector	NoOE recovered – Site no longer under consideration as an ordnance site
5. SEADs-16 and –17 Popping Plants	5	OE	The buildings at SEADs-16 and –17 were used for the deacitvation of munitions	Small arms ammunition is scattered on the ground at each of the areas	Popping plants for munition deactivation. No current use	2.5 acres of SEAD-17 investigated in 100' x 100' grid blocks. SEAD-16 not investigated due to cultural debris	Fuze, 20mm rounds – none HE, explosive, or unexpended
6. EOD Area #3	5	OE	Suspected ordnance demolition	None known.	Reportedly used as and EOD demolition area. Presently wooded - no current use.	4 acres surveyed in 100' x 100' grid blocks	40mm rifle-fired grenades (practice), slap flare, fuze lighter – all expended
7. EOD Area #2	5	OE	Reported use of explosive devices before it was covered by water. Non-explosive metal projectiles were reportedly thrown into the water after the area was flooded.	None known.	Suspected EOD demolition area before flooding. The area is now covered by water (duck pond).	2.5 acres immediately adjacent to sw corner of "duck pond" surveyed. Water prevented survey of other 2.5 acres	Fuze w/ booster, slap flares
8. SEAD-44A QA Function Test Area	4	OE	Suspected testing of fuzes	Remains of 40mm grenades, small arms, rumored live 40mm grenades	Former QA function test area. On site of state maximum security prison	13.75 acres surveyed following 1' scrape and sift of site.	40mm rifle-fired grenades (practice), slap flare – some of each live

Conceptual Site Model
Seneca Army Depot Activity EE/CA, Romulus, NY

Site	Acreage	Site Type	Past DoD Activities	OE Related Items Found Since Closure	Post-DoD Land Use and Current Land Use	Geophysical Investigations	OE Recovered during EE/CA
9. SEAD-46 3.5" Rocket Range	40	OE	Reportedly a test range for the static firing of rocket motors. What appears to be a target berm suggests rockets were fired here.	Spent rocket motors	Test area for rocket motors and/or firing range for 3.5" rockets. No current land use.	17.2 acres surveyed in 100' x 100' grid blocks.	Fuzes, 40mm rifle-fired grenades (practice – 1 HE) , MK2 grenade, 40mm flare, slap flares, 60mm HE mortar round, M83 cluster munition, CS grenade
10. Grenade Range	15	OE	40mm rifle-fired grenade practice range	Several 40mm practice projectiles	Practice grenade range. Mannequins, wooden structures, and armored vehicles used as targets are still present on the range	The 15 acres of the range closest to the targets investigated as one continuous gid block. Two acres of the remainder of the range examined using a meandering path survey.	40mm rifle-fired grenades (practice – 1 HE), 35mm subcaliber rounds – 102 unexpended
11. SEAD-57 Former EOD Range	58	OE	Demolition of ordnance, 10 lb explosive limit	Remains of flares, small arms, shot holes	Former EOD range. No current land use.	1800' radius surrounding EOD berm investigated. 14 acres in 100' x 100' grids, 3.5 acres in meandering path.	Fuzes, 20 and 30mm rounds (2 unexpended 20mm), 105mm projectile, CS grenade, slap flare, 2.36" rocket, MK2 grenade
12. SEAD-45 Open Detonation Grounds	60	OE	A number of large berms were used for the demolition of ordnance. Sizes ranged from small arms to 155mm HE and included flares and fuzes.	Various types of OE scrap and possibly live OE are scattered throughout this area	Open Demolition area. The area is no longer used, but the berms are still present and there is a large amount of OE scattered across the area.	1800' radius surrounding OD berm investigated. 14 acres in 100' x 100' grids, 1.3 acres in meandering path.	Many different types – many live. See App. C for complete list



Approximate Location of EM-31 Survey

997750 748750 Grid Coordinates (New York State Plane, Central)

50 0 50 Feet

N

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Figure 3.10A
Location of EM-31 Survey
Indian Creek Burial Area

DESIGNED BY: JEB	SCALE: 1:600	PROJECT NUMBER: 736703-01000	
DRAWN BY: JEB	DATE: JAN 2004	PAGE NUMBER:	Figure 3.10A
CHECKED BY: BJM	FILE: IN_CRK.APR		
SUBMITTED BY: SAS			

749250
749500
749750
750000
750250
1008000
1007750
1007500
1007250

East-West Baseline Road

EA3A-4 EA3B-4 EA3C-4 EA3D-4 EA3E-4
EA3A-3 EA3B-3 EA3C-3 EA3D-3 EA3E-3
EA3A-2 EA3B-2 EA3C-2 EA3D-2 EA3E-2
EA3A-1 EA3B-1 EA3C-1 EA3D-1 EA3E-1

Suspected Disposal Pit

Unnamed Road

SEAD-46
(3.5" Rocket Range)

EOD 3 Grids

997750
748750
Grid Coordinates
(New York State Plane, Central)

EM-61 Response
(mV)

6
4
2
0
-2

N

100 0 100 Feet

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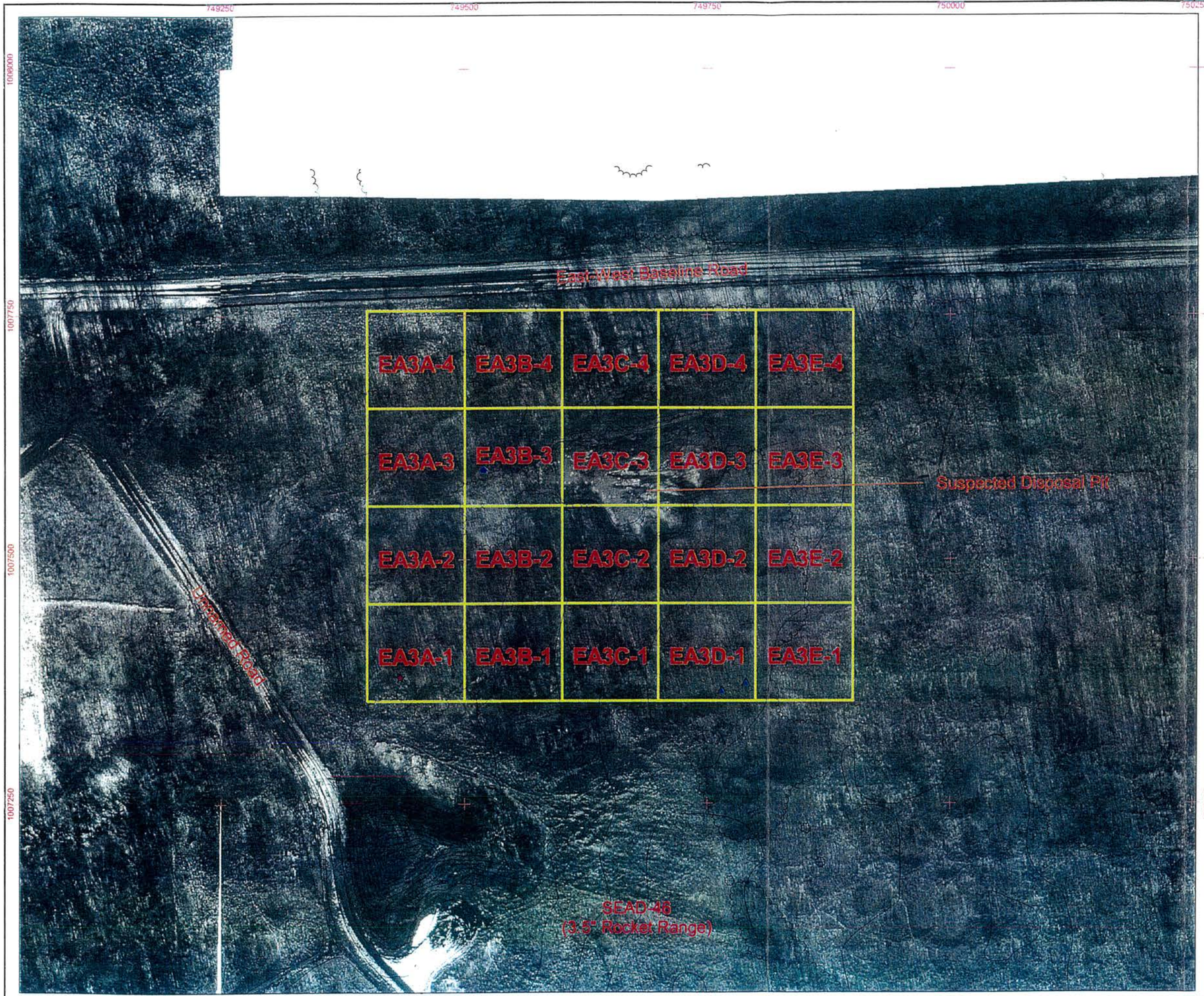
DESIGNED BY: JEB	Figure 3.15 EM-61 Data Collected in EOD Area 3		
DRAWN BY: JEB			
CHECKED BY: BJM	SCALE: 1:1200	PROJECT NUMBER: 736703-01000	
SUBMITTED BY: SAS	DATE: JAN 2004	PAGE NUMBER:	Figure 3.15
	FILE: EOD3.APR		



OE Items Recovered in EOD 3
- M2-Fuze lighter
- Rifle grenade - illum. (Expended)
- Slap Flare -(Illumination)

EOD 3 Grids

997750 748750 Grid Coordinates
(New York State Plane, Central)

N

100 0 100 Feet

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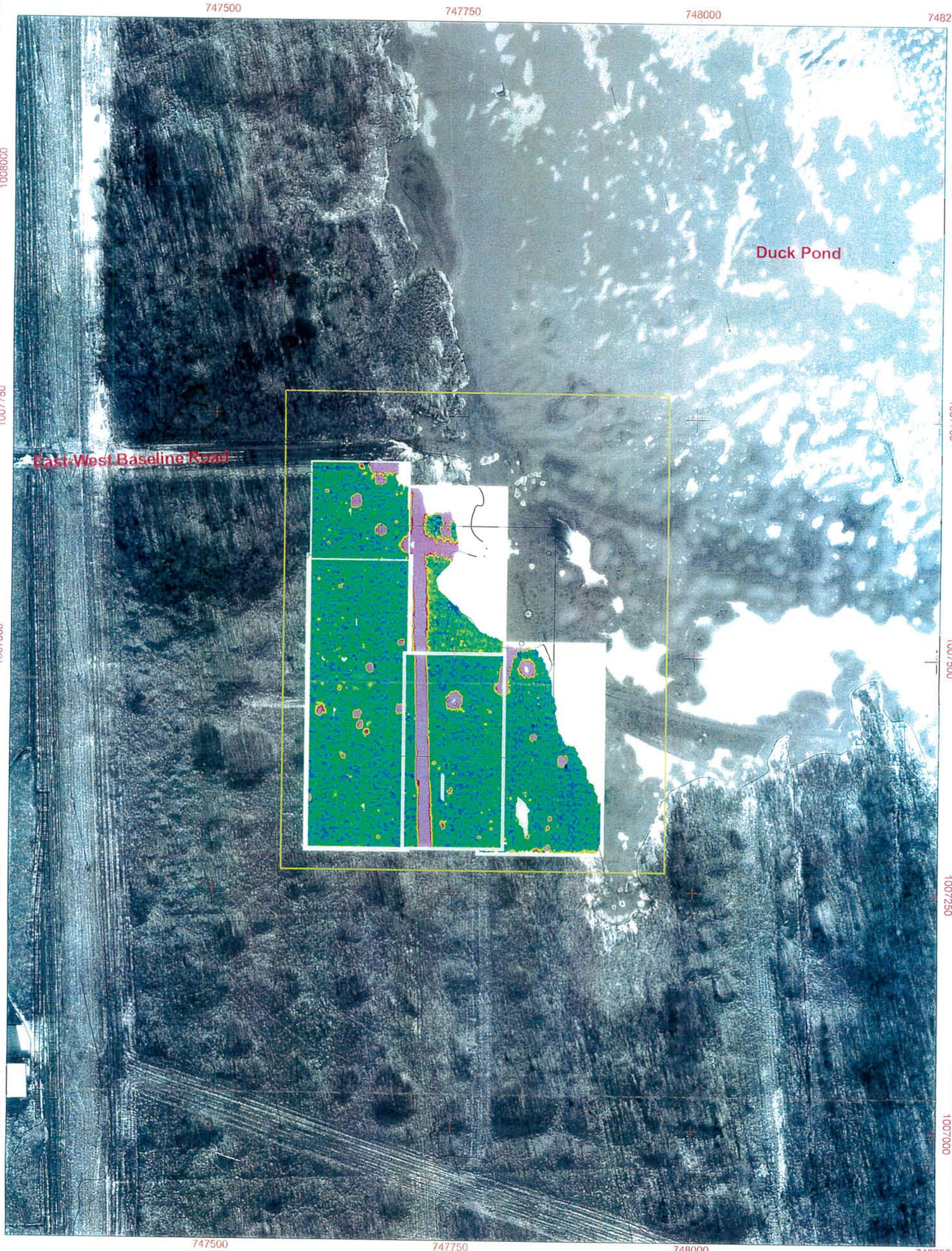
DESIGNED BY: JEB	Figure 3.16 OE Recovered in EOD Area #3		
DRAWN BY: JEB			
CHECKED BY: BJM	SCALE: 1:1200	PROJECT NUMBER: 736703-01000	
SUBMITTED BY: SAS	DATE: JAN 2004	PAGE NUMBER:	Figure 3.16
	FILE: EOD3.APR		



EOD 2 Area

997750 748750 Grid Coordinates (New York State Plane, Central)

N

100 0 100 Feet

EM-61 Response (mV)

6
4
2
0
-2

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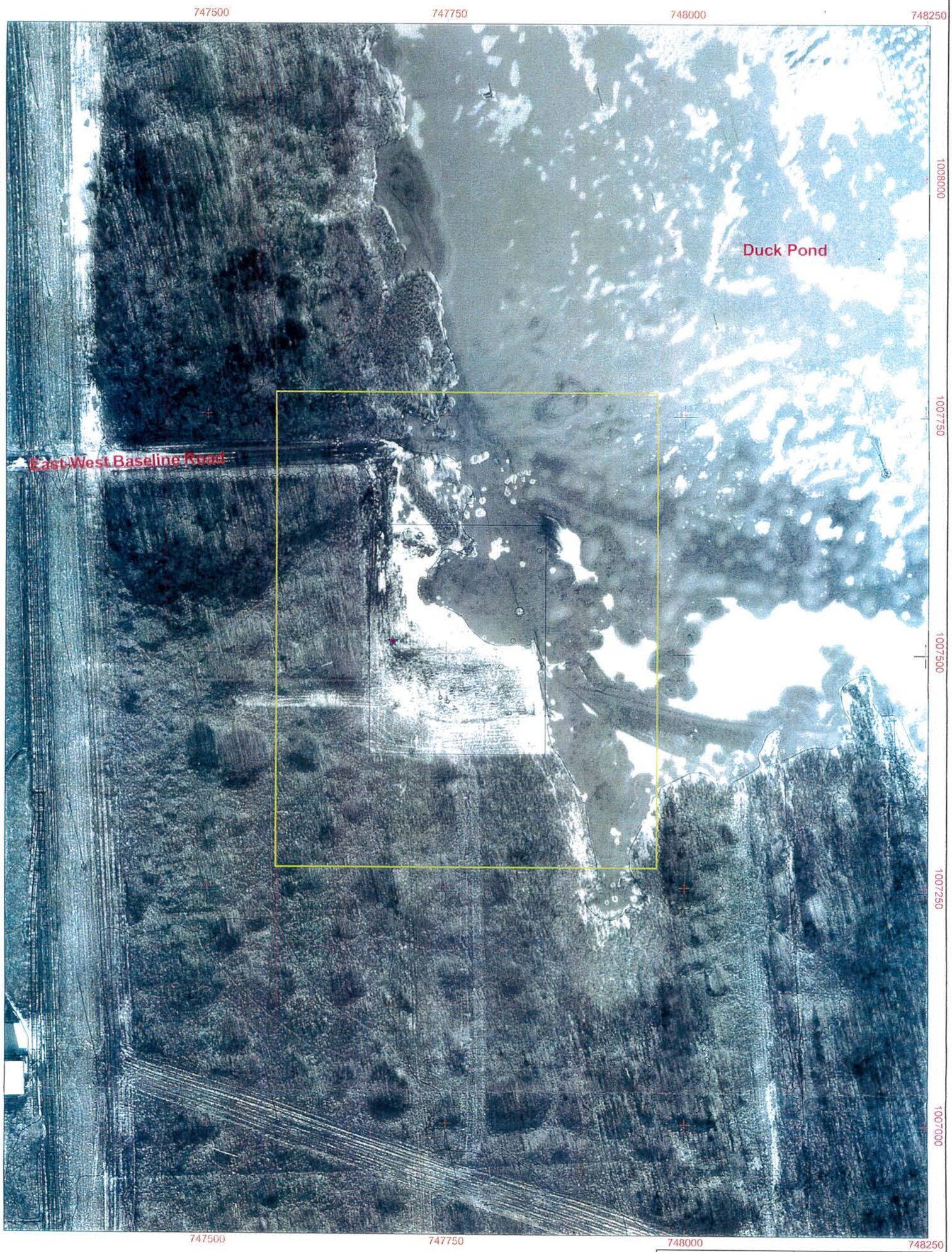
DESIGNED BY JEB	Figure 3.17 EM-61 Data Collected in EOD Area #2	
DRAWN BY JEB		
CHECKED BY BJM	SCALE 1:1200	PROJECT NUMBER 736703-01000
SUBMITTED BY SAS	DATE JAN 2004	FACE NUMBER Figure 3.17
	FILE EOD2.APR	



UXO Recovered in EOD 2

★ Fuze and booster

EOD 2 Area

997750 / 748750 Grid Coordinates (New York State Plane, Central)

N

100 0 100 Feet

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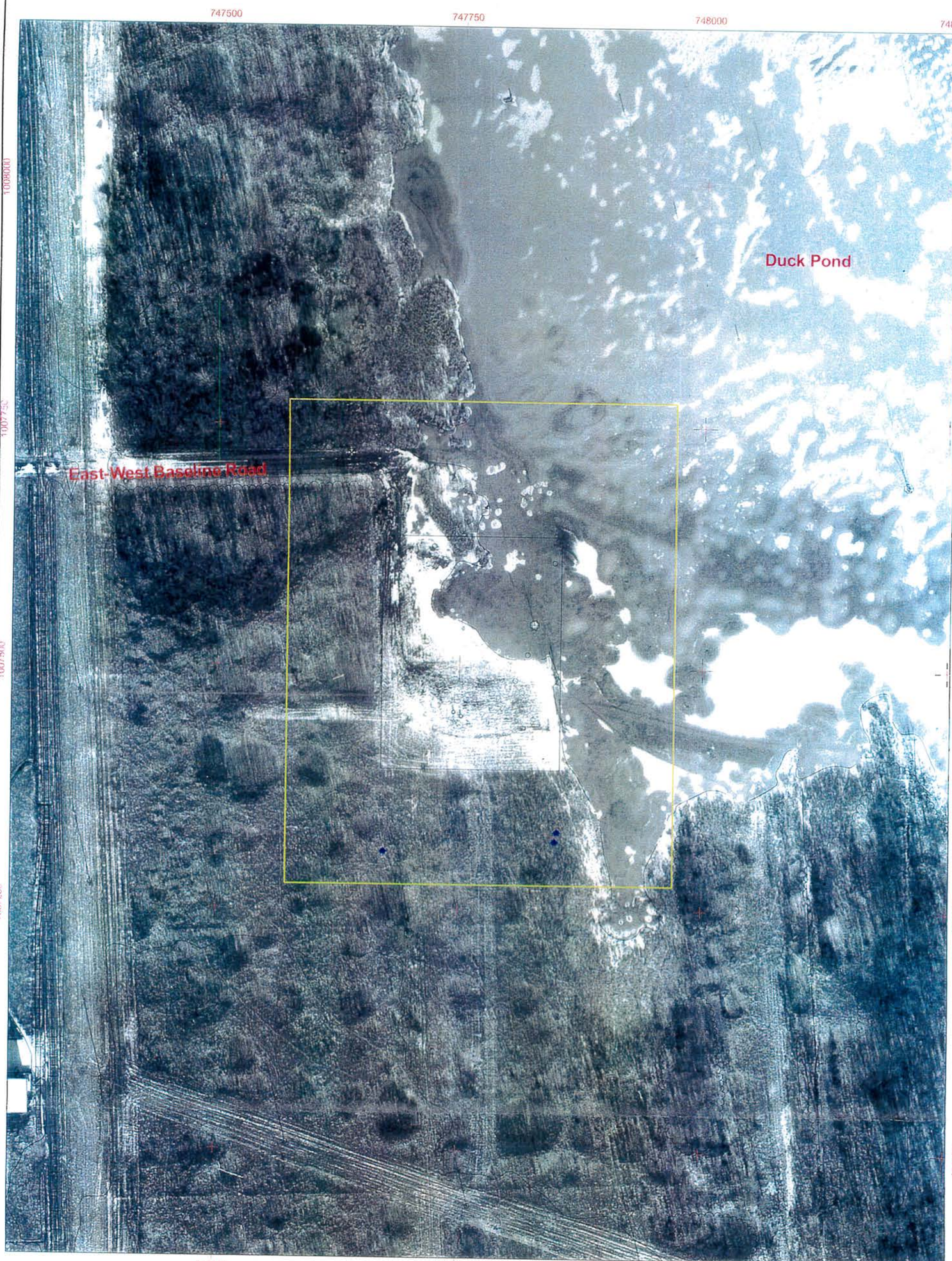
DESIGNED BY JEB	Figure 3.18 UXO Recovered in EOD Area 2	
DRAWN BY JEB		
CHECKED BY BJM	SCALE 1:1200	PROJECT NUMBER 736703-01000
SUBMITTED BY SAS	DATE JAN 2004	PAGE NUMBER Figure 3.18
	FILE EOD2.APR	



OE Items Recovered in EOD 2

- Illumination Flare

EOD 2 Area

997750 / 748750 Grid Coordinates (New York State Plane, Central)

N

40 0 40 80 120 Feet

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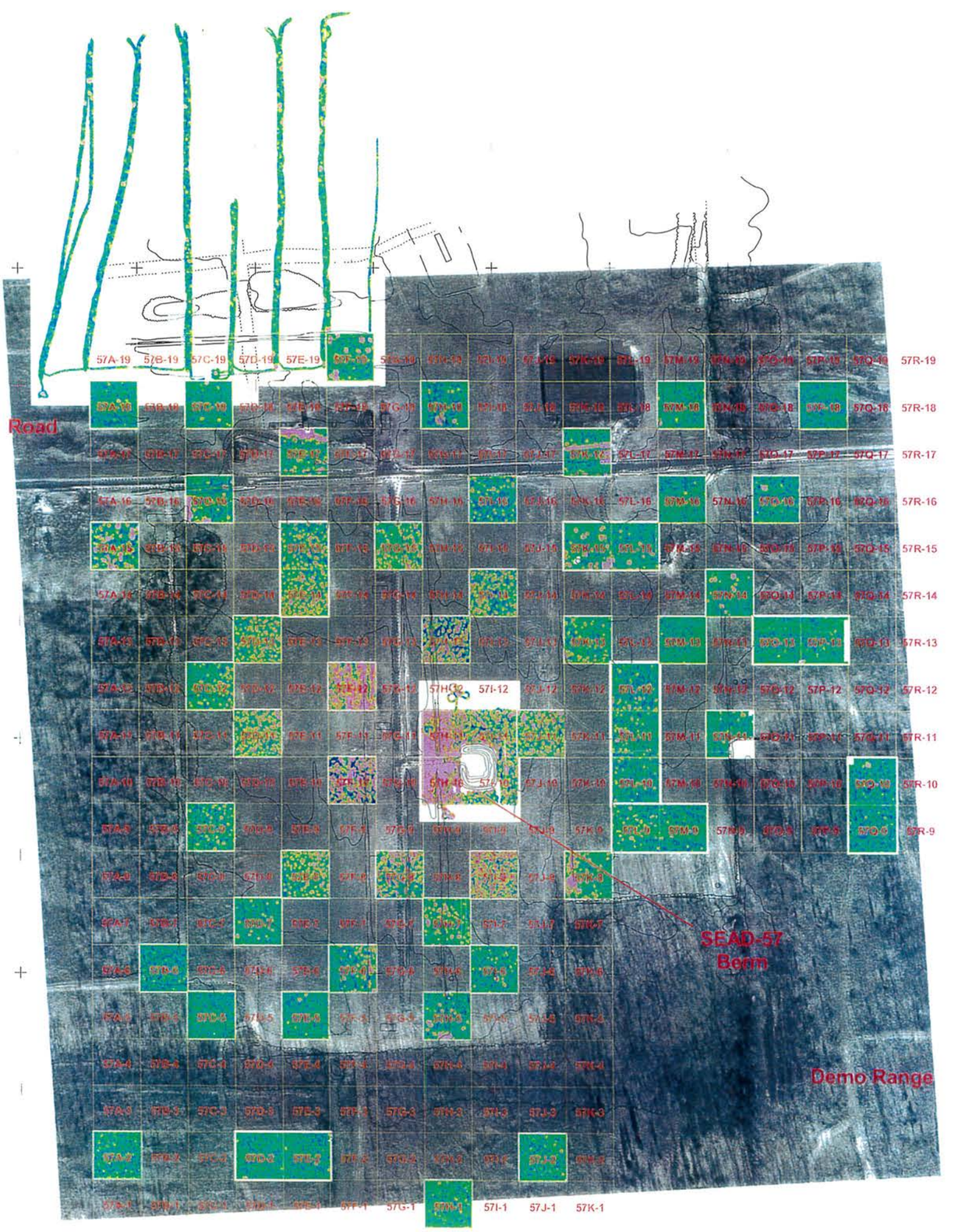
DESIGNED BY JEB	Figure 3.19 OE Recovered in EOD Area 2
DRAWN BY JEB	
CHECKED BY BJM	SCALE 1:1200
SUBMITTED BY SAS	DATE JAN 2004
	FILE EOD2.APR
	PROJECT NUMBER 736703-01000
	PAGE NUMBER Figure 3.19



738000 738500 739000 739500 740000

SEAD-57 Grids

997750 Grid Coordinates (New York State Plane, Central)
748750

100 0 100 200 Feet

N

EM-61 Response (mV)

6
4
2
0
-2

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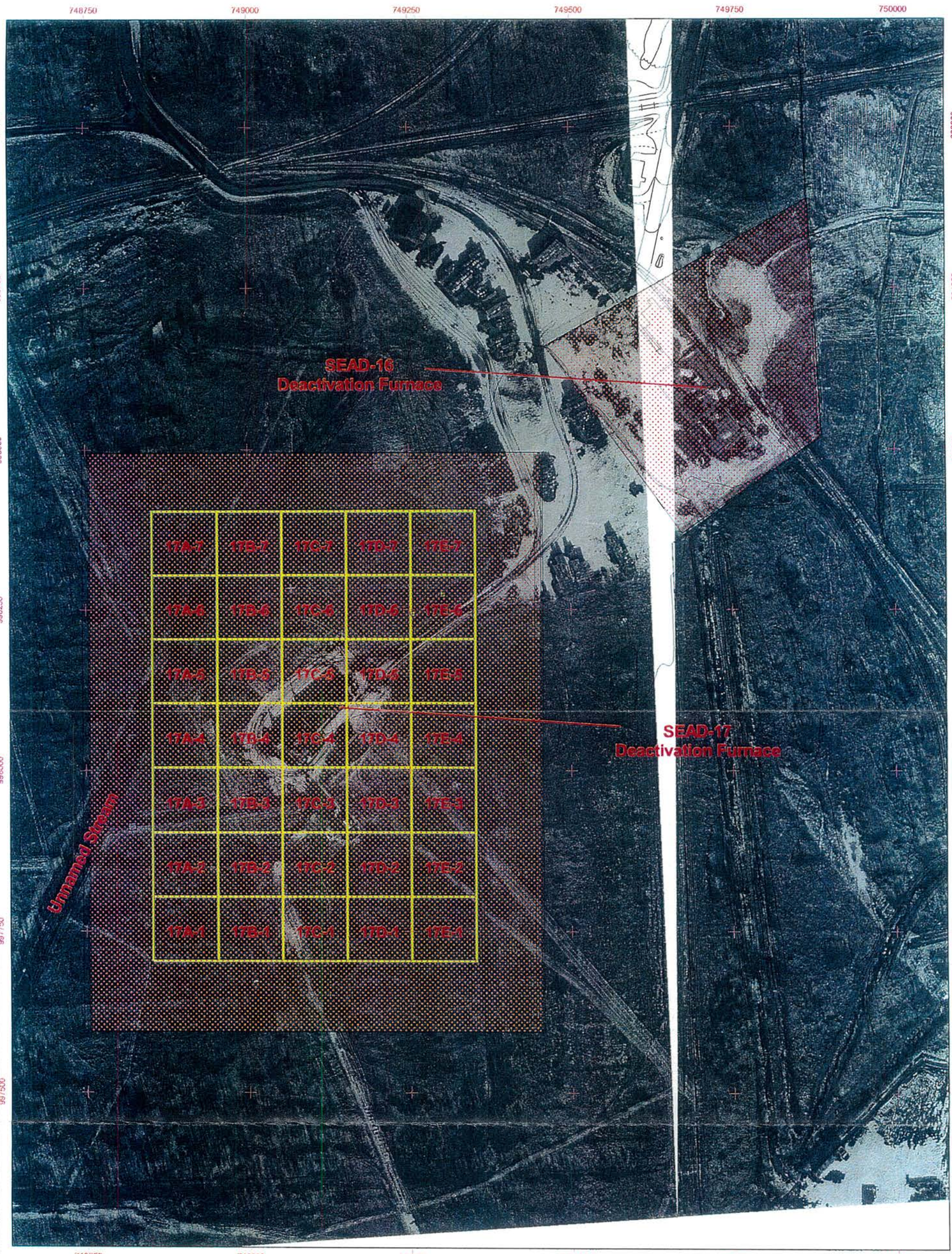
DESIGNED BY JEB	Figure 3.29 EM-61 Data Collected in SEAD-57 (Former EOD Range)	
DRAWN BY JEB		
CHECKED BY BJM	SCALE 1:3000	PROJECT NUMBER 736703-01000
SUBMITTED BY SAS	DATE JAN 2004	PAGE NUMBER Figure 3.29
	FILE SEAD_57.APR	



OE Items Recovered in SEAD-17

20mm
Fuze

Proposed Area of Clearance

SEAD-17 Grids

997750 748750 Grid Coordinates (New York State Plane, Central)

100 0 100 Feet

N

Note: Grids investigated intrusively during EE/CA will not be resurveyed

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DESIGNED BY: JEB	Figure 9.1 Proposed Areas of Clearance SEADs-16 and -17		
DRAWN BY: JEB			
CHECKED BY: BJM	SCALE: 1:1200	PROJECT NUMBER: 736703-01000	
SUBMITTED BY: SAS	DATE: JAN 2004	PAGE NUMBER:	Figure 3.14
	FILE: SEAD_17.APR		

OE Items Recovered in EOD 2

- Slap Flare
- Fuze w/ Booster

Proposed Area of Clearance

997750 / 748750 Grid Coordinates (New York State Plane, Central)

N

40 0 40 80 120 Feet

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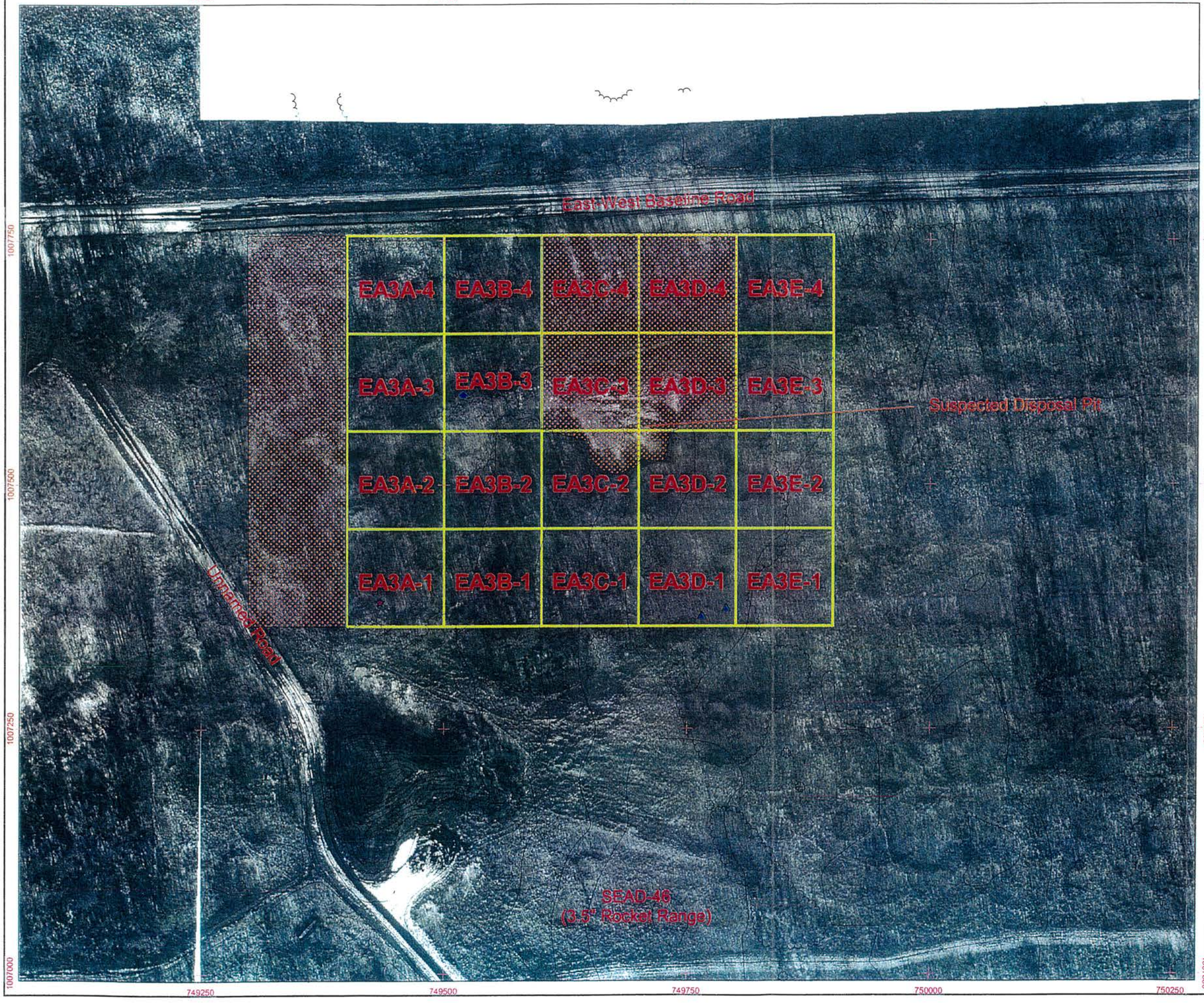
DESIGNED BY: JEB	Figure 9.2 Proposed Area of Clearance EOD Area #2	
DRAWN BY: JEB		
CHECKED BY: BJM	SCALE: 1:1200	PROJECT NUMBER: 736703-01000
SUBMITTED BY: SAS	DATE: JAN 2004	PAGE NUMBER: Figure 9.2
	FILE: EOD2.APR	



OE Items Recovered in EOD 3
- M2-Fuze lighter
- Rifle grenade - illum. (Expended)
- Slap Flare -(Illumination)

Proposed Area of Clearance

EOD 3 Grids

997750 / 748750 Grid Coordinates (New York State Plane, Central)

N

100 0 100 Feet

Note: The area to the south of the EOD Area #3 grids will be surveyed as part of the SEAD-46 response action

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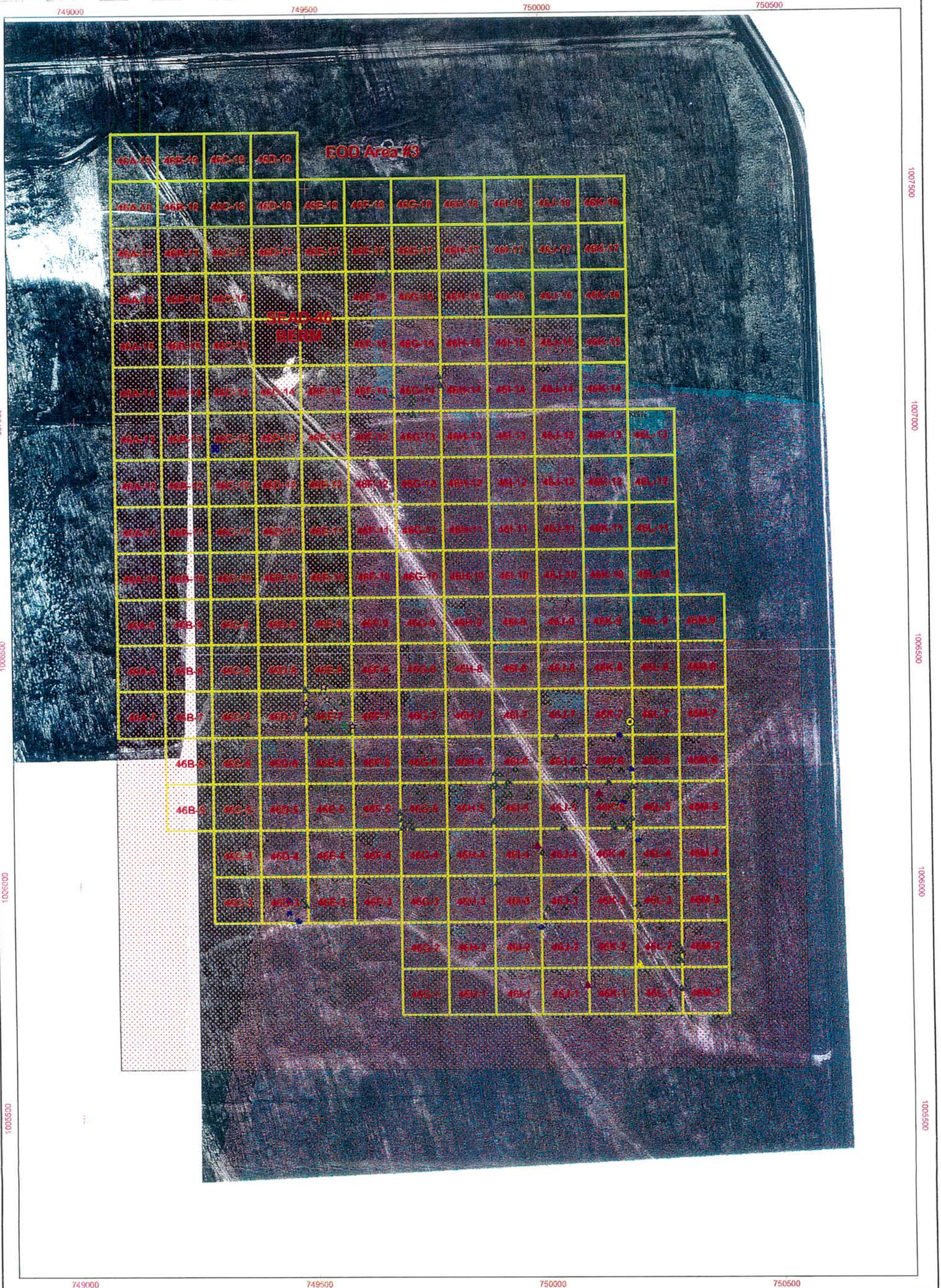
DESIGNED BY: JEB	Figure 9.3 Proposed Area of Clearance EOD Area #3	
DRAWN BY: JEB		
CHECKED BY: BJM	SCALE: 1:1200	PROJECT NUMBER: 736703-01000
SUBMITTED BY: SAS	DATE: JAN 2004	PAGE NUMBER: Figure 9.3
	FILE: EOD3.APR	



OE and UXO Items Recovered in SEAD-46

- Fuze
- M385 or M382 40mm Pratice Grenade
- MK2 grenade
- Chemical Smoke Grenade
- 40mm Illumination Flare
- Illumination Flare
- 60mm mortar body
- M83 Cluster Bomb

Proposed Area of Clearance

SEAD-46 Grids

997750 / 748750 Grid Coordinates (New York State Plane, Central)

100 0 100 200 300 Feet

N

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DESIGNED BY: JEB	Figure 9.4 Proposed Area of Clearance SEAD-46 (3.5" Rocket Range)	
DRAWN BY: JEB		
CHECKED BY: BJM	SCALE: 1:2400	PROJECT NUMBER: 736703-01000
SUBMITTED BY: SAS	DATE: JAN 2004	PAGE NUMBER: Figure 9.4
	FILE: SEAD_46.APR	

Note: Grids investigated intrusively during the EE/CA will not be re-surveyed

752250 752500 752750 753000 753250 753500 753750

986000 985750 985500 985250 985000 984750

44A-7 44B-7 44C-7 44D-7 44E-7 44F-7 44G-7 44H-7 44I-7 44J-7 44K-7 44L-7

44A-6 44B-6 44C-6 44D-6 44E-6 44F-6 44G-6 44H-6 44I-6 44J-6 44K-6 44L-6

44A-5 44B-5 44C-5 44D-5 44E-5 44F-5 44G-5 44H-5 44I-5 44J-5 44K-5 44L-5

44A-4 44B-4 44C-4 44D-4 44E-4 44F-4 44G-4 44H-4 44I-4 44J-4 44K-4 44L-4

44A-3 44B-3 44C-3 44D-3 44E-3 44F-3 44G-3 44H-3 44I-3 44J-3 44K-3 44L-3

44A-2 44B-2 44C-2 44D-2 44E-2 44F-2 44G-2 44H-2 44I-2 44J-2 44K-2 44L-2

44A-1 44B-1 44C-1 44D-1 44E-1 44F-1 44G-1 44H-1 44I-1 44J-1 44K-1 44L-1

44B-8 44C-8 44D-8 44E-8 44F-8 44G-8 44H-8 44I-8 44J-8 44K-8 44L-8

44D-9 44E-9 44F-9 44G-9 44H-9 44I-9 44J-9 44K-9 44L-9

44G-10 44H-10 44I-10 44J-10 44K-10 44L-10

OE and UXO Items Recovered in SEAD-44A

- Illumination Flare
- M54 Chemical Smoke Grenade
- M385 40mm Pratice Grenade
- Proposed Area of Clearance
- SEAD-44A Grids
- Approximate Extent of Stream and Ponded Water
- 753750 / 985750 Grid Coordinates (New York State Plane, Central)

All of the OE and UXO items recovered by Parsons on the north side of the stream in SEAD-44A were items left after the 1-foot scrape performed by EODT and Sessler

N

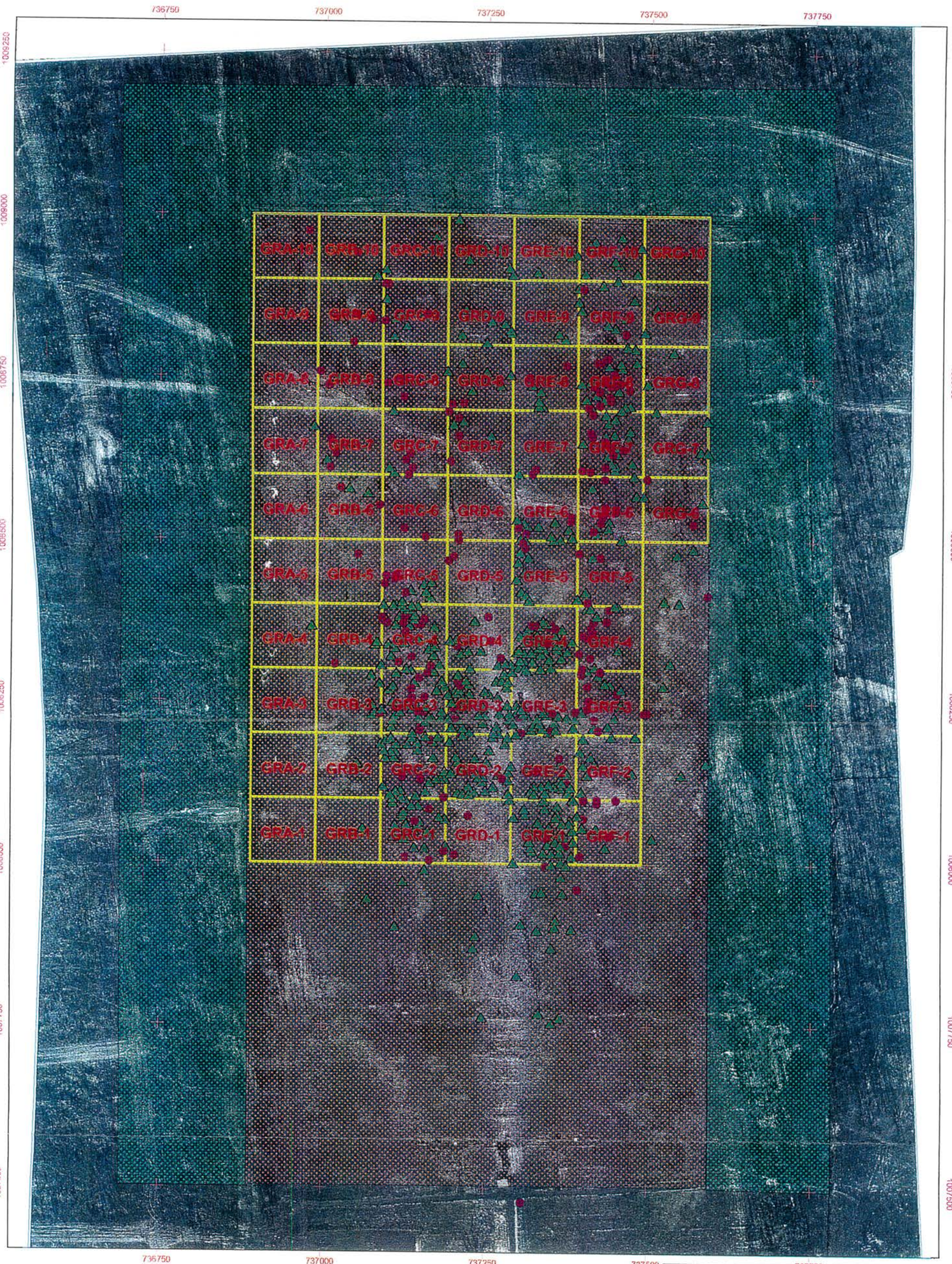
50 0 50 100 150 200 250 Feet

Note: Grids investigated intrusively during the EE/CA will not be re-surveyed

PARSONS

U.S. ARMY CORPS OF ENGINEERS HUNTSVILLE CENTER

DESIGNED BY JEB	Figure 9.5 Proposed Area of Clearance SEAD-44A	
DRAWN BY JEB		
CHECKED BY BJM	SCALE 1:1800	PROJECT NUMBER 736703-01000
SUBMITTED BY SAS	DATE JAN 2004	PAGE NUMBER Figure 9.5
	FILE SEAD_44A.APR	



OE and UXO Items Recovered in Grenade Range

- M73-35mm Subcaliber Pratice Rocket
- M382 or M385-40mm Pratice Grenade

Proposed Area of Clearance to 6"

Proposed Area of Clearance to Depth of Detection

Grenade Range Grids

997750 748750 Grid Coordinates (New York State Plane, Central)

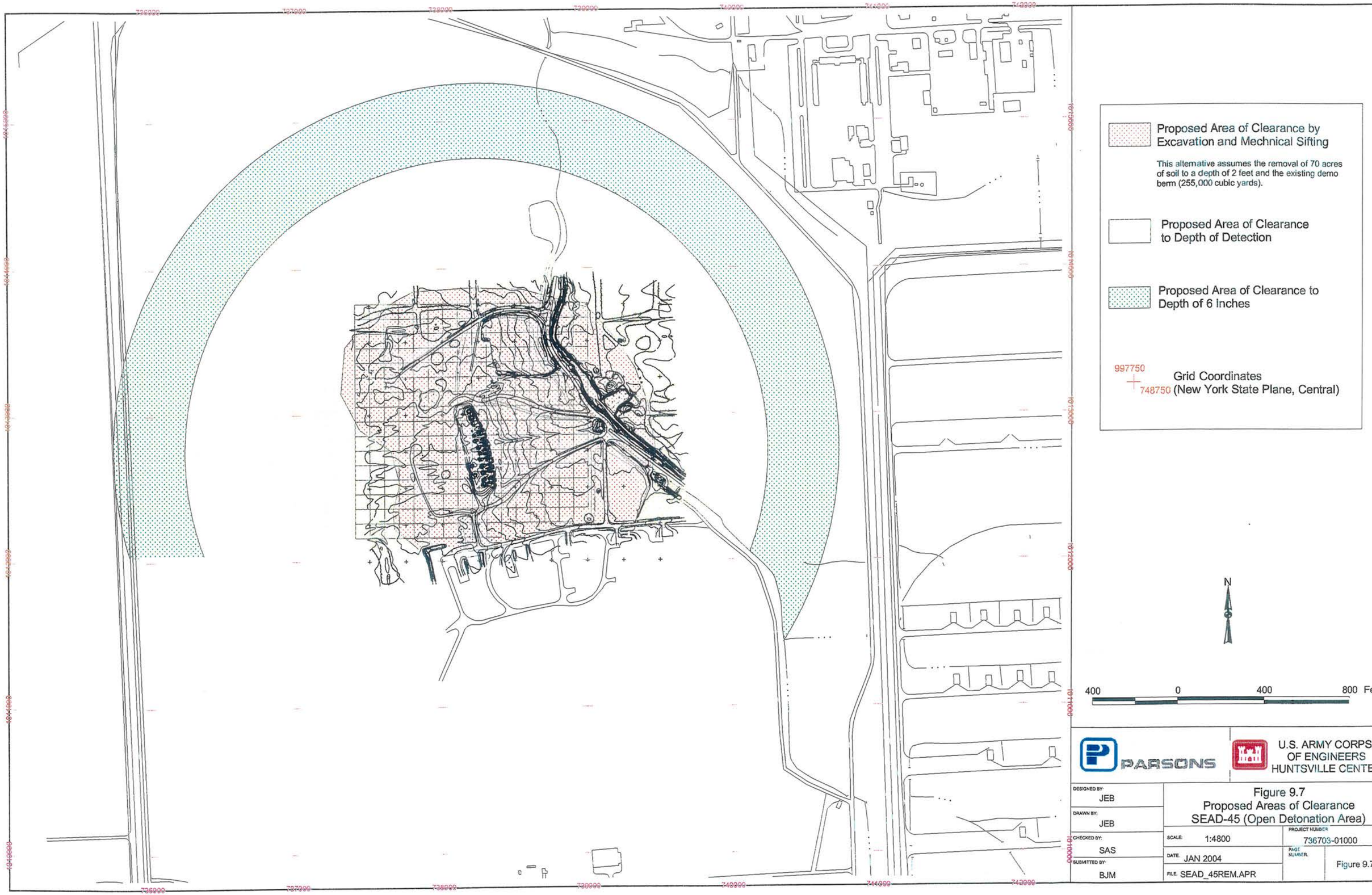
N

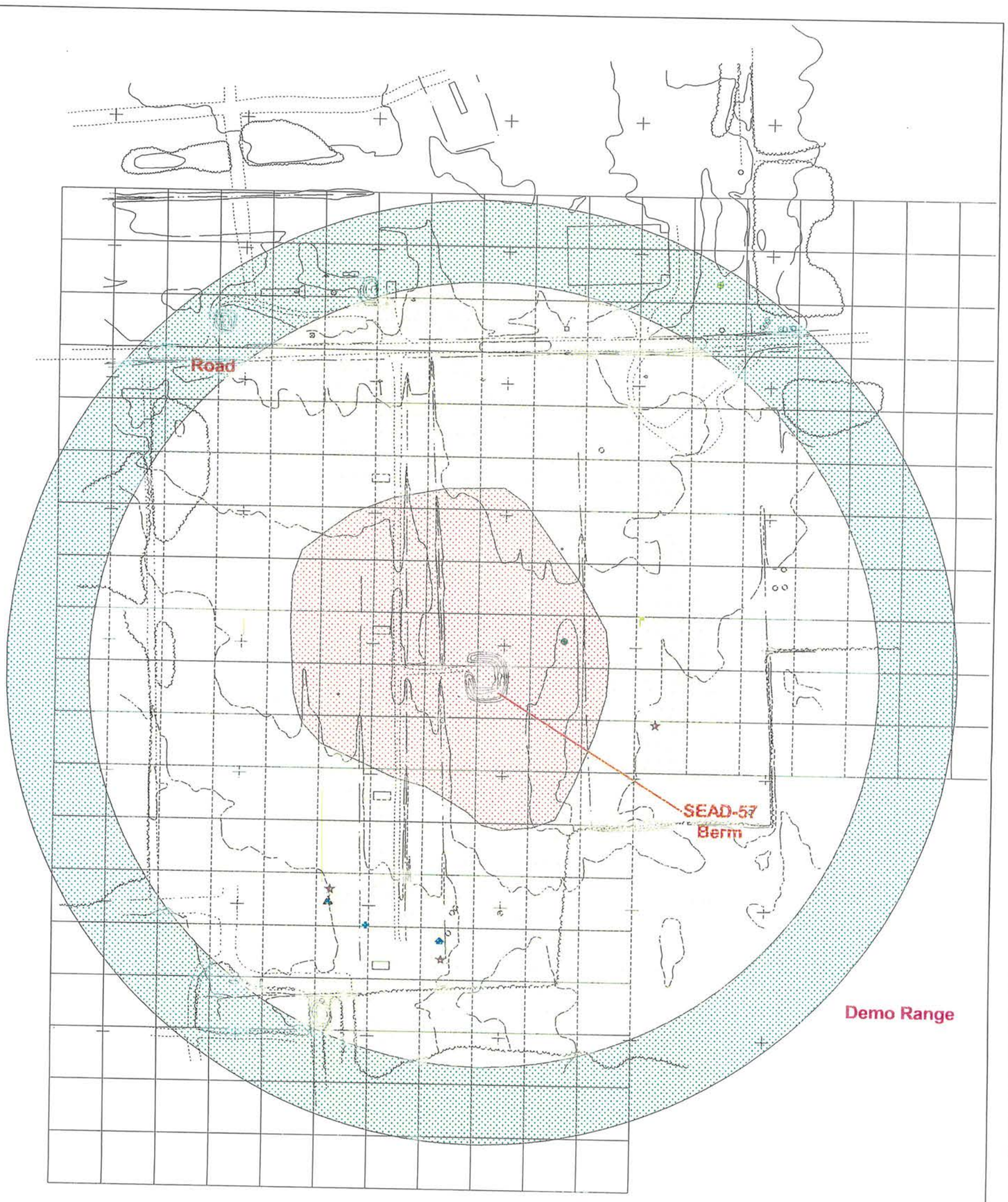
100 0 100 200 Feet

PARSONS

U.S. ARMY CORPS OF ENGINEERS HUNTSVILLE CENTER

DESIGNED BY: JEB	Figure 9.6 Proposed Areas of Clearance Grenade Range	
DRAWN BY: JEB		
CHECKED BY: BJM	SCALE: 1:1800	PROJECT NUMBER: 736703-01000
SUBMITTED BY: SAS	DATE: JAN 2004	PAGE NUMBER: Figure 9.5
	FILE: GR_RNG.APR	


Proposed Area of Clearance by Excavation and Mechnical Sifting
This alternative assumes the removal of 70 acres of soil to a depth of 2 feet and the existing demo berm (255,000 cubic yards).
Proposed Area of Clearance to Depth of Detection
Proposed Area of Clearance to Depth of 6 Inches
997750
748750 Grid Coordinates (New York State Plane, Central)
N
400 0 400 800 Feet
PARSONS
U.S. ARMY CORPS OF ENGINEERS HUNTSVILLE CENTER
DESIGNED BY: JEB
DRAWN BY: JEB
CHECKED BY: SAS
SUBMITTED BY: BJM
Figure 9.7
Proposed Areas of Clearance
SEAD-45 (Open Detonation Area)
SCALE: 1:4800
PROJECT NUMBER: 736703-01000
DATE: JAN 2004
PAGE NUMBER: Figure 9.7
FILE: SEAD_45REM.APR



Proposed Area of Clearance by Excavation and Mechanical Sorting

Proposed Area of Clearance to Depth of Detection

Proposed Area of Clearance to 6"

997750 + 748750 Grid Coordinates (New York State Plane, Central)

N

100 0 100 200 Feet

PARSONS

U.S. ARMY CORPS OF ENGINEERS HUNTSVILLE CENTER

DESIGNED BY: JEB	Figure 9.8 Proposed Areas of Clearance SEAD-57 (Former EOD Range)	
DRAWN BY: JEB		
CHECKED BY: BJM	SCALE: 1:2400	PROJECT NUMBER: 736703-01000
SUBMITTED BY: SAS	DATE: JAN 2004	PAGE NUMBER: Figure 9.8
	FILE: SEAD_57.APR	

APPENDIX B

REVISED SECTION 7 OF EE/CA REPORT

SECTION 7

IDENTIFICATION AND ANALYSIS OF RESPONSE ACTION ALTERNATIVES

7.1 INTRODUCTION

7.1.1 Response action alternatives will be identified and analyzed for each of the 11 AOIs under investigation. Response actions will be considered at the following AOIs:

- Indian Creek Burial Area
- SEAD-53 (Igloo Area)
- Demo Range
- SEADs-16 and -17 (Deactivation Furnaces)
- EOD Area #3
- EOD Area #2
- SEAD-44A (QA Function Test Area)
- SEAD-46 (3.5" Rocket Range)
- Grenade Range
- SEAD-57 (Former EOD Area)
- SEAD-45 (Open Detonation Area)

7.1.2 The identification of alternatives for these AOIs at SEDA includes two principal groups, intrusive and non-intrusive, as well as several variations of these two. Non-intrusive alternatives are comprised of the No Further Action (NFA) and institutional controls alternatives, while intrusive approaches a number of different clearance alternatives. This chapter provides a brief, general description of OE clearance technologies. From this general description, five specific response action alternatives for Seneca Army Depot will be introduced.

7.1.3 Once the potential response action alternatives have been introduced, each must be analyzed and screened against the three general response objective categories (effectiveness, implementability, and cost) to ensure that it meets the minimum standards within each of the criteria of the three categories. This screening will be performed on all potential response action alternatives for the 11 AOIs investigated at SEDA. The purpose of this screening is to ensure that only viable alternatives are ranked against each other in Chapter 8 of this document. Once this screening has been completed, the remaining alternatives will be compared to each other in regards to each of the three general response categories.

7.2 DESCRIPTION OF OE CLEARANCE TECHNOLOGIES

Various technologies and approaches exist for the clearance of OE. OE clearance operations fall into three distinct areas: detection, recovery, and disposal. A discussion of the techniques used in each of these areas is presented in the following paragraphs.

7.2.1 OE DETECTION

7.2.1.1 The detection of OE includes those methods and instruments that can be used to locate OE. The selection of the best technology depends on the properties of the OE to be located, including whether the ordnance is found on the surface or below the surface, and the characteristics of the area where the OE is located, such as soil type, topography, vegetation, and geology.

7.2.1.2 Detection technologies have two basic forms. One form, visual searching, has been successfully used on a number of sites where OE is located on the ground surface. When performing a visual search of a site, the area to be searched is divided into five-foot lanes, which are then systematically inspected for OE. A metal detector is sometimes used to supplement the visual search in areas where ground vegetation may conceal OE. Typically, any OE found during these searches is flagged or marked on a grid sheet for later removal.

7.2.1.3 The other form of OE detection, geophysics, includes a family of detection instruments designed to locate OE. This family of instruments includes magnetic instruments, electromagnetic instruments, and ground penetrating radar. Each piece of equipment has its own inherent advantages and disadvantages based on its operating characteristics, making the selection of the type of geophysical instrument paramount to the survey success. Nevertheless, geophysics is the most cost-effective method of conducting subsurface OE surveys. The equipment designed for OE geophysical surveys is lightweight, easily maintained, and very effective. However, there are limitations to geophysics.

7.2.1.4 Geophysical equipment cannot usually distinguish OE items from other metallic objects located below the surface. "Cultural interference," such as underground utility lines, construction debris, or metal bearing rock, can produce a signature to the equipment similar to OE. Therefore, it is necessary for the geophysical survey team to carefully document any known cultural interference prior to beginning the survey. Another limitation to the equipment is that metallic objects have to be larger when at greater depths so that the geophysical equipment can obtain a reading. Due to these limitations, no geophysical equipment will detect every buried OE item on a site. However, no equipment or process can, at present, be guaranteed to detect and remove 100 percent of OE on a site. The use of geophysical equipment and surveys has proven to be one of the most cost effective methods currently available to detect subsurface OE.

7.2.2 OE RECOVERY

7.2.2.1 Once a site has been surveyed by either visual or geophysical means, the recovery of OE can begin. OE recovery operations can take the form of a surface-only clearance, an intrusive (subsurface) clearance, or a combination of the two methods. The decision on the appropriate level of clearance operation is based on the nature and extent of the OE contamination as well as the intended future use of the site.

7.2.2.2 During a surface clearance operation exposed OE or suspected OE items are identified during the detection phase. The OE items are then inspected, collected (if possible), and transported to a designated area for cataloging and eventual disposal. If it is determined during the OE inspection that the item cannot be safely moved it may be necessary to destroy the OE item in place.

7.2.2.3 During a subsurface clearance operation buried OE items or suspected OE identified by the geophysical survey or other detection methods require excavation for removal. Because the actual nature of the buried OE item cannot be determined without it being uncovered, non-essential personnel evacuations are necessary, as well as, perhaps, the use of engineering controls to ensure the safety of the operation. The excavation of the OE item then takes place with either hand tools or mechanical equipment depending on the suspected depth of the object. Once the OE item has been exposed, it is then inspected, collected (if possible), and transported to a designated area for cataloging and disposal. If it is determined during the OE inspection that the item cannot be safely moved, it will be destroyed in place.

7.2.2.4 Evacuations are sometimes necessary when conducting intrusive investigations to minimize the risk of the operation. An evacuation area is calculated by USACE based on the potential explosive force that could be encountered during an excavation. An evacuation distance is then calculated to ensure that all non-essential personnel are outside of that distance during the excavation process. Engineering controls can be developed to reduce this evacuation distance; however, evacuations may be required in any future OE investigation at Seneca Army Depot if excavations take place close to any inhabited areas and engineering controls cannot be developed to reduce the exclusion zone to preclude the need to evacuate. Every possible option will be explored to minimize potential evacuations with the exception of compromising public safety. Due to the remoteness of SEDA, it is unlikely that many evacuations will be necessary during future OE clearance operations.

7.2.3 OE DISPOSAL

7.2.3.1 Disposal of recovered OE items at Seneca Army Depot can take one of two forms, remote, on-site demolition and disposal; or in-place demolition and disposal. The decision regarding which of these techniques to use is based on the risk involved in employing the disposal option, as determined by the specific area's characteristics and the nature of the OE items recovered.

7.2.3.2 A countercharge can be used to destroy the OE item or the OE item can be burned as a means of destruction. Burning an OE item is not as desirable as a countercharge, as the burning can produce secondary explosions, or the item may not be completely destroyed, thus leaving the OE item in a more dangerous state than it was originally. Engineering controls, such as sandbag mounds and sandbag walls over and around the OE item, are often used to minimize the blast effects when an OE item is destroyed in this manner.

7.2.3.3 In some instances it is determined that an OE item must be destroyed in-place. This technique is typically employed when the OE item cannot be safely moved to a remote location. This procedure utilizes techniques similar to those described above that will detonate the OE item or apply sufficient pressure and heat to neutralize the hazard. When this technique is employed, engineering controls such as sandbag mounds and sandbag walls over and around the OE item are often used to minimize the blast effects.

7.3 IDENTIFICATION AND DESCRIPTION OF RESPONSE ALTERNATIVES

7.3.1 The alternatives identified in this section have been selected based on the results of the investigations conducted to date as well as available OE detection and disposal technology. Each alternative, if implemented, must have the ability to achieve the response action objectives. To aid in the selection of appropriate OE clearance alternatives, a penetration analysis was performed by the USACE to determine possible depths of penetration for ordnance types used at SEDA.

7.3.2 This information, combined with the OE sampling information, soil conditions, and bedrock conditions at the site, was utilized to select appropriate OE clearance alternatives. For the removal action at the Seneca Army Depot Activity, five response alternatives have been developed:

Alternative 1. No Further Action (NFA);

Alternative 2. Institutional Controls;

Alternative 3. Removal of OE items to depth of 6 inches

Alternative 4. Removal of OE items to depth using a geophysical instrument selected in a prove-out

Alternative 5. Excavation of soil to a specified depth, followed by mechanical sifting of this soil to separate out OE. Removed soil will be replaced and the area restored after sift.

7.3.3 No response measure can completely remove all OE risk due to limitations in available technology. Yet, all of the response measures being considered for the site will reduce risks posed by inadvertent ordnance detonation, resulting in a reduction of the OE risk. It may also be feasible and appropriate to combine some of the alternatives in order to optimize the safe transition of the site to a future land use. Note that surface clearance was not selected as a viable

stand-alone alternative because subsurface OE/UXO was found in each AOI where OE/UXO was present.

7.3.4 The implementation of a long-term monitoring program will not be evaluated as a separate alternative, but as an integral part of any alternative where OE material has been removed or left on-site. As part of this monitoring program, visual surveys will be performed on a proposed schedule. These visual surveys will consist of the inspection of areas to determine the effectiveness of the clearance alternative applied. These visual surveys will be concentrated in areas most susceptible to erosion and frost effects. Any incident reports from the property will be reviewed and any Institutional Controls in effect will be checked to see that they have been properly maintained. During this inspection it will also be determined if any of the proposed land-uses have changed. It is proposed that the first visual inspection would occur approximately every two years up to 30 years from the completion of clearance activities. If the results of these inspections indicate that additional clearance is necessary in certain areas, steps will be taken to perform additional clearance.

7.3.1 NFA (ALTERNATIVE 1)

Alternative 1, if selected, would take no further action in regards to detecting, clearing, and disposing of any potential OE. The NFA alternative would involve either the transfer of parts of the Depot in their current condition or the Army retaining control of the Depot as an inactive facility. This alternative can be implemented if the potential exposure and hazards from OE are such that the proposed future uses can be implemented safely or if the Army retains control of the facility. Implementation of Alternative 1 at SEDA is dependent upon the results of the EE/CA surveys. If the data indicated that no evidence of OE existed at the site, and the area is safe for recreational uses, then the site, or portions of the site, may be turned over for use as recreation/conservation area without any further action. This alternative, if selected, does not preclude a later DoD response should a problem surface. However, these sites will no longer be under consideration as ordnance sites.

7.3.2 INSTITUTIONAL CONTROLS (ALTERNATIVE 2)

The institutional controls (Alternative 2), if selected, would provide a legal and/or administrative mechanism to either prevent access to or control the use of specific areas of SEDA with OE concerns. This alternative could also provide ordnance education and awareness; thereby reducing the risk of an OE related accident at the site. Examples of potential institutional controls include fences, warning signs, deed restrictions, covenants, and enforceable local government ordinance. Examples of OE education include educational programs, brochures, and media displays. Alternative 2 may be implemented as a stand-alone alternative, or may be implemented in conjunction with another selected alternative to ensure that restrictions on future land use are followed. The Institutional Analysis Report, which describes the full range of institutional controls, is provided in Chapter 5.

7.3.3 CLEARANCE OF OE ITEMS TO DEPTH OF 6 INCHES (ALTERNATIVE 3)

7.3.3.1 Alternative 3, if selected, would include the use of geophysical instruments to detect OE in the shallow subsurface (0-6 inches). If this alternative is selected, an instrument will be selected, through the process of a geophysical proveout, which will detect any of the OE recovered during the EE/CA to at least 6 inches.

7.3.3.2 Prior to any geophysical survey, brush-clearing crews would clear enough undergrowth so that the geophysical crews could adequately perform their work. Brush clearing should be limited to only those areas where the vegetation prevents the effective use of the clearance equipment. In areas where the geophysical equipment can be used effectively in the natural state, there will be no brush clearance. In areas where the future land use is slated for conservation, brush clearing would only be used as necessary so that the surrounding ecosystem would not be disturbed. It is assumed that brush clearance will create minimal short-term disturbance to the ecosystem due to the rapid vegetation growth rates in this climate.

7.3.3.3 During the geophysical investigation, OE clearance would be completed by experienced UXO-qualified personnel who visually search the ground surface for any OE. In addition, the personnel would be aided by a geophysical instrument that would be used to perform a sweep in lanes five feet apart, or some other comparable width depending on the sweep reach of the type of equipment used, to ensure complete site coverage. In this type of investigation, all contacts would be removed, if possible, or flagged and investigated or detonated as needed at a later time.

7.3.4 CLEARANCE OF OE ITEMS TO DEPTH OF DETECTION (ALTERNATIVE 4)

Alternative 4 would be similar to Alternative 3. Brush would still be removed from the site as needed, and the geophysical data collected would typically be collected in grids that would be established across the AOI. Geophysical data collected under this alternative would be stored for further processing after collection. Anomalies would then be picked after the data were processed, and these targets would be reacquired using GPS equipment and marked for further investigation. The second phase to this approach includes the intrusive investigation of all flagged anomalies identified during the survey to determine their exact nature. During this investigation, phased engineering controls may have to be used to reduce the evacuation distance that would be required during the conduct of these investigations. Evacuation distances are determined by USACE based on the "maximum credible event" (MCE) or worst-case scenario of the potential detonation of an ordnance item that could be found at the site. All non-essential personnel would be evacuated to distance from the excavated area based on the most probable munition (MPM) to maximize the safety of the operation. Once these investigations begin, each anomaly will be excavated to the depth necessary to remove it from the ground. Following removal of the item identified, the excavation will be back filled to as close to its original state as possible.

7.3.5 REMOVAL OF OE ITEMS TO DEPTH BY MEANS OF EXCAVATION AND MECHANICAL SORTING (ALTERNATIVE 5)

Alternative 5 calls for the excavation of soils to a specified depth, and the sorting of OE out of those soils. A land surveying and brush clearing operation would be necessary as described in Alternative 3, and experienced UXO-qualified personnel will perform all phases of the work. Soil would be excavated to a depth determined by the OE depth data collected during the EE/CA. This excavated soil would then be mechanically sifted. Any OE would be removed as the dirt passed through the screen. Sifted soil would be certified "clean" and replaced after a confirmation survey of the areas it had been removed from. This confirmation survey would be performed as the clearance to depth alternative (alternative 4). Geophysical instruments would be used to identify any anomalies below the excavated soil, and these anomalies investigated prior to the replacement of the "clean" soil.

7.3.6 OPTIONS

The combination of one or more alternatives together will be dealt with on a case-by-case basis. It may become necessary to perform an excavation removal on a portion of an area while the remainder of the area can be controlled with institutional measures.

7.4 INTRODUCTION OF SCREENING CRITERIA

7.4.1 In the EE/CA process, the alternatives described above must be analyzed and screened against the three general categories of effectiveness, implementability, and cost to ensure that they meet the minimum standards of the criteria within each category. This screening will be performed for the alternatives chosen as possibilities at each AOI. The three general categories are described below along with the specific evaluation criteria contained within each of the categories.

7.4.2 The effectiveness of an alternative refers to its ability to meet the clean-up objective within the scope of the response action. The effectiveness category is divided into four evaluation criteria. These include Overall Protection of Public Safety and the Human Environment; Compliance with ARARs; Long-Term Effectiveness; and Short-Term Effectiveness.

7.4.3 The implementability category includes the technical and administrative feasibility of implementing an alternative, the availability of various services and materials required during its implementation, and the acceptance local residents and agencies have expressed towards the various alternatives. The implementability category is divided into six evaluation criteria including: Technical Feasibility; Administrative Feasibility; Availability of

Services and Materials; Property Owner Acceptance; Local Agency Acceptance; and Community Acceptance.

7.4.4 Finally, each alternative is evaluated to determine its projected overall implementation cost. Each of the evaluation criteria introduced above will be discussed in greater detail in the following paragraphs.

7.5 EFFECTIVENESS

7.5.1 OVERALL PROTECTION OF PUBLIC SAFETY AND THE HUMAN ENVIRONMENT

Alternatives are evaluated under this criterion on how well they achieve and maintain protection of public safety and the human environment. A process known as impact analysis is applied in evaluating this criterion. At this stage of the EE/CA, impact analysis consists of an evaluation of whether the alternative will have an impact on the potential for harm and the level of protectiveness at the site if the alternative is implemented, as compared to the existing condition. The evaluation is based on the ten factors used in the risk assessment presented in Chapter 4.

7.5.2 COMPLIANCE WITH ARARS

Evaluation under this criterion ensures that all requirements can be met without regulatory problems. The assessment may also include the TBC criteria. The applications of ARARs for each alternative will primarily focus on what ARARs apply as well as how they will be met.

7.5.3 LONG-TERM EFFECTIVENESS

This criterion measures how an alternative maintains the protection of human health and the environment after the response objective has been met. The analysis focuses on:

- the permanence of the response action alternative;
- the magnitude of residual risk following completion of the response action; and
- the adequacy and reliability of controls, if any, used to manage the treated residuals or untreated wastes that remain at the site following the response action.

7.5.4 SHORT-TERM EFFECTIVENESS

This criterion addresses the effects of an alternative during the implementation phase. Alternatives are evaluated for their effects on human health and the environment prior to the response objectives being met. More specifically, each alternative will be examined for:

- protection of the community and workers during the response action;
- adverse impacts resulting from construction and implementation; and
- the time required to meet the response objectives.

7.6 IMPLEMENTABILITY

7.6.1 TECHNICAL FEASIBILITY

This criterion evaluates the ease of implementing a specific alternative. The analysis of the technical feasibility for each course of action focuses on difficulties in:

- the operation and construction of the response action;
- the reliability of the response action in relation to implementation; and
- the need and ease of conducting future removal actions/requirements following the initial undertaking.

7.6.2 ADMINISTRATIVE FEASIBILITY

This criterion focuses on the planning for a course of action. The evaluation of this criterion considers difficulties in:

- obtaining permits applicable to a proposed alternative;
- coordinating services needed to carry out an alternative; and
- arranging the delivery of services in a timely manner.

7.6.3 AVAILABILITY OF SERVICES AND MATERIALS

This criterion primarily deals with the availability of services needed to carry out an alternative. Two issues are of primary importance under this criterion:

- can the services and materials be delivered conveniently; and
- are the quantities needed to implement the response action available in a timely manner.

7.6.4 STAKEHOLDER ACCEPTANCE

Each of the alternatives may have a varying degree of impact on the future use of the area. As a result, each alternative is rated based on the degree of acceptance expressed by the stakeholders at SEDA. Each alternative is rated based on the degree of acceptance expressed by the property owners at each site, federal and state government as represented by NYSDEC, the EPA, and the USACE, and the communities of Romulus and Varick. These two communities and their local governments will be those responsible for any necessary oversight after the land is transferred to future owners.

7.7 COST

As the scope of work for each alternative is developed, an order of magnitude cost estimate is calculated for costs associated with the implementation of each response action. These costs will include the direct and indirect capital costs incurred in implementing the response action. As part of this assessment, a time frame for completion of each of the proposed alternatives is also developed.

7.8 APPLICATION OF THE EVALUATION CRITERIA BY ALTERNATIVE

7.8.1 ALTERNATIVE 1: NO FURTHER ACTION

Effectiveness: The NFA alternative does not have an impact on the overall protection of public safety and the human environment at the AOIs where UXO and/or OE items have been recovered (Tables 7.1 through 7.8). It will, therefore, not be considered in SEADs-16 and -17, -44A, -45, -46, -57, the Grenade Range, or EOD Areas #2 or #3. This alternative is a possibility in the three areas where no OE or UXO was recovered during the EE/CA, the Indian Creek Burial Area, SEAD-53, and the Demo Range. In addition to a lack of OE recovered, there is little more than rumor to suggest that any of these areas was actually involved in any ordnance demolition or burial. However, while the Demo Range may not have been involved in any ordnance related activities as a separate area, it is in relatively close proximity to the demo berm in SEAD-57. Any response action applied to a certain radius around this berm will include a portion of the Demo Range.

7.8.2 ALTERNATIVE 2: INSTITUTIONAL CONTROLS

7.8.2.1 *Effectiveness*: The Institutional Controls alternative has an impact on the overall protection of public safety and the human environment (see Tables 7.1 through 7.8), complies with ARARs, and provides for both the long-term and short-term effectiveness at each of the 11 AOIs.

7.8.2.2 *Implementability*: The Institutional Controls alternative is technically feasible although not administratively Implement able. Some of the aspects, materials and services to implement this alternative are readily available. However the Institutional Analysis determined that local County and State Government support for institutional controls is inadequate. The willingness of the public to support the institutional controls alternative is not known. Input received from the current stakeholders as a part of the public response period for this draft EE/CA report will be incorporated into Institutional Analysis in the final report and may affect this evaluation.

7.8.2.3 *Cost*: The cost to perform this alternative at each AOI where it has been considered is presented in Chapter 8, and the cost breakdowns are presented in Appendix G.

7.8.3 ALTERNATIVE 3: CLEARANCE OF OE TO DEPTH OF 6 INCHES

7.8.3.1 *Effectiveness*: For this alternative, qualified UXO clearance personnel would perform a one-time removal of OE to a depth of 6 inches. OE items were identified within 6 inches of the surface in all of the AOIs other than Indian Creek, SEAD-53, and the Demo Range. Therefore, an OE clearance operation to a depth of 6 inches below the surface would favorably impact the overall protection of public safety and the human environment at each of the other AOIs (see Tables 7.1 through 7.8). Alternative 3 would be effective in both the long term and the short term.

7.8.3.2 *Implementability*: This alternative is both technically and administratively feasible and the materials and services necessary to implement this alternative are readily available. Generally, clearance alternatives are acceptable to stakeholders as a means to reduce the residual UXO risk.

7.8.3.3 *Cost*: The cost to perform this alternative at each AOI where it has been considered is presented in Chapter 8, and the cost breakdowns are presented in Appendix G.

TABLE 7.1
IMPACT ANALYSIS
SEADs-16 AND -17

Alternative	Ordnance				Site			
	Type	Sensitivity	Density	Depth	Activity	Access	Stability	People
Existing Condition	Inert 20mm Projectile, Unknown Fuze (inert)	Category 0	Low	0-5"	Industrial Development	Limited Restriction	Moderately Stable	High
No Further Action	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
Institutional Controls	No Impact	No Impact	No Impact	No Impact	**Moderate**	**Moderate**	No Impact	**Moderate**
Clearance to 6"	No Impact	No Impact	**Significant**	**Significant**	No Impact	No Impact	No Impact	No Impact
Clearance to Depth	No Impact	No Impact	**Significant**	**Significant**	No Impact	No Impact	No Impact	No Impact
Excavation and Mechanical Sorting	No Impact	No Impact	**Significant**	**Significant**	No Impact	No Impact	No Impact	No Impact

TABLE 7.2
IMPACT ANALYSIS
EOD AREA #3

Alternative	Ordnance				Site			
	Type	Sensitivity	Density	Depth	Activity	Access	Stability	People
Existing Condition	Fuze lighter, Rifle-fired Grenade	Category 0	Low	0-12"	Conservation/ Recreation	Limited Restriction	Moderately Stable	High
No Further Action	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
Institutional Controls	No Impact	No Impact	No Impact	No Impact	**Moderate**	**Moderate**	No Impact	**Moderate**
Clearance to 6"	No Impact	No Impact	**Moderate**	**Moderate**	No Impact	No Impact	No Impact	No Impact
Clearance to Depth	No Impact	No Impact	**Significant**	**Significant**	No Impact	No Impact	No Impact	No Impact
Excavation and Mechanical Sorting	No Impact	No Impact	**Significant**	**Significant**	No Impact	No Impact	No Impact	No Impact

TABLE 7.3
IMPACT ANALYSIS
EOD AREA #2

Alternative	Ordnance				Site			
	Type	Sensitivity	Density	Depth	Activity	Access	Stability	People
Existing Condition	Fuze w/ Booster	Category 2	Medium	0-3"	Conservation/ Recreation	Limited Restriction	Moderately Stable	High
No Further Action	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
Institutional Controls	No Impact	No Impact	No Impact	No Impact	**Moderate**	**Moderate**	No Impact	**Moderate**
Clearance to 6"	No Impact	No Impact	**Significant**	**Significant**	No Impact	No Impact	No Impact	No Impact
Clearance to Depth	No Impact	No Impact	**Significant**	**Significant**	No Impact	No Impact	No Impact	No Impact
Excavation and Mechanical Sorting	No Impact	No Impact	**Significant**	**Significant**	No Impact	No Impact	No Impact	No Impact

TABLE 7.4
IMPACT ANALYSIS
SEAD-44A

Alternative	Ordnance				Site			
	Type	Sensitivity	Density	Depth	Activity	Access	Stability	People
Existing Condition	40mm Rifle-fired Grenade	Category 2	Low	0-12"	Prison	Limited Restriction	Unstable	Low
No Further Action	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
Institutional Controls	No Impact	No Impact	No Impact	No Impact	**Slight**	**Slight**	No Impact	**Slight**
Clearance to 6"	No Impact	No Impact	**Moderate**	**Moderate**	No Impact	No Impact	No Impact	No Impact
Clearance to Depth	No Impact	No Impact	**Significant**	**Significant**	No Impact	No Impact	No Impact	No Impact
Excavation and Mechanical Sorting	No Impact	No Impact	**Significant**	**Significant**	No Impact	No Impact	**Moderate**	No Impact

TABLE 7.5
IMPACT ANALYSIS
SEAD-46

Alternative	Ordnance				Site			
	Type	Sensitivity	Density	Depth	Activity	Access	Stability	People
Existing Condition	M83 Fragmentation Bomb	Category 3	Low	0-12"	Conservation/ Recreation	Limited Restriction	Moderately Stable	High
No Further Action	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
Institutional Controls	No Impact	No Impact	No Impact	No Impact	**Moderate**	**Moderate**	No Impact	**Moderate**
Clearance to 6"	No Impact	No Impact	**Moderate**	**Moderate**	No Impact	No Impact	No Impact	No Impact
Clearance to Depth	No Impact	No Impact	**Significant**	**Significant**	No Impact	No Impact	No Impact	No Impact
Excavation and Mechanical Sorting	No Impact	No Impact	**Significant**	**Significant**	No Impact	No Impact	No Impact	No Impact

TABLE 7.6
IMPACT ANALYSIS
GRENADE RANGE

Alternative	Ordnance				Site			
	Type	Sensitivity	Density	Depth	Activity	Access	Stability	People
Existing Condition	40mm Rifle-fired Grenade, 35mm Subcaliber LAW Rocket	Category 2	High	0-12"	Conservation/ Recreation	Limited Restriction	Moderately Stable	High
No Further Action	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
Institutional Controls	No Impact	No Impact	No Impact	No Impact	**Moderate**	**Moderate**	No Impact	**Moderate**
Clearance to 6"	No Impact	No Impact	**Moderate**	**Moderate**	No Impact	No Impact	No Impact	No Impact
Clearance to Depth	No Impact	No Impact	**Significant**	**Significant**	No Impact	No Impact	No Impact	No Impact
Excavation and Mechanical Sorting	No Impact	No Impact	**Significant**	**Significant**	No Impact	No Impact	No Impact	No Impact

TABLE 7.7
IMPACT ANALYSIS
SEAD-57

Alternative	Ordnance				Site			
	Type	Sensitivity	Density	Depth	Activity	Access	Stability	People
Existing Condition	MK 2 Fragmentation Grenade	Category 3	Low	0-6"	Conservation/ Recreation	Limited Restriction	Moderately Stable	High
No Further Action	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
Institutional Controls	No Impact	No Impact	No Impact	No Impact	**Moderate**	**Moderate**	No Impact	**Moderate**
Clearance to 6"	No Impact	No Impact	**Moderate**	**Moderate**	No Impact	No Impact	No Impact	No Impact
Clearance to Depth	No Impact	No Impact	**Moderate**	**Moderate**	No Impact	No Impact	No Impact	No Impact
Excavation and Mechanical Sorting	No Impact	No Impact	**Significant**	**Significant**	No Impact	No Impact	No Impact	No Impact

TABLE 7.8
IMPACT ANALYSIS
SEAD-45

Alternative	Ordnance				Site			
	Type	Sensitivity	Density	Depth	Activity	Access	Stability	People
Existing Condition	105mm WP Projectile	Category 3	High	0-48"	Conservation/ Recreation	Limited Restriction	Unstable	High
No Further Action	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
Institutional Controls	No Impact	No Impact	No Impact	No Impact	**Moderate**	**Moderate**	No Impact	**Moderate**
Clearance to 6"	No Impact	No Impact	**Slight**	**Slight**	No Impact	No Impact	No Impact	No Impact
Clearance to Depth	No Impact	No Impact	**Moderate**	**Moderate**	No Impact	No Impact	No Impact	No Impact
Excavation and Mechanical Sorting	No Impact	No Impact	**Significant**	**Significant**	No Impact	**Moderate**	No Impact	No Impact

7.8.4 ALTERNATIVE 4: CLEARANCE TO DEPTH OF DETECTION

7.8.4.1 *Effectiveness*: For this alternative, clearance personnel would perform a one-time OE removal to the depth of detection of the geophysical equipment chosen as ideal for the site during a geophysical prove-out. It is assumed that the geophysical instrumentation chosen for this task will detect the majority of the OE present in any of the AOIs to at least the specific depth of penetration for each item. For example, while most geophysical instruments will not detect a 20mm projectile to deeper than approximately 18", these items are not expected to be present at a depth greater than this. While larger items may penetrate farther than 18", their larger mass makes them detectable to deeper depths. The results of the EE/CA support the assumption that the OE present at SEDA is within the detection depths of commonly used geophysical equipment. As with Alternative 3, Alternative 4 would have favorably impact the overall protection of public safety and the human environment at each of the AOIs where OE was recovered (see Tables 7.1 through 7.8). Alternative 4 would be effective in both the long term and the short term.

7.8.4.2 *Implementability*: This alternative is both technically and administratively feasible and the materials and services necessary to implement this alternative are readily available. Generally, clearance alternatives are acceptable to stakeholders as a means to reduce the residual UXO risk.

7.8.4.3 *Cost*: The cost to perform this alternative at each AOI where it has been considered is presented in Chapter 8, and the cost breakdowns are presented in Appendix G.

7.8.5 ALTERNATIVE 5: CLEARANCE OF OE TO DEPTH BY MEANS OF MECHANICAL SORTING

7.8.5.1 *Effectiveness*: For this alternative, qualified UXO clearance personnel would oversee the excavation of all soil containing OE and supervise the mechanical sorting of OE from surrounding soils. This removal activity would address not only those OE items found within the first six inches below the surface, but also those found at deeper depths. This alternative has an impact on the overall protection of public safety and the human environment by removing the OE from the site. This alternative would be effective in both the long term and short term and would open the land up for unrestricted use.

7.8.5.2 *Implementability*: This alternative is both technically and administratively feasible and the materials and services necessary to implement this alternative are readily available for SEAD-45. Generally, excavation and mechanical sorting alternatives are acceptable to stakeholders as a means to remove the overall UXO risk.

7.8.5.3 *Cost*: The cost to perform this alternative at each AOI where it has been considered is presented in Chapter 8, and the cost breakdowns are presented in Appendix G.

7.9 SUMMARY OF REMAINING ALTERNATIVES

7.9.1 Alternative 1, NFA, is a viable alternative at the three sites where no UXO or OE was recovered during the EE/CA fieldwork. The other four Alternatives, however, do have some impact at each of the other sites investigated. Therefore, Alternatives 2, 3, 4, and 5 have been considered for each of the sites where OE was recovered. At some of the sites containing OE, a number of these alternatives would have a significant impact on the OE risk. Therefore, only one of the alternatives having a significant impact will be considered at each site. This will always be the most cost-effective alternative.

7.9.2 At SEADs-16 and -17 and EOD Area #2, where OE was not found below 6 inches, Alternatives 4 (Clearance to Depth) and 5 (Clearance to Depth by means of Mechanical Sorting) have not been considered, as they will not provide any more protection than Alternative 3 (Clearance to 6"). Alternative 5 has also not been considered at EOD Area #3, SEAD-46, or the Grenade Range, as it would not be any more effective than Alternative 4. Further implementation of Alternative 5 has also not been considered at SEAD-44A, as the area that has not already been scraped can be remediated as effectively with Alternative 4. However, given the current state of SEAD-44A, implementation of Alternative 4 in that area is contingent upon the mechanical sorting of OE out of the estimated 35,000 cubic yards of soil stockpiled there. The completion of this sorting is built into all further discussion of Alternative 4 in SEAD-44A.

APPENDIX C

REVISED SECTION 4 OF EE/CA REPORT

SECTION 4

RISK ASSESSMENT

4.1 INTRODUCTION

A qualitative risk assessment was performed at SEDA to assess the risk of OE to public safety and the human environment. This risk assessment was performed using the Interim Guidance for Ordnance and Explosive Risk Impact Assessment (OERIA) (US Army Engineering and Support Center, Huntsville, March 2001). The 11 AOIs that were evaluated under this risk assessment include:

- Indian Creek Burial Area
- SEAD-53 (Igloo Area - D Row Ditches)
- Demo Range
- SEADs-16 and-17 (Deactivation Furnaces)
- EOD Area #3
- EOD Area #2
- SEAD-44A (QA Function Test Area)
- SEAD-46 (3.5" Rocket Range)
- Grenade Range
- SEAD-57 (Former EOD Area)
- SEAD-45 (Open Detonation Area)

4.2 DEFINITION OF RISK ASSESSMENT FACTORS

4.2.1 INTRODUCTION

The potential risk posed by UXO at a site may be characterized qualitatively by evaluating factors in two categories, ordnance and site characteristics. By performing a qualitative assessment of these categories, an overall assessment of the safety risk posed by UXO remaining at the site may be obtained. The following paragraphs describe the components of each category.

4.2.2 ORDNANCE

4.2.2.1 There are four risk assessment factors in the ordnance category. These include the type, sensitivity, density, and depth of the ordnance.

4.2.2.2 *Type.* The type of OE found at a site impacts the likelihood and severity of a possible injury. The type(s) of OE found at each site during the investigation are included. When multiple types of OE are found, the type with the potential to cause the most severe injury is used. The four levels of ordnance type are defined and presented in order from highest to lowest risk in Table 4.1.

TABLE 4.1
OE TYPE RISK FACTOR DEFINITIONS

OE Type Category	Description
Most severe	OE that will kill an individual if detonated by an individual's activities
Moderate severity	OE that will cause major injury to an individual if detonated by an individual's activities
Least severity	OE that will cause minor injury to an individual if detonated by an individual's activities
No injury	Inert OE or scrap, will cause no injury

4.2.2.3 *Sensitivity.* The type of OE identified in an AOI is used to determine the sensitivity, which, in general, is the likelihood that a piece of ordnance will detonate. There are four levels of sensitivity defined in the risk assessment process. When multiple types of OE are discovered in an AOI, the highest risk level is used in the risk assessment. The four levels of sensitivity are defined and presented in order from highest to lowest risk in Table 4.2.

TABLE 4.2
OE SENSITIVITY RISK FACTOR DEFINITIONS

Level of Sensitivity	Description
Very Sensitive	OE that is very sensitive, i.e. electronic fusing, land mines, booby traps
Less sensitive	OE that has a standard fusing
Insensitive	OE that may have functioned correctly, or is

	unfuzed, but has a residual risk
Inert	Inert OE or scrap, will cause no injury

4.2.2.4 *Density.* UXO Density is directly related to the likelihood that an individual will come into contact with UXO. In an area with low UXO density, considerable exploration would be needed to find a single UXO item; whereas in an area with high UXO density, only a brief visual or instrument aided inspection would be required to find an item. Assessment of this risk factor reflects the findings of the EE/CA and previous site inspections.

4.2.2.5 *Depth.* The depth of the UXO affects the likelihood that an individual will be exposed to UXO. There exists a direct relationship between the depth at which UXO is found and the likelihood of exposure to the UXO. That is, the greater the depth that the UXO are found, the lower the risk of exposure. There are two categories within the UXO Depth risk factor: near-surface and subsurface. The near-surface category includes those items recovered from the surface to 6 inches below ground surface. The subsurface category includes those items recovered from greater than 6 inches below ground surface. Assessment of this risk factor reflects the findings of the EE/CA and previous site investigations.

4.2.3 SITE CHARACTERISTICS

4.2.3.1 There are four risk assessment factors in the site category. These include site activity, site accessibility, site stability, and population.

4.2.3.2 *Site Activity.* The types of activities conducted at a site affect the likelihood of encountering UXO. The types of activities and the depth at which UXO have been found are both considered to categorize the overall risk. For example, at a site where UXO is found at the surface, all activities that can impact UXO at the surface are considered activities that can have a significant impact. Conversely, if all UXO is located at depths greater than one foot below the ground surface and only surface impact activities are being performed at the site, the activities are considered to have a moderate or low impact.

4.2.3.3 *Site Accessibility.* The accessibility of a site affects the likelihood of encountering UXO. Natural or physical barriers can limit the accessibility. Natural barriers can include the terrain or topography of the site as well as the vegetation. Physical barriers can include walls and fences that limit the public's accessibility to the site. Both the physical and natural barriers found at a site are considered when evaluating this risk factor. There are three categories within the Accessibility risk factor. These categories are presented in Table 4.3.

4.2.3.4 *Site Stability.* This factor relates to the probability of buried UXO being exposed by natural processes. These natural processes include recurring natural events (e.g., frost heave, soil movement, erosion) or extreme natural events (e.g., tornadoes, hurricanes). The local soil type, topography, climate, and vegetation affect stability of the site. The soil type and climate primarily affects the depth of penetration of the UXO. Over time, the soil type and

climate will also affect the degree of erosion that takes place at a site. Topography and vegetation in the area will also affect the rate of erosion that takes place in an area. There are three categories within this risk factor. Table 4.4 describes these categories.

TABLE 4.3
SITE ACCESSIBILITY RISK FACTOR DEFINITIONS

Accessibility of Site	Description
No Restriction to Site	No physical barriers, gently rolling terrain, no vegetation that restricts access, no water
Limited Restriction to Site	Physical barriers, vegetation that restricts access, water, snow or ice cover, terrain restricts access
Complete Restriction to Site	All points of entry are controlled

TABLE 4.4
SITE STABILITY RISK FACTOR DEFINITIONS

Site Stability	Description
Stable	UXO should not be exposed by natural events
Moderately stable	UXO may be exposed by natural events
Unstable	UXO most likely will be exposed by natural events

4.2.3.5 *Population.* This factor refers to the number of people that may have access to the site on a daily basis. The number of people using the site directly affects the likelihood of encountering UXO. Determination of this risk factor is related to the land use expected at the site. There are three categories within this risk factor: high, medium and low. These categories are defined and presented from highest to lowest risk in Table 4.5.

TABLE 4.5
POPULATION
RISK FACTOR DEFINITION

Number of People Using Site	Description
High	Public attraction such as a park, beach, other tourist sites
Medium	Public has access to land, but area is not an attraction to the public
Low	Owners are primary users of the land

4.3 RISK ASSESSMENT AT 11 OE AOIs AT SEDA

4.3.1 INTRODUCTION

Each of the risk factors identified above was evaluated using existing data for each AOI under consideration. The following sections discuss the risk assessment by factor.

4.3.2 ORDNANCE TYPE

Appendix C lists the type and amount of UXO and OE identified in each AOI during the EE/CA. Descriptions of many of these ordnance types are contained in Section 3.7.4. The ordnance type category assigned to each of the AOIs investigated is summarized in Table 4.6.

4.3.3 ORDNANCE SENSITIVITY

There were no items recovered during the EE/CA that suggested the presence of extremely sensitive fuzing. All UXO recovered contained standard fuzing. Therefore, the ordnance sensitivity level in each of the AOIs in which UXO was found is considered Less Sensitive.

4.3.4 UXO DENSITY

The expected qualitative UXO density of each site is summarized in the Risk Assessment Table (Table 4.7). UXO density for each AOI was determined using the findings of the EE/CA field work in conjuction with USACE's UXO Calculator. Qualitative values were then assigned to ranges of density. "Low" density was defined as less than 1 UXO item expected per acre, "medium" density was defined as 1-10 UXO items/acre, and "high" density was defined as more than 10 items/acre. Densities were not applicable at the ditches in SEAD-53, the Indian Creek site or the Demo Range, as no OE was recovered in any of these areas.

4.3.5 OE DEPTH

The OE identified at Seneca Army Depot during the EE/CA and previous environmental investigations has been found at depths ranging from surface to 48 inches deep. The presence of UXO beyond 12 inches is so far limited to SEAD-45. The majority of the UXO recovered during the EE/CA was found between 0 and 6 inches below the ground surface. OE recovery depths at each site are summarized in Table 4.7.

4.3.6 SITE ACTIVITY

Most of the AOIs investigated are slated for use as Conservation/Recreation areas under the current future management plan established by the LRA. The exceptions would be SEADs-16 and -17 that are allocated for Industrial Development and SEAD-44A that will be transferred to the prison when the UXO hazard has been alleviated. At all of the AOIs where OE was found, there was at least some OE present within 6 inches of the ground surface. Therefore, as all of the AOIs have some planned future activity, the OE hazard is significant at each site.

4.3.7 SITE ACCESSIBILITY

Access to nine of the 11 AOIs at Seneca Army Depot are considered unlimited or unrestricted under the site accessibility risk factor definitions shown in Table 4.3. The accessibilities were based on the intended future use of most of the site land as a public conservation park. If the base fences are opened or removed to allow the public unrestricted movement across park land, there are few natural barriers which would prevent access to any of the sites. In fact, roads currently pass through or immediately adjacent to all of the AOIs currently planned for use as conservation land. Only two sites of the original 11 AOIs are planned to have limited restriction due to their intended use by private parties. Seads-16 and –17 are intended for industrial use, although it is unclear at present exactly what form this use will

TABLE 4.7
RISK ASSESSMENT

AOI	Ordnance				Site			
	Type	Sensitivity	Expected Density	Depth	Activity	Access	Stability	People
Indian Creek	No OE encountered	N /A	N /A	N /A	N/A	No Restriction	Moderately Stable	High
SEAD-53 (D Row Ditches)	No OE encountered	N /A	N /A	N /A	N/A	No Restriction	Moderately Stable	High
Demo Range	No OE encountered	N /A	N/A	N /A	N/A	No Restriction	Moderately Stable	High
SEAD-17	Inert	Inert	Low	Surface (0-5")	Significant	Limited Restriction	Moderately Stable	High
EOD Area 3	Inert	Inert	Low	Subsurface (0-12")	Significant	No Restriction	Moderately Stable	High
EOD Area 2	Moderate severity	Less sensitive	Low	Surface (0-3")	Significant	No Restriction	Moderately Stable	High
SEAD-44A	Moderate severity	Less sensitive	Low	Subsurface (0-12")	Significant	Limited Restriction	Unstable	Low
SEAD-46	Most severe	Less sensitive	Low	Subsurface (0-12")	Significant	No Restriction	Moderately Stable	High
Grenade Range Grids	Moderate severity	Less sensitive	High	Subsurface (0-12")	Significant	No Restriction	Moderately Stable	High
Grenade Range Meandering Path	Moderate severity	Less sensitive	Medium	Surface (0-5")	Significant	No Restriction	Moderately Stable	High
SEAD-57	Most severe	Less sensitive	Low	Surface (0-6")	Significant	No Restriction	Moderately Stable	High
SEAD-45 Grids	Most severe	Less sensitive	High	Subsurface (0-48")	Significant	No Restriction	Unstable	High
SEAD-45 Meandering Path	Most severe	Less sensitive	High	Subsurface (0-36")	Significant	No Restriction	Moderately Stable	High

take; and SEAD-44A has been transferred to the prison and is entirely within the boundaries of at least one fence.

4.3.8 SITE STABILITY

Frost heaving is a major consideration at SEDA as far as site stability is concerned. As all of the AOIs will be subjected to this process, all have been classified as moderately stable at best. Two sites, SEAD-44A and SEAD-45, also contain land that is almost completely barren. All of SEAD-44A and the detonation berm in SEAD-45 are subject to greater amounts of erosion by wind and rain due to their lack of vegetative cover. These two sites have been classified as unstable.

TABLE 4.6
ORDNANCE TYPE

Area of Interest	Most Sensitive Ordnance Type	Category
Indian Creek Burial Area	No OE Encountered	N/A
SEAD-53 (D Row Ditches)	No OE Encountered	N/A
Demo Range	No OE Encountered	N/A
SEADs-16 and -17	Unknown Fuze (spent)	Inert
EOD Area #3	Spent Rifle Grenade (illumination)	Inert
EOD Area #2	Fuze with booster	Moderate severity
SEAD-44A	40mm Rifle-Fired Grenade - 6g HE spotting charge	Moderate severity
SEAD-46	M83 (Butterfly) Fragmentation Bomb	Most severe
Grenade Range	M73 35mm Subcaliber LAW Rocket, 40mm Rifle-Fired Grenade - 6g HE spotting charge	Moderate severity

Area of Interest	Most Sensitive Ordnance Type	Category
SEAD-57	MK2 Fragmentation Grenade	Most severe
SEAD-45	105mm White Phosphorus	Most severe

4.3.9 POPULATION

If future land use plans are followed, most of SEDA will become a public conservation park or an industrial complex. Both of these uses are expected to attract a number of people to the property. This attraction will significantly increase the number of people visiting compared with current land use. This increase in people to the property will, in turn, intensify the probability of a person's exposure to UXO. While the fence encompassing the former depot restricts public access, the freedom of people to move about within the confines of the fenced site will be unrestricted unless areas of concern are controlled or restricted prior to public access. The only site where there should not be a significant increase in the number of visitors is SEAD-44A, which is within the perimeter fence of the prison.

4.4 RISK ASSESSMENT SUMMARY

4.4.1 The risk to public safety and the human environment associated with UXO at the Seneca Army Depot Activity was evaluated for each of the 11 AOIs under investigation. This assessment pertains only to those portions of the AOIs that were investigated.

4.4.2 Based on the results of the site visit and this assessment, there is no public safety risk associated with UXO at three of the AOIs investigated: the SEAD-53 ditches, the Indian Creek Burial Area, and most of the Demo Range. No OE was identified in these AOIs during the site visit or during any of the previous investigations.

4.4.3 While the Risk Assessment characterizes the Demo Range as having no OE associated hazard, this site is in very close proximity to the detonation berm in SEAD-57. Therefore, while most of the Demo Range will continue to be classified as no risk, a part of this site will be considered to have the same risk factors as those associated with SEAD-57. The specific portion of the Demo Range that will be grouped with SEAD-57 will be clarified when response action alternatives are analyzed in Chapter 8.

4.4.4 A public safety risk associated with UXO was identified at eight AOIs under investigation: SEADs-16 and -17, -44A, -45, -46, and -57, EOD Areas #2 and #3, and the Grenade Range. Response action alternatives will be evaluated for these eight AOIs.

APPENDIX D

REVISED COSTS/COST ESTIMATES FOR ALTERNATIVES

Table G-1
SEADs-16 and -17 (Deactivation Furnaces)
Cost Estimate for Alternative 3:
Clearance to 6"

This estimate assumes:
Clearnce to 6" of 8 acres SEAD-17and 5 acres in SEAD-16

Item	Unit	Unit Cost	Amount	Initial Cost	Life Cycle Cost (30 yrs)	Total Cost
UXO Clearance[1]	acre	$3,400	15	$51,000	$0	$51,000
Scrap Removal		$10,000		$10,000	$0	$10,000
A-E Field Oversight		15% of UXO Clearance/IC		$9,150	$0	$9,150
A-E Project Management		8% of UXO Clearance/IC		$4,880	$0	$4,880
Light Brush Cutting[2]	acre	$120	9	$1,080	$0	$1,080
			Subtotal:	$76,110	$0	$76,110
CEHNC Oversite		15% of subtotal		$11,417	$0	$11,417
					Total Cost Estimate:	**$87,527**
					Contingency (25%):	**$21,882**
						$109,408
					Cost per. Acre =	***$10,941***

Assumptions
[1]Cost for UXO clearance includes all ODC and mobilization costs, and equipment
[2]Brush cutting costs taken from ECHOS 1996 and adjusted for inflation using Engineering News Record Construction Cost Index History

Table G-2
SEADs-16 and -17 (Deactivation Furnaces)
Cost Estimate for Alternative 2:
Institutional Controls

This estimate assumes:
A fence surrounding SEADs -16 and -17

Item	Unit	Unit Cost	Amount	Initial Cost	Life Cycle Cost (30 yrs)	Total Cost
UXO Sweep Contractor[1]	linear feet	$2	4,800	$9,600	$0	$9,600
Fencing Installed[2]	linear feet	$10	4,800	$48,000	$144,000	$192,000
Signs Installed	1 sign (per 500' of fence)	$93	10	$893	$5,760	$6,653
A-E Field Oversight		15% of UXO Clearance/IC		$8,774	$0	$8,774
A-E Project Management		8% of UXO Clearance/IC		$4,679	$0	$4,679
Heavy Brush Cutting[3]	acre	$603	2	$905	$0	$905
			Subtotal:	$72,851	$149,760	$222,611
CEHNC Oversite		15% of subtotal		$10,928	$0	$10,928
					Total Cost Estimate:	**$233,538**
					Contingency (25%):	**$58,385**
						$291,923
					Cost per. Acre =	***$36,490***

Assumptions
[1]Estimate includes surface sweep of area to be performed prior to having fence installed
[2]Cost to install fencing is $10 per linear foot of 8 foot chain link with three strands of barbed wire
[3]Brush cutting costs taken from ECHOS 1996 and adjusted for inflation using Engineering News Record Construction Cost Index History

Table G-3
EOD Area #2 (Rumored EOD Area)
Cost Estimate for Alternative 3:
Clearance to 6"

This estimate assumes:
Clearance to 6" of 2.5 acres in EOD Area #2

Item	Unit	Unit Cost	Amount	Initial Cost	Life Cycle Cost (30 yrs)	Total Cost
UXO Clearance[1]	acre	$3,400	2.5	$8,500	$0	$8,500
A-E Field Oversight		15% of UXO Clearance/IC		$1,275	$0	$1,275
A-E Project Management		8% of UXO Clearance/IC		$680	$0	$680
Moderate Brush Cutting[2]	acre	$426	2.5	$1,065	$0	$1,065
			Subtotal:	$11,520	$0	$11,520
CEHNC Oversite		15% of subtotal		$1,728	$0	$1,728

Total Cost Estimate:	**$13,248**
Contingency (25%):	**$3,312**
	$16,560
Cost per. Acre =	***$6,624***

Assumptions
[1]Cost for UXO clearance includes all ODC and mobilization costs, and equipment
[2]Brush cutting costs taken from ECHOS 1996 and adjusted for inflation using Engineering News Record Construction Cost Index History

Table G-4
EOD Area #2 (Rumored EOD Area)
Cost Estimate for Alternative 2:
Institutional Controls

This estimate assumes:
A fence surrounding EOD Area #2

Item	Unit	Unit Cost	Amount	Initial Cost	Life Cycle Cost (30 yrs)	Total Cost
UXO Sweep Contractor[1]	linear feet	$2	1,800	$3,600	$0	$3,600
Fencing Installed[2]	linear feet	$10	1,800	$18,000	$54,000	$72,000
Signs Installed	1 sign (per 500' of fence)	$93	4	$335	$2,160	$2,495
A-E Field Oversight		15% of UXO Clearance/IC		$3,290	$0	$3,290
A-E Project Management		8% of UXO Clearance/IC		$1,755	$0	$1,755
Moderate Brush Cutting[3]	acre	$426	1	$426	$0	$426
			Subtotal:	$27,406	$56,160	$83,566
CEHNC Oversite		15% of subtotal		$4,111	$0	$4,111

Total Cost Estimate:	**$87,677**
Contingency (25%):	**$21,919**
	$109,596
Cost per. Acre =	***$43,838***

Assumptions
[1]Estimate includes surface sweep of area to be performed prior to having fence installed
[2]Cost to install fencing is $10 per linear foot of 8 foot chain link with three strands of barbed wire
[3]Brush cutting costs taken from ECHOS 1996 and adjusted for inflation using Engineering News Record Construction Cost Index History

Table G-5
EOD Area #3 (Rumored EOD Area)
Cost Estimate for Alternative 4:
Clearance to Depth

This estimate assumes:
Clearance to depth of detection of 2 acres in EOD Area #3

Item	Unit	Unit Cost	Amount	Initial Cost	Life Cycle Cost (30 yrs)	Total Cost
UXO Clearance[1]	acre	$11,000	2	$22,000	$0	$22,000
A-E Field Oversight		15% of UXO Clearance/IC		$3,300	$0	$3,300
A-E Project Management		8% of UXO Clearance/IC		$1,760	$0	$1,760
Heavy Brush Cutting[2]	acre	$603	2	$1,206	$0	$1,206
			Subtotal:	$28,266	$0	$28,266
CEHNC Oversite		15% of subtotal		$4,240	$0	$4,240

Total Cost Estimate:	**$32,506**
Contingency (25%):	**$8,126**
	$40,632
Cost per. Acre =	***$20,316***

Assumptions

[1]Cost for UXO clearance includes all ODC and mobilization costs, and equipment
With EM-61, it also includes the collection, processing, and storage of data
as well as the reacquisition and removal of anomalies and a 10% QC survey

[2]Brush cutting costs taken from ECHOS 1996 and adjusted for inflation using Engineering News Record Construction Cost Index History

Table G-6
EOD Area #3 (Rumored EOD Area)
Cost Estimate for Alternative 3:
Clearance to 6"

This estimate assumes:
Clearance to 6" of 2 acres in EOD Area #3

Item	Unit	Unit Cost	Amount	Initial Cost	Life Cycle Cost (30 yrs)	Total Cost
UXO Clearance[1]	acre	$3,400	2	$6,800	$0	$6,800
A-E Field Oversight		15% of UXO Clearance/IC		$1,020	$0	$1,020
A-E Project Management		8% of UXO Clearance/IC		$544	$0	$544
Heavy Brush Cutting[2]	acre	$603	2	$1,206	$0	$1,206
			Subtotal:	$9,570	$0	$9,570
CEHNC Oversite		15% of subtotal		$1,436	$0	$1,436

Total Cost Estimate:	**$11,006**
Contingency (25%):	**$2,751**
	$13,757
Cost per. Acre =	***$6,878***

Assumptions

[1]Cost for UXO clearance includes all ODC and mobilization costs, and equipment

[2]Brush cutting costs taken from ECHOS 1996 and adjusted for inflation using Engineering News Record Construction Cost Index History

Table G-7
EOD Area #3 (Rumored EOD Area)
Cost Estimate for Alternative 2:
Institutional Controls

This estimate assumes:
A fence surrounding EOD Area #3

Item	Unit	Unit Cost	Amount	Initial Cost	Life Cycle Cost (30 yrs)	Total Cost
UXO Sweep Contractor[1]	linear feet	$2	1,800	$3,600	$0	$3,600
Fencing Installed[2]	linear feet	$10	1,800	$18,000	$54,000	$72,000
Signs Installed	1 sign (per 500' of fence)	$93	4	$335	$2,160	$2,495
A-E Field Oversight		15% of UXO Clearance/IC		$3,290	$0	$3,290
A-E Project Management		8% of UXO Clearance/IC		$1,755	$0	$1,755
Moderate Brush Cutting[3]	acre	$426	1	$426	$0	$426
			Subtotal:	$27,406	$56,160	$83,566
CEHNC Oversite		15% of subtotal		$4,111	$0	$4,111
					Total Cost Estimate:	**$87,677**
					Contingency (25%):	**$21,919**
						$109,596
					Cost per. Acre =	***$43,838***

Assumptions
[1]Estimate includes surface sweep of area to be performed prior to having fence installed
[2]Cost to install fencing is $10 per linear foot of 8 foot chain link with three strands of barbed wire
[3]Brush cutting costs taken from ECHOS 1996 and adjusted for inflation using Engineering News Record Construction Cost Index History

Table G-8
SEAD-44A (QA Function Test Area)
Cost Estimate for Alternative 4:
Finish Soil Sifting - Confirm with Clearance to Depth

This estimate assumes:
The sifting of 35,000 cubic feet of soil already stockpiled at SEAD-44A
Clearance to depth of detection of 11 acres not surveyed during the EE/CA

Item	Unit	Unit Cost	Amount	Total Cost	Life Cycle Cost (30 yrs)	Total Cost
Soil Ecavated and Sifted[1]	cubic yard	$30	35,000	$1,050,000	$0	$1,050,000
Replacement/Compaction of Soil[2]	cubic yard	$5	35,000	$175,000	$0	$175,000
Re-seeding Disturbed Soil[2]	acre	$438	25	$10,950	$0	$10,950
UXO Clearance[3]	acre	$11,000	23	$253,000	$0	$253,000
A-E Field Oversite		15% of UXO Clearance		$223,343	$0	$223,343
A-E Project Management		8% of UXO Clearance		$119,116	$0	$119,116
			Subtotal:	$1,831,409	$0	$1,831,409
CEHNC Oversite		15% of subtotal		$274,711	$0	$274,711
					Total Cost Estimate	**$2,106,120**
					Contingency (25%)	**$526,530**
						$2,632,650
					Cost per acre =	***$105,306***

Assumptions
[1]Unit cost assumes $25/yd^3 for primary sift, $3/yd^3 for secondary sift, and $2/yd^3 for tertiary sift and hand sort
[2]Costs taken from ECHOS 1996 and adjusted for inflation using Engineering News Record Construction Cost Index History
[3]Cost for UXO clearance includes all ODC and mobilization costs, and equipment
With EM-61, it also includes the collection, processing, and storage of data
as well as the reacquisition and removal of anomalies and a 10% QC survey

Table G-9
SEAD-44A (QA Function Test Area)
Cost Estimate for Alternative 3:
Finish Soil Sifting - Confirm with Clearance to 6"

This estimate assumes:
The sifting of 35,000 cubic feet of soil already stockpiled at SEAD-44A
Clearance to 6" of 11 acres not surveyed during EE/CA

Item	Unit	Unit Cost	Amount	Total Cost	Life Cycle Cost (30 yrs)	Total Cost
Soil Ecavated and Sifted[1]	cubic yard	$30	35,000	$1,050,000	$0	$1,050,000
Replacement/Compaction of Soil[2]	cubic yard	$5	35,000	$175,000	$0	$175,000
Re-seeding Disturbed Soil[2]	acre	$438	25	$10,950	$0	$10,950
UXO Clearance[3]	acre	$5,400	23	$124,200	$0	$124,200
A-E Field Oversite		15% of UXO Clearance		$204,023	$0	$204,023
A-E Project Management		8% of UXO Clearance		$108,812	$0	$108,812
			Subtotal:	$1,672,985	$0	$1,672,985
CEHNC Oversite		15% of subtotal		$250,948	$0	$250,948
					Total Cost Estimate	**$1,923,932**
					Contingency (25%)	**$480,983**
						$2,404,915
					Cost per acre =	***$96,197***

Assumptions
[1]Unit cost assumes $25/yd^3 for primary sift, $3/yd^3 for secondary sift, and $2/yd^3 for tertiary sift and hand sort
[2]Costs taken from ECHOS 1996 and adjusted for inflation using Engineering News Record Construction Cost Index History
[3]Cost for UXO clearance includes all ODC and mobilization costs, and equipment

Table G-10
SEAD-44A (QA Function Test Area)
Cost Estimate for Alternative 2:
Institutional Controls

This estimate assumes:
Upkeep of the fence already surrounding SEAD-44A

Item	Unit	Unit Cost	Amount	Initial Cost	Life Cycle Cost (30 yrs)	Total Cost
Fencing Installed	linear feet	$10	4,250	$0	$127,500	$127,500
Signs Installed	1 sign (per 500' of fence)	$93	4	$335	$2,160	$2,495
			Subtotal:	$335	$129,660	$129,995
CEHNC Oversite		15% of subtotal		$50	$0	$50
					Total Cost Estimate:	**$130,045**
					Contingency (25%):	**$32,511**
						$162,556
					Cost per. Acre =	***$6,502***

Table G-11
SEAD-46 (3.5" Rocket Range)
Cost Estimate for Alternative 4:
Clearance to Depth

This estimate assumes:
Clearance to depth of detection in 39 acres where brush can be cleared for geophysical surveys

Item	Unit	Unit Cost	Amount	Initial Cost	Life Cycle Cost (30 yrs)	Total Cost
UXO Clearance[1]	acre	$11,000	39	$429,000	$0	$429,000
A-E Field Oversight		15% of UXO Clearance/IC		$64,350	$0	$64,350
A-E Project Management		8% of UXO Clearance/IC		$34,320	$0	$34,320
Light Brush Cutting[2]	acre	$120	21	$2,520	$0	$2,520
Heavy Brush Cutting[2]	acre	$603	30	$18,090	$0	$18,090
			Subtotal:	$548,280	$0	$548,280
CEHNC Oversite		15% of subtotal		$82,242	$0	$82,242
					Total Cost Estimate:	**$630,522**
					Contingency (25%):	**$157,631**
						$788,153
					Cost per. Acre =	***$20,209***

Assumptions
[1]Cost for UXO clearance includes all ODC and mobilization costs, and equipment
With EM-61, it also includes the collection, processing, and storage of data
as well as the reacquisition and removal of anomalies and a 10% QC survey
[2]Brush cutting costs taken from ECHOS 1996 and adjusted for inflation using Engineering News Record Construction Cost Index History

Table G-12
SEAD-46 (3.5" Rocket Range)
Cost Estimate for Alternative 3:
Clearance to 6"

This estimate assumes:
Clearance to 6" of 39 acres in SEAD-46

Item	Unit	Unit Cost	Amount	Initial Cost	Life Cycle Cost (30 yrs)	Total Cost
UXO Clearance[1]	acre	$3,400	39	$132,600	$0	$132,600
A-E Field Oversight		15% of UXO Clearance/IC		$19,890	$0	$19,890
A-E Project Management		8% of UXO Clearance/IC		$10,608	$0	$10,608
Light Brush Cutting[2]	acre	$120	21	$2,520	$0	$2,520
Heavy Brush Cutting[2]	acre	$603	30	$18,090	$0	$18,090
			Subtotal:	$183,708	$0	$183,708
CEHNC Oversite		15% of subtotal		$27,556	$0	$27,556
					Total Cost Estimate:	**$211,264**
					Contingency (25%):	**$52,816**
						$264,080
					Cost per. Acre =	***$6,771***

Assumptions
[1]Cost for UXO clearance includes all ODC and mobilization costs, and equipment
[2]Brush cutting costs taken from ECHOS 1996 and adjusted for inflation using Engineering News Record Construction Cost Index History

Table G-13
SEAD-46 (3.5" Rocket Range)
Cost Estimate for Alternative 2:
Institutional Controls

This estimate assumes:
A fence surrounding SEAD-46

Item	Unit	Unit Cost	Amount	Initial Cost	Life Cycle Cost (30 yrs)	Total Cost
UXO Sweep Contractor[1]	linear feet	$2	6,600	$13,200	$0	$13,200
Fencing Installed[2]	linear feet	$10	6,600	$66,000	$198,000	$264,000
Signs Installed	1 sign (per 500' of fence)	$93	13	$1,228	$7,920	$9,148
A-E Field Oversight		15% of UXO Clearance/IC		$12,064	$0	$12,064
A-E Project Management		8% of UXO Clearance/IC		$6,434	$0	$6,434
Heavy Brush Cutting[3]	acre	$603	2	$905	$0	$905
			Subtotal:	$99,830	$205,920	$305,750
CEHNC Oversite		15% of subtotal		$14,975	$0	$14,975

Total Cost Estimate:	**$320,725**
Contingency (25%):	**$80,181**
	$400,906
Cost per. Acre =	***$7,710***

Assumptions
[1]Estimate includes surface sweep of area to be performed prior to having fence installed
[2]Cost to install fencing is $10 per linear foot of 8 foot chain link with three strands of barbed wire
[3]Brush cutting costs taken from ECHOS 1996 and adjusted for inflation using Engineering News Record Construction Cost Index History

Table G-14
Grenade Range
Cost Estimate for Alternative 4:
Clearance to Depth

This estimate assumes:
Clearance to depth of detection of 25 acres in the Grenade Range
Clearance to 6" of 19 acres of woodland immediately surrounding the range

Item	Unit	Unit Cost	Amount	Initial Cost	Life Cycle Cost (30 yrs)	Total Cost
UXO Clearance to depth[1]	acre	$11,000	25	$275,000	$0	$275,000
UXO Clearance to 6"[2]	acre	$3,400	19	$64,600	$0	$64,600
A-E Field Oversight		15% of UXO Clearance/IC		$41,250	$0	$41,250
A-E Project Management		8% of UXO Clearance/IC		$22,000	$0	$22,000
Light Brush Cutting[3]	acre	$120	25	$3,000	$0	$3,000
Moderate Brush Cutting[3]	acre	$426	19	$8,094	$0	$8,094
			Subtotal:	$413,944	$0	$413,944
CEHNC Oversite		15% of subtotal		$62,092	$0	$62,092

Total Cost Estimate:	**$476,036**
Contingency (25%):	**$119,009**
	$595,045
Cost per. Acre =	***$13,524***

Assumptions
[1]Cost for UXO clearance includes all ODC and mobilization costs, and equipment
With EM-61, it also includes the collection, processing, and storage of data
as well as the reacquisition and removal of anomalies and a 10% QC survey
[2]Cost for UXO clearance includes all ODC and mobilization costs, and equipment
[3]Brush cutting costs taken from ECHOS 1996 and adjusted for inflation using Engineering News Record Construction Cost Index History

Table G-15
Grenade Range
Cost Estimate for Alternative 3:
Clearance to 6"

This estimate assumes:
Clearance to 6" of 44 acres in and surrounding the Grenade Range

Item	Unit	Unit Cost	Amount	Initial Cost	Life Cycle Cost (30 yrs)	Total Cost
UXO Clearance[1]	acre	$3,400	44	$149,600	$0	$149,600
A-E Field Oversight		15% of UXO Clearance/IC		$22,440	$0	$22,440
A-E Project Management		8% of UXO Clearance/IC		$11,968	$0	$11,968
Light Brush Cutting[2]	acre	$120	25	$3,000	$0	$3,000
Moderate Brush Cutting[2]	acre	$426	19	$8,094	$0	$8,094
			Subtotal:	$195,102	$0	$195,102
CEHNC Oversite		15% of subtotal		$29,265	$0	$29,265
					Total Cost Estimate:	**$224,367**
					Contingency (25%):	**$56,092**
						$280,459
					Cost per. Acre =	***$6,374***

Assumptions
[1]Cost for UXO clearance includes all ODC and mobilization costs, and equipment
[2]Brush cutting costs taken from ECHOS 1996 and adjusted for inflation using Engineering News Record Construction Cost Index History

Table G-16
Grenade Range
Cost Estimate for Alternative 2:
Institutional Controls

This estimate assumes:
A fence surrounding the Grenade Range

Item	Unit	Unit Cost	Amount	Initial Cost	Life Cycle Cost (30 yrs)	Total Cost
UXO Sweep Contractor[1]	linear feet	$2	60,000	$120,000	$0	$120,000
Fencing Installed[2]	linear feet	$10	60,000	$600,000	$1,800,000	$2,400,000
Signs Installed	1 sign (per 500' of fence)	$93	120	$11,160	$72,000	$83,160
A-E Field Oversight		15% of UXO Clearance/IC		$109,674	$0	$109,674
A-E Project Management		8% of UXO Clearance/IC		$58,493	$0	$58,493
Heavy Brush Cutting[3]	acre	$603	13	$7,839	$0	$7,839
			Subtotal:	$907,166	$1,872,000	$2,779,166
CEHNC Oversite		15% of subtotal		$136,075	$0	$136,075
					Total Cost Estimate:	**$2,915,241**
					Contingency (25%):	**$728,810**
						$3,644,051
					Cost per. Acre =	***$82,819***

Assumptions
[1]Estimate includes surface sweep of area to be performed prior to having fence installed
[2]Cost to install fencing is $10 per linear foot of 8 foot chain link with three strands of barbed wire
[3]Brush cutting costs taken from ECHOS 1996 and adjusted for inflation using Engineering News Record Construction Cost Index History

Table G-17
SEAD-57 (Former EOD Range)
Cost Estimate for Alternative 5:
Soil Excavation and Sifting

This estimate assumes:
the excavation and sifting of 12,000 cubic yards of material from SEAD-57
Clearance to depth of detection of 41 acres where brush can be cleared for geophysical surveys
Clearance to 6" of 20 thickly wooded acres (this area includes a portion of the Demo Range)

Item	Unit	Unit Cost	Amount	Total Cost	Life Cycle Cost (30 yrs)	Total Cost
Soil Ecavated and Sifted[1]	cubic yard	$30	12,000	$360,000	$0	$360,000
Replacement/Compaction of Soil[2]	cubic yard	$5	12,000	$60,000	$0	$60,000
Re-seeding Disturbed Soil[2]	acre	$438	7	$3,241	$0	$3,241
UXO Clearance to depth[3]	acre	$11,000	41	$445,500	$0	$445,500
UXO Clearance to 6"[4]	acre	$5,400	20	$108,000	$0	$108,000
A-E Field Oversite		15% of UXO Clearance		$146,511	$0	$146,511
A-E Project Management		8% of UXO Clearance		$78,139	$0	$78,139
Light Brush Cutting[2]	acre	$120	46	$5,520	$0	$5,520
Moderate Brush Cutting[2]	acre	$426	20	$8,520	$0	$8,520
Heavy Brush Cutting[2]	acre	$603	9	$5,427	$0	$5,427
			Subtotal:	$1,220,859	$0	$1,220,859
CEHNC Oversite		15% of subtotal		$183,129	$0	$183,129

Total Cost Estimate	**$1,403,987**
Contingency (25%)	**$350,997**
	$1,754,984
Cost per acre =	***$24,375***

Assumptions

[1]Unit cost assumes $25/yd[3] for primary sift, $3/yd[3] for secondary sift, and $2/yd[3] for tertiary sift and hand sort

[2]Costs taken from ECHOS 1996 and adjusted for inflation using Engineering News Record Construction Cost Index History

[3]Cost for UXO clearance includes all ODC and mobilization costs, and equipment
With EM-61, it also includes the collection, processing, and storage of data
as well as the reacquisition and removal of anomalies and a 10% QC survey

[4]Cost for UXO clearance includes all ODC and mobilization costs, and equipment

Table G-18
SEAD-57 (Former EOD Range)
Cost Estimate for Alternative 4:
Clearance to Depth

This estimate assumes:
Clearance to depth of detection of 30 acres where brush can be cleared for geophysical surveys
Clearance to 6" of 20 thickly wooded acres (this area includes a portion of the Demo Range)
A 700' x 700' fence surrounding the demo berm in SEAD-57

Item	Unit	Unit Cost	Amount	Initial Cost	Life Cycle Cost (30 yrs)	Total Cost
UXO Clearence w/ EM-61[1]	acre	$11,000	30	$330,000	$0	$330,000
UXO Clearence w/ Schonstedt[2]	acre	$3,400	20	$68,000	$0	$68,000
UXO Sweep Contractor[3]	linear feet	$2	2,800	$5,600	$0	$5,600
Fencing Installed[4]	linear feet	$10	2,800	$28,000	$84,000	$112,000
Signs Installed	1 sign (per 500' of fence)	$93	6	$521	$3,600	$4,121
A-E Field Oversight		15% of UXO Clearance/IC		$64,818	$0	$64,818
A-E Project Management		8% of UXO Clearance/IC		$34,570	$0	$34,570
Light Brush Cutting[5]	acre	$120	46	$5,520	$0	$5,520
Moderate Brush Cutting[5]	acre	$426	20	$8,520	$0	$8,520
Heavy Brush Cutting[5]	acre	$603	9	$5,427	$0	$5,427
			Subtotal:	$545,549	$87,600	$633,149
CEHNC Oversite		15% of subtotal		$81,832	$0	$81,832

Total Cost Estimate:	**$714,981**
Contingency (25%):	**$178,745**
	$893,726
Cost per. Acre =	***$12,413***

Assumptions

[1]Cost for UXO clearance includes all ODC and mobilization costs, and equipment
With EM-61, it also includes the collection, processing, and storage of data
as well as the reacquisition and removal of anomalies and a 10% QC survey

[2]Cost for UXO clearance includes all ODC and mobilization costs, and equipment

[3]Estimate includes surface sweep of area to be performed prior to having fence installed

[4]Cost to install fencing is $10 per linear foot of 8 foot chain link with three strands of barbed wire

[5]Brush cutting costs taken from ECHOS 1996 and adjusted for inflation using Engineering News Record Construction Cost Index History

Table G-19
SEAD-57 (Former EOD Range)
Cost Estimate for Alternative 3:
Clearance to 6"

This estimate assumes:
Clearance to 6" of 50 acres (this area includes a portion of the Demo Range)
A 700' x 700' fence surrounding the demo berm in SEAD-57

Item	Unit	Unit Cost	Amount	Initial Cost	Life Cycle Cost (30 yrs)	Total Cost
UXO Clearence w/ Schonstedt[1]	acre	$3,400	50	$170,000	$0	$170,000
UXO Sweep Contractor[2]	linear feet	$2	2,800	$5,600	$0	$5,600
Fencing Installed[3]	linear feet	$10	2,800	$28,000	$84,000	$112,000
Signs Installed	1 sign (per 500' of fence)	$93	6	$521	$3,600	$4,121
A-E Field Oversight		15% of UXO Clearance/IC		$30,618	$0	$30,618
A-E Project Management		8% of UXO Clearance/IC		$16,330	$0	$16,330
Light Brush Cutting[4]	acre	$120	46	$5,520	$0	$5,520
Moderate Brush Cutting[4]	acre	$426	20	$8,520	$0	$8,520
Heavy Brush Cutting[4]	acre	$603	9	$5,427	$0	$5,427
			Subtotal:	$265,109	$87,600	$352,709
CEHNC Oversite		15% of subtotal		$39,766	$0	$39,766

Total Cost Estimate:	**$392,475**
Contingency (25%):	**$98,119**
	$490,594
Cost per. Acre =	***$6,814***

Assumptions
[1]Cost for UXO clearance includes all ODC and mobilization costs, and equipment
[2]Estimate includes surface sweep of area to be performed prior to having fence installed
[3]Cost to install fencing is $10 per linear foot of 8 foot chain link with three strands of barbed wire
[4]Brush cutting costs taken from ECHOS 1996 and adjusted for inflation using Engineering News Record Construction Cost Index History

Table G-20
SEAD-45 (Open Detonation Area) & SEAD-57 (Former EOD Range)
Cost Estimate for Alternative 2:
Institutional Controls

This estimate assumes:
A fence surrounding SEADs-45 and -57

Item	Unit	Unit Cost	Amount	Initial Cost	Life Cycle Cost (30 yrs)	Total Cost
UXO Sweep Contractor[1]	linear feet	$2	7,700	$15,400	$0	$15,400
Fencing Installed[2]	linear feet	$10	7,700	$77,000	$690,000	$767,000
Signs Installed	1 sign (per 500' of fence)	$93	46	$4,278	$27,600	$31,878
A-E Field Oversight		15% of UXO Clearance/IC		$14,502	$0	$14,502
A-E Project Management		8% of UXO Clearance/IC		$7,734	$0	$7,734
Heavy Brush Cutting[3]	acre	$603	3	$1,809	$0	$1,809
			Subtotal:	$120,723	$717,600	$838,323
CEHNC Oversite		15% of subtotal		$18,108	$0	$18,108

Total Cost Estimate:	**$856,431**
Contingency (25%):	**$214,108**
	$1,070,539
Cost per. Acre =	***$14,869***

Assumptions
[1]Estimate includes surface sweep of area to be performed prior to having fence installed
[2]Cost to install fencing is $10 per linear foot of 8 foot chain link with three strands of barbed wire
Also assumes installation of 7,700' of fence to be tied into existing fence
Total length of fence, used to calculate signage needs and life cycle cost, is 23,000'
[3]Brush cutting costs taken from ECHOS 1996 and adjusted for inflation using Engineering News Record Construction Cost Index History

Table G-21
SEAD-45 (Open Detonation Area)
Cost Estimate for Alternative 5:
Soil Excavation and Sifting

This estimate assumes:
the excavation and sifting of 255,000 cubic yards of material from SEAD-45
Clearance to depth of detection of the area within a 2,000' radius of the detonation berm
Clearance to 6" of the area between 2,000' and 2,500' from the berm

Item	Unit	Unit Cost	Amount	Initial Cost	Life Cycle Cost (30 yrs)	Total Cost
UXO soils excavated and sifted[1]	cubic yard	$30	255,000	$7,650,000	$0	$7,650,000
Replacement/Compaction of Soil[2]	cubic yard	$5	255,000	$1,275,000	$0	$1,275,000
Re-seeding Disturbed Soil[2]	acre	$438	80	$35,040	$0	$35,040
UXO Clearance to depth[3]	acre	$11,000	255	$2,805,000	$0	$2,805,000
UXO Clearence to 6"[4]	acre	$5,400	195	$1,053,000	$0	$1,053,000
A-E Field Oversite		15% of UXO Clearance		$1,922,706	$0	$1,922,706
A-E Project Management		8% of UXO Clearance		$1,025,443	$0	$1,025,443
Light Brush Cutting[2]	acre	$120	60	$7,200	$0	$7,200
Moderate Brush Cutting[2]	acre	$426	225	$95,850	$0	$95,850
Heavy Brush Cutting[2]	acre	$603	225	$135,675	$0	$135,675
			Subtotal:	$16,004,914	$0	$16,004,914
CEHNC Oversite		15% of subtotal		$2,400,737	$0	$2,400,737
					Total Cost Estimate	**$18,405,651**
					Contingency (25%)	**$4,601,413**
						$23,007,064
					Cost per acre =	***$51,127***

Assumptions
[1] Unit cost assumes $25/yd^3 for primary sift, $3/yd^3 for secondary sift, and $2/yd^3 for tertiary sift and hand sort
[2]Costs taken from ECHOS 1996 and adjusted for inflation using Engineering News Record Construction Cost Index History
[3]Cost for UXO clearance includes all ODC and mobilization costs, and equipment
With EM-61, it also includes the collection, processing, and storage of data
as well as the reacquisition and removal of anomalies and a 10% QC survey
[4]Cost for UXO clearance includes all ODC and mobilization costs, and equipment

Table G-22
SEAD-45 (Open Detonation Area)
Cost Estimate for Alternative 4:
Clearance to Depth

This estimate assumes:
Clearance to depth of detection of the area within a 2,000' radius of the detonation berm
Clearance to 6" of the area between 2,000' and 2,500' from the berm
A 5700' fence surrounding the demo berm in SEAD-45

Item	Unit	Unit Cost	Amount	Initial Cost	Life Cycle Cost (30 yrs)	Total Cost
UXO Clearance to depth[1]	acre	$11,000	175	$1,925,000	$0	$1,925,000
UXO Clearance to 6"[2]	acre	$3,400	195	$663,000	$0	$663,000
UXO Sweep Contractor[3]	linear feet	$2	5,700	$11,400	$0	$11,400
Fencing Installed[4]	linear feet	$10	5,700	$57,000	$171,000	$228,000
Signs Installed	1 sign (per 500' of fence)	$93	11	$1,060	$6,840	$7,900
A-E Field Oversight		15% of UXO Clearance/IC		$398,619	$0	$398,619
A-E Project Management		8% of UXO Clearance/IC		$212,597	$0	$212,597
Moderate Brush Cutting[5]	acre	$487	225	$109,575	$0	$109,575
Heavy Brush Cutting[5]	acre	$690	225	$155,250	$0	$155,250
			Subtotal:	$3,378,251	$177,840	$3,556,091
CEHNC Oversite		15% of subtotal		$506,738	$0	$506,738
					Total Cost Estimate:	**$4,062,829**
					Contingency (25%):	**$1,015,707**
						$5,078,536
					Cost per. Acre =	***$12,237***

Assumptions
[1]Cost for UXO clearance includes all ODC and mobilization costs, and equipment
With EM-61, it also includes the collection, processing, and storage of data
as well as the reacquisition and removal of anomalies and a 10% QC survey
[2]Cost for UXO clearance includes all ODC and mobilization costs, and equipment
[3]Estimate includes surface sweep of area to be performed prior to having fence installed
[4]Cost to install fencing is $10 per linear foot of 8 foot chain link with three strands of barbed wire
[5]Brush cutting costs taken from ECHOS 1996 and adjusted for inflation using Engineering News Record Construction Cost Index History

Table G-23
SEAD-4 (3.5" Rocket Range)
Cost Estimate for Alternative 3:
Clearance to 6"

This estimate assumes:
Clearance to 6" of 370 acres in SEAD-45
A 700' x 700' fence surrounding the demo berm in SEAD-57

Item	Unit	Unit Cost	Amount	Initial Cost	Life Cycle Cost (30 yrs)	Total Cost
UXO Clearence to 6"[1]	acre	$3,400	370	$1,258,000	$0	$1,258,000
UXO Sweep Contractor[2]	linear feet	$2	5,700	$11,400	$0	$11,400
Fencing Installed[3]	linear feet	$10	5,700	$57,000	$171,000	$228,000
Signs Installed	1 sign (per 500' of fence)	$93	11	$1,060	$6,840	$7,900
A-E Field Oversight		15% of UXO Clearance/IC		$199,119	$0	$199,119
A-E Project Management		8% of UXO Clearance/IC		$106,197	$0	$106,197
Moderate Brush Cutting[4]	acre	$426	185	$78,810	0	$78,810
Heavy Brush Cutting[4]	acre	$603	185	$111,555	0	$111,555
			Subtotal:	$1,711,586	$177,840	$1,889,426
CEHNC Oversite		15% of subtotal		$256,738	$0	$256,738
					Total Cost Estimate:	**$2,146,164**
					Contingency (25%):	**$536,541**
						$2,682,705
					Cost per. Acre =	***$6,464***

Assumptions
[1]Cost for UXO clearance includes all ODC and mobilization costs, and equipment
[2]Estimate includes surface sweep of area to be performed prior to having fence installed
[3]Cost to install fencing is $10 per linear foot of 8 foot chain link with three strands of barbed wire
[4]Brush cutting costs taken from ECHOS 1996 and adjusted for inflation using Engineering News Record Construction Cost Index History

Table G-24
Seneca Army Depot Activity
Costs for Recurring Reviews
30 Year Period

This estimate assumes:
Recurring review Depot wide every 2 years
2 man crew on site for 4 days
Report to be files upon completion of review

Item	Unit	Unit Cost	Amount	Per Review Cost	Total Cost	(30 yrs)[1]
Mob/Demob		$1,500	2	$3,000		$18,427
Per Diem	day	$124	8	$992		$6,093
Reviewers (2)	hour	$65	100	$6,500		$39,924
A-E Field Oversight		15% of UXO Clearance/IC		$1,574		$9,667
A-E Project Management		8% of UXO Clearance/IC		$839		$5,155
			Subtotal:	$12,905		$79,266
CEHNC Oversite		15% of subtotal		$1,936		$11,890
				Total Cost Estimate:		**$91,156**
				Contingency (25%):		**$22,789**
						$113,944

Assumptions
[1]30 Year costs assume present value costs with a discount factor of 7%