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U.S. Army Corps of Engineers

Omaha District
Offutt AFB, Nebraska

SENECA ARMY DEPOT ACTIVITY
OPEN DETONATION GROUNDS SITE
SEAD 45/115
SENECA COUNTY
ROMULUS, NEW YORK

Contract No. DACA45-98-D-0004
Task Order No. 037

DRAFT
PHASE II ORDNANCE AND EXPLOSIVES REMOVAL REPORT

March 2006

01M-0007

WESTON SOLUTIONS
Restoring Resource Efficiency

U.S. Army Corps of Engineers

Omaha District
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Prepared for

U.S. ARMY CORPS OF ENGINEERS,
OMAHA DISTRICT
Castle Hall Building No. 525
3rd Floor
Offutt AFB, Nebraska

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March 2006

W.O. No. 20074.515.037

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LIST OF ACRONYMS

AOIs	areas of investigation
bgs	below ground surface
CERCLA	Comprehensive Environmental Response Compensation and Liability Act
DOD	Department of Defense
EE/CA	Engineering Evaluation/Cost Analysis
ESS	*Explosive Safety Submission*
ft	feet/foot
GPO	Geophysical Prove Out
GPS	Global Positioning System
mm	millimeters
MOFBs	Mini Open Front Barricades
mV	millivolt
OE	Ordnance and Explosives
ODG	Open Detonation Grounds
ORS	ordnance related scrap
Parsons	Parsons Engineering
PDA's	Personal Data Assistants
PWD	Public Withdrawal Distance
QC	Quality Control
SEDA	Seneca Army Depot Activity
SOW	*Scope of Work*
SUXOS	Senior UXO Supervisor
TO	Task Order
USACE	U.S. Army Corps of Engineers
UXO	Unexploded Ordnance
WESTON®	Weston Solutions, Inc.

EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

This Draft Ordnance and Explosives (OE) Removal Report summarizes and documents the site activities performed by WESTON Solutions, Inc. (WESTON®) during Phase II OE Removal at the Open Detonation Grounds (ODG) site within the Seneca Army Depot Activity (SEDA) located in Romulus, New York. This Task Order was performed for the U.S. Army Corps of Engineers (USACE), Omaha District under the Rapid Response, Immediate Response Contract Number DACA-45-98-D0004 for the Control/Remediation of Hazardous, Toxic, and Radioactive Waste.

The SEAD 45/115 ODG site, located in the northwest corner of the SEDA property, consists of an open area of approximately 60 acres around a central large berm. The balance of the 450-acre site out to a distance of 2,500 feet (ft) from the center of the ODG site consists of both open and vegetated fields with some heavily wooded areas. The berms were used to suppress the effects of OE demolition activities. A variety of ordnance was destroyed by detonation in this area, including explosives, rockets, and heavy artillery. Although the blast radius shown on old drawings included in the *Archive Search Report* is 1,800 ft from the center of the demolition berm, which is also the radius investigated as part of the *Engineering Evaluation/Cost Analysis* (EE/CA) [Parsons Engineering (Parsons), 1998], the *Explosive Safety Submission* (ESS) required that a 2,500-ft radius be investigated as confirmed in the *Phase I Report* prepared by WESTON, titled "*The Final Site Specific Project Report*" (March 2005).

Phase I activities which included surface clearance, geophysical mapping, and anomaly investigation were performed within a 213-acre area between June 2003 and August 2003, and included the investigation of 9.65 acres of wooded transects. During the Phase I activities, the specific areas or "kick out" zones that were geophysically investigated included the area between the 1,500-ft radius and the 2,500-ft radius from the ODG center.

The *Phase I Report* (WESTON, 2005) includes mapping and database information and a target anomaly list for Phase II activities. Results of the digital and manual geophysical surveys indicated that approximately 599 targets per acre exist in non-wooded areas between 1,000 and 1,500 ft (from ODG center), 139 targets per acre exist in non-wooded areas between

1,500 and 2,500 ft (from ODG center), and that 208 targets per acre exist in wooded (transect) areas.

The primary objective of Phase II was to reacquire, remove, and dispose of approximately 8,500 OE/ Unexploded Ordnance (UXO) items and ordnance related scrap (ORS) anomalies located in non-wooded, i.e., open areas, between the 1,500-ft and 2,500-ft radial limits of the ODG to depth of 4 ft. In addition, potential OE/UXO and ORS items manually located within 220 transects through wooded areas of the ODG also required reacquisition, removal, and disposal. The ultimate goal of the OE removal action is to allow the Department of Defense to transfer the property for Conservation/Recreation use. The 4-ft clearance depth is based upon the Public Access scenario (e.g., surface recreation). In accordance with the ESS, there will be reuse restrictions required following this action.

Between September 2003 and March 2005, WESTON reacquired over 7,940 anomalies using a total of three UXO teams and removed a total of 9,497 items in open areas between the 1,500 ft and 2,500-ft radius (representing targets with a millivolt (mV) response ranging from 13 mV to 184,975 mV). A total of 5,393 of the 7,940 anomalies representing all targets greater than 50 mV were removed. The open area reacquisition effort resulted in the removal of 1,082 OE items, 4,116 ORS items, 3,229 Non-OE items, 1,032 No-Contacts, and 38 Quality Control (QC) items. The OE that was identified and removed included Fuzes [20 millimeters (mm), 25mm, 37mm, 40mm, 57mm, 75mm, 76mm, 106mm, M47, M51, M66, and M103] Smoke Pots, 2.36 inches Warheads, 20mm Projectiles; 37mm Projectiles; 57mm Projectiles; a 1.1 Anti-Aircraft round, and a 20-pounds fragmentation bomb. The OE items were located to a maximum depth of 36 inches below ground surface. Numerous non-OE items were identified and removed which included: ORS, nails, cans, wire, and fencing, and ORS of various sizes. The productivity for removal during Phase II activities ranged between 50 to 75 items per day, per crew.

In addition to clearing the open areas of anomalies, WESTON cleared a total of 169 out of 220 transects. A total of 6,663 items were removed from the transects, which included 105 OE items, 5,236 ORS items, 1,318 Non-OE items, and 4 No-Contacts. The remaining 51 transects

were not investigated either due to limited access restrictions, i.e., equipment accessibility, safety concerns (ponded water or numerous stumps), or due to extreme grade changes.

During the course of Phase II anomaly reacquisition, demilitarization operations consisting of either a blow-in-place, intentional detonation, or thermal treatment (open burn) were conducted as needed to prepare OE for demilitarization and disposal off-site. A total of 5 out of 1,187 OE items were found to be fuzed. As these items were still fuzed, they were considered unsafe to move and had to be blown-in-place. A total of 66 out of 1,187 OE items were found to be unfuzed but contained energetic (explosive) material and were considered safe to move. These items were transported to a locked storage bunker on a daily basis and destroyed by intentional detonation as required under the ESS. A total of 1,084 out of the 1,187 OE items were identified as various fuzes and 20mm Projectiles. As these items could not be positively identified as being free of explosive residue, they were demilitarized/destroyed by thermal treatment. The thermal treatment consisted of an open burn utilizing the existing SEDA burn tray. A total of 32 out of the 1,187 OE items were acquired between January 2005 and March 2005. These items, which consisted of various fuzes, were found within the transects and were placed in Magazine A705 and will require demilitarization and disposal. In addition, all ORS and non-OE scrap were subjected to thermal treatment to ensure all explosive residue was destroyed prior to shipment off-site. A total of 10,640 pounds of scrap metal were transported to Empire - Seneca Iron and Metal Co., Inc. in Waterloo, New York for disposal.

During Phase II, QC inspections were conducted to verify that the anomaly investigation operations were being completed as stated in the USACE *Scope of Work* and the approved *Implementation Work Plan*. A total of 10% of all anomalies were inspected by WESTON's Senior UXO Supervisor (SUXOS)/QC Officer and Site Manager and 10% of the transect areas were inspected for QC.

Based on completion of Phase II activities, all anomalies greater than 50 mV were removed between the 1,500-ft and 2,500-ft radius and OE items were removed to a depth of 3 ft. In addition, 169 out of 220 transects were cleared to obtain information on anomalies in wooded areas. While all anomalies between the 1,500-ft radius and the 2,500-ft radius were not removed, it is intended that the surface clearance (performed as part of Phase I activities) and removal of

all signature items with a millivolt response greater than 50 mV has eliminated the hazards associated with OE on the surface in open areas while substantially reducing the risk associated with finding OE at depth. In addition, it is anticipated that transect information will be utilized to make conclusions on the remaining wooded areas outside the 1,500-ft radius. A master list of items removed is contained in the report.

The area within the 1,000 ft and 1,500-ft radius will need to be addressed via conventional automated methods, i.e., excavation, sifting, ferrous metals separation to safety and effectively remove all hazardous items to a depth of 4 ft since a total of over 28,559 targets remain (616 targets/acre) based on Phase I data. In addition, the immediate area within 1,000 ft of the ODG center will also need to be addressed via conventional methods as this area is highly saturated with metals based on the *EE/CA* (Parsons, 1998) data. This area is targeted to be addressed during Phase II activities.

It is anticipated that SEDA will be able to transfer the area outside the 1,500-ft radius with land use restrictions in accordance with the ESS once the wooded areas and all remaining areas not investigated as part of the Phase II activities are addressed. The total cost of Phase II activities was $1,061,165. Based on this total and the number of targets removed, the cost to acquire and remove each target is $134 per target. A breakdown of costs is included in the report.

SECTION 1

INTRODUCTION

1. INTRODUCTION

This Draft Ordnance and Explosives (OE) Removal Report summarizes and documents the site activities performed by Weston Solutions, Inc. (WESTON®) during Phase II OE Removal and Disposal at the Open Detonation Grounds (ODG) site within the Seneca Army Depot Activity (SEDA) located in Romulus, New York. This Task Order (TO) was performed for the U.S. Army Corps of Engineers (USACE), Omaha District under the Rapid Response, Immediate Response Contract Number DACA-45-98-D0004 for the Control/Remediation of Hazardous, Toxic, and Radioactive Waste (TO No. 0037). Direct oversight was provided by USACE, New York District Seneca Area Office, with support provided by USACE, Baltimore and Rock Island Districts.

All OE removal activities were performed under the direct oversight of USACE in accordance with the U.S. Department of Defense (DOD) Explosive Safety Board approved *Explosive Safety Submission* (ESS) dated September 2002, prepared by the USACE, and the *Scope of Work* (SOW) dated 25 March 2003, prepared by the Omaha District Corps of Engineers as amended with corrections.

Phase II activities included the investigation of all OE and ordnance related scrap (ORS) resulting from Phase I data and removal of items to a depth of 4 feet (ft) This report and supporting documents are being submitted as required by the ESS.

1.1 BACKGROUND

The SEDA facility was constructed in 1941 and was operated by the United States Army until its closure in July 2000. From 1941 to 1995, the site was used for receipt, storage, maintenance, and supply of military items including munitions and equipment. On 13 July 1989, the facility was included on the Federal Facilities National Priorities List, which mandated that necessary remedial investigations and actions be completed in accordance with the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) and the "Federal Facility Agreement" under CERCLA, Section 120 in the matter of Seneca Army Depot, Romulus, New York.

SEDA was included on the 1995 Base Realignment and Closure List and has since been closed. Although the majority of the installation will be used for housing developments, industrial development, institutional and conservation/recreation uses upon transfer of property, it is anticipated that the ODG area will be classified as conservation/recreation space which includes wildlife habitation, wildlife viewing, hiking/walking, and/or picnicking with certain land use restrictions.

Following a recommendation from USACE in 1998, Parsons Engineering (Parsons) performed an *Engineering Evaluation/Cost Analysis* (*EE/CA*) to identify and develop response actions for specific areas of investigation (AOIs) within SEDA. The SEAD 45/115 ODG site was one of eleven AOIs identified during the *EE/CA* (Parsons, 1998). The SEAD 45/115 site was formerly used for the disposal and detonation of ammunition, and consequently OE/Unexploded Ordnance (UXO) and ORS are prevalent throughout this area. The study confirmed the existence of surface OE out to an 1,800-ft radius from the ODG site possibly due to "kick-outs" or annual clearance of surface vegetation (fire breaks) conducted with earth moving equipment. The *EE/CA* (Parsons, 1998) recommended OE clearance out to a 2,500-ft radius from the center of the ODG site.

In response to the *EE/CA* (Parsons, 1998) findings pertaining to the AOI at the ODG site, an ESS was submitted in September 2002 for the removal of OE from the peripheral acreage "kick-out" zone of the ODG site to address surface and subsurface OE to a depth of up to 4 ft. The ESS also provided an outline of the process to safely remove and cleanup UXO and OE at the ODG, and summarizes requirements for completion of Phase I and II activities.

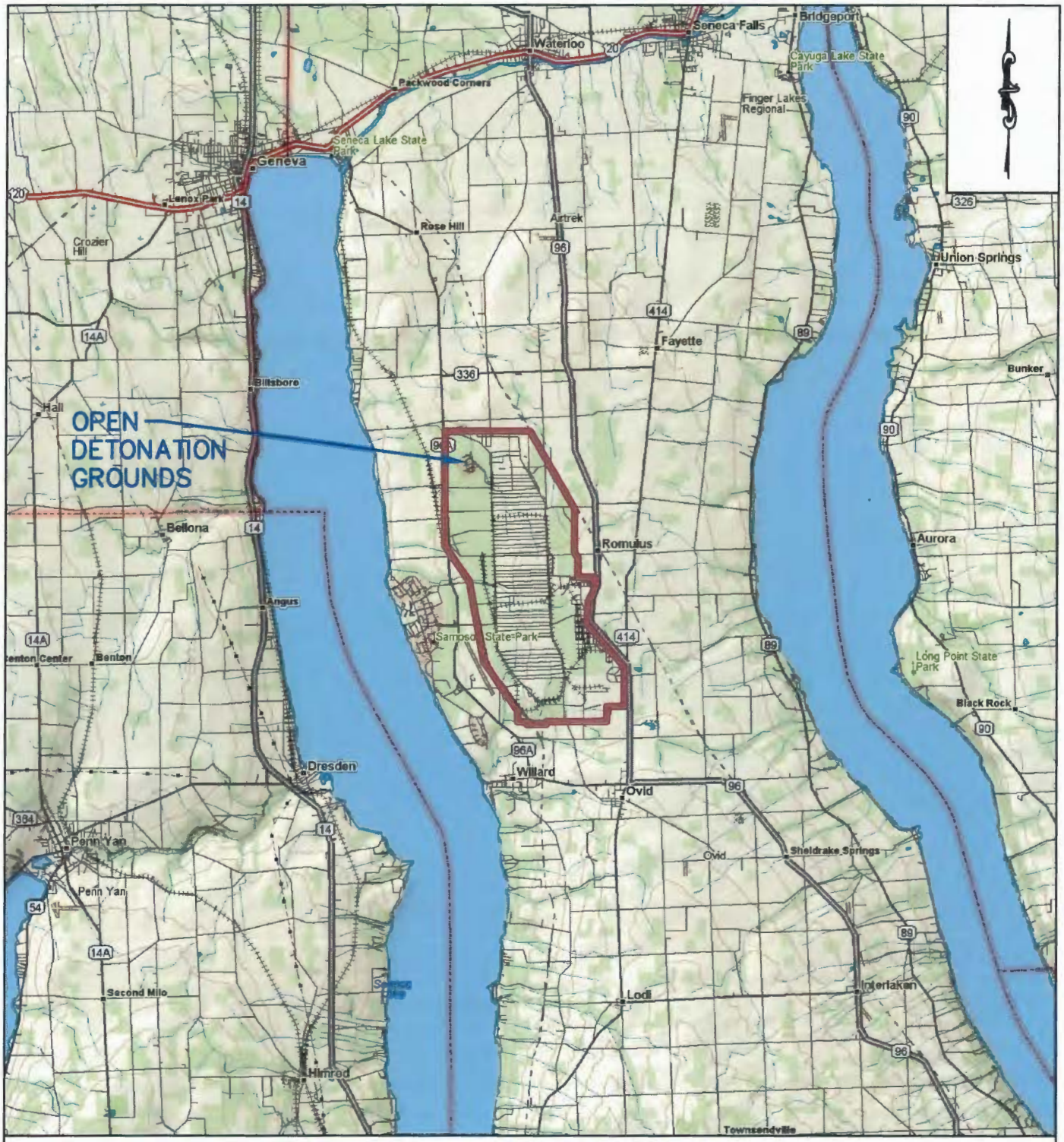
Phase I activities which included surface clearance, geophysical mapping, and anomaly investigation were performed within a 213-acre area between June 2003 and August 2003, and included an investigation of 9.65 acres of wooded transects. During the Phase I activities, the specific areas or "kick out" zones that were geophysically investigated were initially divided into an inner radius (0 ft - 1,000 ft) and an outer radius (1,000 ft - 2,500 ft) from the ODG center. The inner radius, which is considered saturated with OE/UXO and ORS (Parsons, 2001), was later expanded to 1,500 ft. Therefore, the final limits investigated during Phase I included the area between the 1,500-ft radius and 2,500-ft radius. Figure 1-2 delineates the limits of all three radii.

The *Phase I Report* prepared by WESTON, titled "*The Final Site Specific Project Report*" (March 2005) summarizes mapping and database information regarding the acreage estimates for the remedial zones outlined in the *EE/CA* (Parsons, 1998) and defines the target anomaly list for Phase II activities. Results of the digital and manual geophysical surveys indicated that approximately 599 targets per acre exist in non-wooded areas between 1,000 and 1,500 ft (from ODG center), 139 targets per acre exist in non-wooded areas between 1,500 and 2,500 ft (from ODG center), and that 208 targets per acre exist in wooded (transect) areas. A unit cost of $126 per target for Phase II OE removal and disposal was estimated for the area between the 1,500-ft radius and 2,500-ft radius.

1.2 SITE DESCRIPTION

The SEDA facility is located in Seneca County, Romulus, New York (see Figure 1-1). It is a United States Army facility that occupies approximately 10,600 acres. It is bounded to the west by State Route 96A, and to the east by State Route 96. Geneva and Rochester are located to the northwest (14 and 50 miles, respectively), Syracuse is 50 miles to the northeast, and Ithaca is 31 miles to the south. The surrounding area outside the SEDA property is used mainly for agriculture.

The SEAD 45/115 ODG site, located in the northwest corner of the SEDA property, consists of a non-wooded area of approximately 60 acres around a central large berm. The balance of the 450 acre site out to a distance of 2,500 ft from the center of the ODG site consists of both non-wooded and vegetated fields with some heavily wooded areas (See Figure 1-2). The berms were used to suppress the effects of OE demolition activities. A variety of ordnance was destroyed by detonation in this area, including explosives, rockets, and heavy artillery. Although the blast radius shown on old drawings included in the *Archive Search Report* is 1,800 ft from the center of the demolition berm, which is also the radius investigated as part of the *EE/CA* (Parsons, 1998), the ESS required that a 2,500-ft radius be investigated as confirmed in the *Phase I Report.*



SOURCE:
USGS TOPOGRAPHY MAPS; GENEVA SOUTH, DRESDEN, OVID, & ROMULUS – NEW YORK QUADS

GRAPHIC SCALE
3 1.5 0 1.5 3
APPROXIMATE SCALE IN MILES

PHASE II – ORDNANCE AND EXPLOSIVES REMOVAL
SENECA ARMY DEPOT ACTIVITY (SEDA)
ROMULUS, NEW YORK

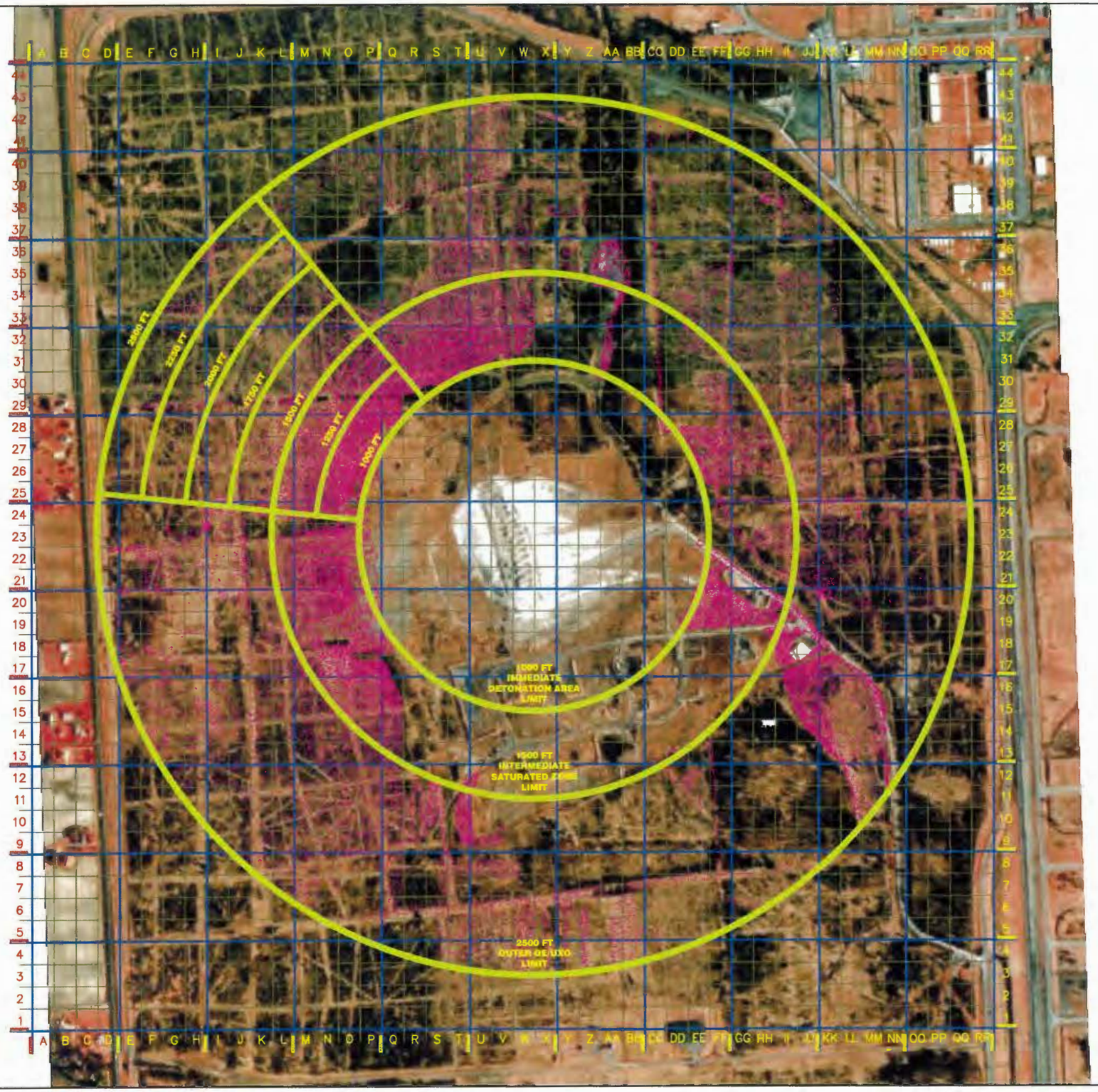
DEPARTMENT OF THE ARMY
OMAHA DISTRICT
CORPS OF ENGINEERS
OFFUTT, NEBRASKA

SITE LOCATION MAP

WESTON SOLUTIONS
MANCHESTER NEW HAMPSHIRE

DRAWN BEG
DATE MAR 2006
FIGURE NO. 1–1

M:\...\DWG\ACOE\SENECA\OD GROUNDS\Phase II Ordnance and Explosives Removal\FIG 1-1 FIG 1-1, 3/8/2006 1:54:23 PM, GIRARDEB, 1:1



LEGEND

GEOPHYSICAL SURVEY ANOMALY LOCATIONS

GRAPHIC SCALE

500 250 0 250 500

APPROXIMATE SCALE IN FEET

WESTON SOLUTIONS
MANCHESTER NEW HAMPSHIRE

DEPARTMENT OF THE ARMY
OMAHA DISTRICT
CORPS OF ENGINEERS
OFFUTT AFB, NEBRASKA

PHASE II – ORDNANCE AND EXPLOSIVES REMOVAL
SENECA ARMY DEPOT ACTIVITY
ROMULUS, NEW YORK

OPEN DETONATION GROUNDS TARGET ANOMALY DISTRIBUTION

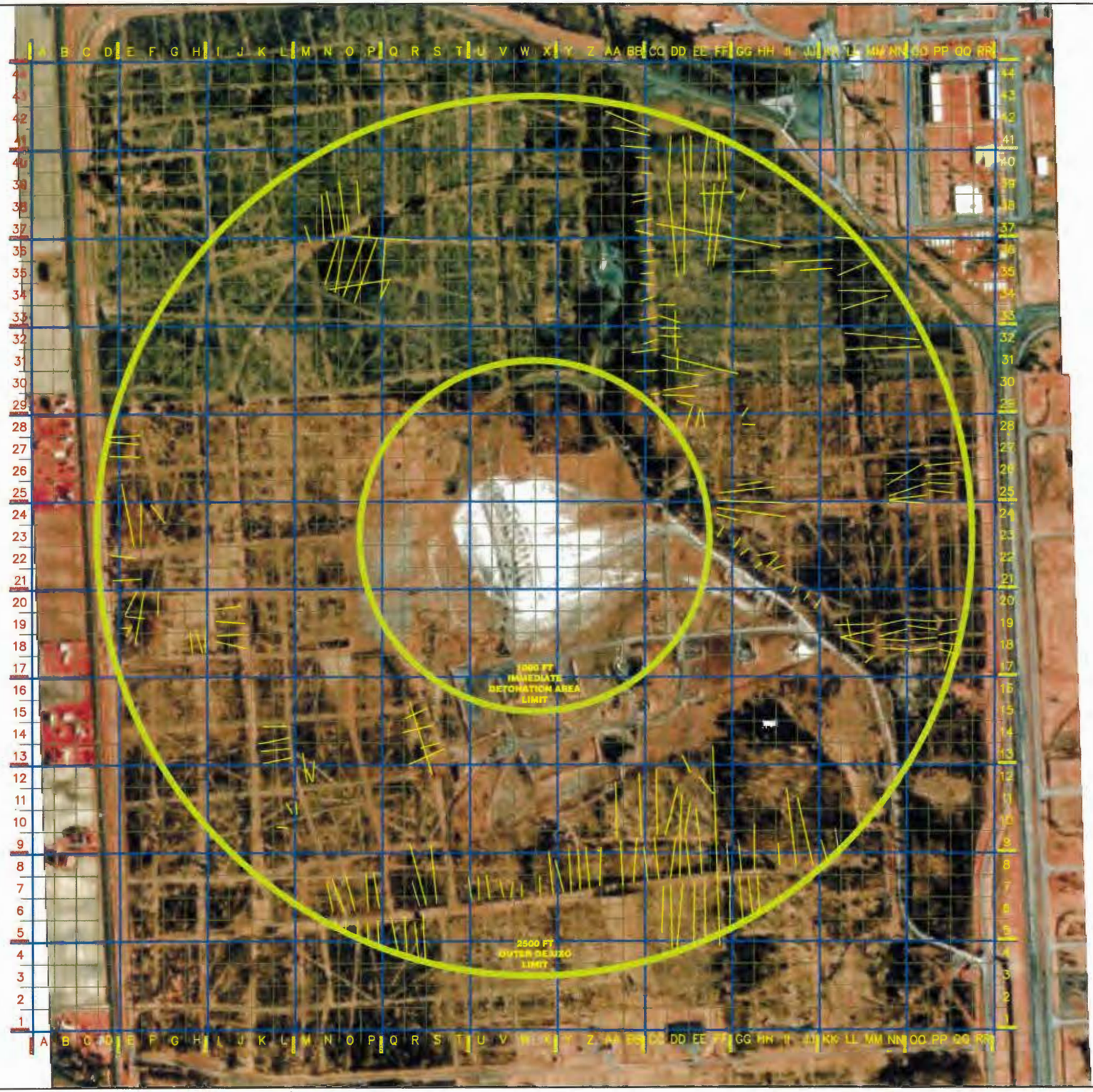
DRAWN	DATE	FIGURE NO.
BEG	MAR 2006	1–2
CHECKED	W.O. NO. 20074.515.037	

M:\Ds _n\DWG\ACOE\SENECA\OD GROUNDS\Phase II Ordnance and Explosives Removal\FIG 1-2.u..g, FIG 2-3, 3/8/2006 1:49:10 PM, GIRARDEB, 1:1

1.3 PROJECT OBJECTIVES

The primary objective of Phase II was to reacquire, remove, and dispose of approximately 8,500 OE/UXO and ORS anomalies located in non-wooded areas between the 1,500-ft and 2,500-ft radial limits of the ODG. In addition, potential OE/UXO and ORS items manually located within 220 transects through wooded areas of the ODG also required reacquisition, removal, and disposal. The transect locations are shown in Figure 1-3. Specific target anomaly locations were identified based on manual and digital geophysical mapping and survey data collected during Phase I. Results of the Phase I data are presented in WESTON's *Final Site-Specific Project Report* (WESTON, February 2005).

The ultimate goal of the OE removal action is to allow the DOD to transfer the property for Conservation/Recreation use. The 4-ft clearance depth is based upon the Public Access scenario (e.g., surface recreation). In accordance with the ESS, there will be reuse restrictions required following this action.



LEGEND

TRANSECT LOCATIONS

GRAPHIC SCALE

500 250 0 250 500

APPROXIMATE SCALE IN FEET

WESTON SOLUTIONS
MANCHESTER NEW HAMPSHIRE

DEPARTMENT OF THE ARMY
OMAHA DISTRICT
CORPS OF ENGINEERS
OFFUTT AFB, NEBRASKA

PHASE II – ORDNANCE AND EXPLOSIVES REMOVAL
SENECA ARMY DEPOT ACTIVITY
ROMULUS, NEW YORK

OPEN DETONATION GROUNDS SITE CLEARING AND TRANSECT LOCATIONS

DRAWN	DATE	FIGURE NO.
BEG	MAR 2006	1–3
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M:\Des_gn\DWG\ACOE\SENECA\OD GROUNDS\Phase II Ordnance and Explosives Removal\FIG 1-3.a., , FIG 2-1, 3/8/2006 1:51:17 PM, GIRARDEB, 1:1

SECTION 2

SITEWORK

2. SITEWORK

Site activities during Phase II included mobilization, site preparation, anomaly investigation, anomaly reacquisition and removal, anomaly reacquisition documentation, demilitarization and disposal, and demobilization. These activities are summarized in detail in the following subsections. A detailed schedule of all site activities is included in Figure 2-1.

2.1 MOBILIZATION

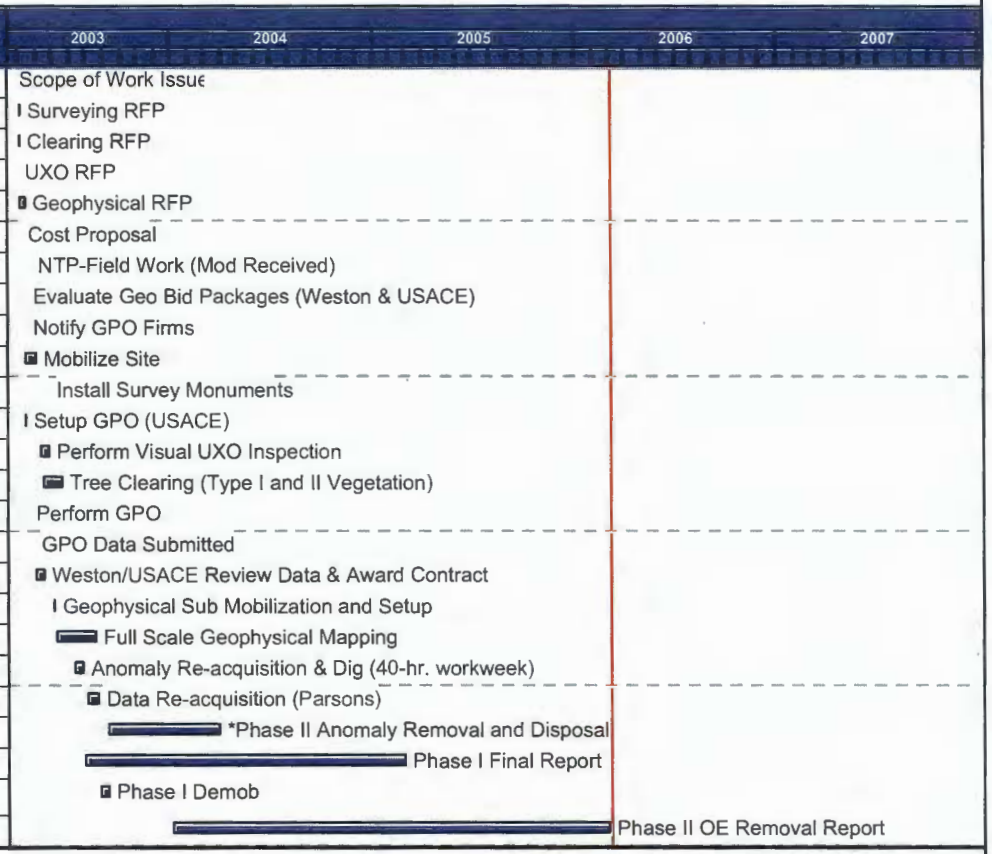
Following the Notice to Proceed from USACE, WESTON mobilized personnel, equipment, materials, and subcontractor personnel to the site between 9 and 10 September 2003. WESTON's field crew consisted of a Site Manager, UXO Quality Control (QC)/Safety Supervisor, Senior UXO Supervisor (SUXOS), and Survey Technician. Subcontractor personnel included UXO Technicians from Explosive Ordnance Technologies, Inc.

The following list summarizes the primary equipment that was used at the site during various phases of work.

Sitework Equipment	Manufacturer
▪ Schonstedt GA-52Cx Ferrous Metals Locators	Schonstedt
▪ Fisher 1266-XB All Metals Locators	Fisher
▪ Mini Open Front Barricades (MOFBs)	Human Factors Association
▪ Trimble RTK Global Positioning System (GPS) System (4)	Trimble
▪ Polaris All Terrain Vehicles	Polaris
▪ Kenwood Radios (9)	Kenwood
▪ Digital Camera	Mavica
▪ Hewlett Packard Personal Data Assistants (PDA's)	Hewlett Packard

Geophysical Investigation and Anomaly Removal
Open Detonation Grounds
at
Seneca Army Depot Activity, Romulus, NY

Act ID	Description	Orig Dur	Early Start	Early Finish
950	Scope of Work Issued	1d	25MAR03 A	25MAR03 A
1000	Surveying RFP	3d	02APR03 A	07APR03 A
1010	Clearing RFP	4d	02APR03 A	07APR03 A
1020	UXO RFP	3d	02APR03 A	04APR03 A
1030	Geophysical RFP	6d	04APR03 A	16APR03 A
1040	Cost Proposal	1d	09APR03 A	09APR03 A
1050	NTP-Field Work (Mod Received)	1d	25APR03 A	25APR03 A
1060	Evaluate Geo Bid Packages (Weston & USACE)	2d	16APR03 A	18APR03 A
1070	Notify GPO Firms	1d	17APR03 A	18APR03 A
1080	Mobilize Site	1d	14APR03 A	05MAY03 A
1090	Install Survey Monuments	3d	29MAY03 A	31MAY03 A
1100	Setup GPO (USACE)	5d	14APR03 A	17APR03 A
1110	Perform Visual UXO Inspection	12d	12MAY03 A	29MAY03 A
1120	Tree Clearing (Type I and II Vegetation)	24d	14MAY03 A	23JUN03 A
1130	Perform GPO	3d	22APR03 A	24APR03 A
1140	GPO Data Submitted	1d	30APR03 A	30APR03 A
1150	Weston/USACE Review Data & Award Contract	3d	01MAY03 A	21MAY03 A
1155	Geophysical Sub Mobilization and Setup	3d	02JUN03 A	06JUN03 A
1160	Full Scale Geophysical Mapping	45d	07JUN03 A	22AUG03 A
1165	Anomaly Re-acquisition & Dig (40-hr. workweek)	22d	09JUL03 A	30JUL03 A
1167	Data Re-acquisition (Parsons)	8d	04AUG03 A	26AUG03 A
1168	*Phase II Anomaly Removal and Disposal	61d	11SEP03 A	31MAR04 A
1170	Phase I Final Report	30d	28JUL03 A	04MAR05 A
1180	Phase I Demob	2d	27AUG03 A	12SEP03 A
1190	Phase II OE Removal Report	15d	02JAN04 A	08MAR06 A



Start date	19MAR03
Finish date	08MAR06
Data date	08MAR06
Run date	08MAR06
Page number	1A

Figure 2-1
Prepared by Weston Solutions, Inc.
for
U.S. Army Corps of Engineers

Early bar
Progress bar
Critical bar
Summary bar
Start milestone point
Finish milestone point

2.2 SITE PREPARATION

Following mobilization, WESTON performed a visual inspection of the site. An equipment staging area approximately 200 ft by 200 ft was established northwest of the Open Detonation Hill, at a free standing blast shield. This blast shield was previously used during the demilitarization of military munitions. The area was cleared by UXO Technicians in order to allow for safe setup of the equipment. Control to the area was maintained through a central gate located southeast of the site outside the established limits of the 1,233-ft Public Withdrawal Distance (PWD). Only essential personnel were allowed within this area during OE Removal operations. Non-UXO Qualified Essential Personnel worked under the direct supervision of a UXO Tech III at all times. Non-Essential Personnel were not allowed on-site or within the PWD during active operations.

2.3 ANOMALY INVESTIGATION

Based on Phase I data, WESTON utilized the target list containing 52,700 items to refine the anomaly listing between the 1,500-ft radius and 2,500-ft radius. The 52,700 anomalies signified those items generating a response large enough to be picked up by the EM-61 Mk II. For Phase II activities, a total of 24,141 targets were initially selected ranging in millivolt (mV) response from 3 mV to 184,975.5 mV. While the final list of targets used for the Phase II activities (16,068) is slightly less than the total number of targets identified during Phase I for the area between 1,500 ft and 2,500 ft (24,241), the majority of the decrease in items is based on the cut-off between the 3 mV response (lowest response reported for targets reported in Phase I) and the 13 mV response (response used in the initial listing). The initial value of 13 mV chosen as the cut-off for Phase II activities was conservatively chosen since no OE items were found during the limited intrusive activities performed in Phase I below 19.6 mV. In addition, many of the items between 19.6 mV and 3 mV signified either ORS, scrap (horseshoes, nails, wire, plow teeth), or No-Contacts (hot soil/rock).

For anomaly reacquisition and removal activities performed in Phase II, the UXO personnel were provided a revised list of 16,068 anomalies with a millivolt response greater than or equal to

13 mV to start reacquisition and removal. It is noted that this list was later refined to 7,940 anomalies using a minimum value of 50 mV based on cumulative Phase II data collected.

2.4 ANOMALY REACQUISITION AND REMOVAL

Anomaly and reacquisition activities were conducted between 10 September 2003 and 30 March 2005. Intrusive investigations were performed using UXO Technicians following completion of the Phase I geophysical mapping effort. Prior to digging a potential anomaly location, the location of targets would be identified using Real Time Kinematic surveying equipment. The coordinates of each target were downloaded into the Trimble surveying equipment and the item was flagged based on GPS coordinates.

Unexploded Ordnance teams worked within specific grids and positioned themselves at flagged locations to begin anomaly reacquisition and removal. The technicians performed a surface sweep of the area within a 48-inch radius of each flagged location to eliminate any false-positive signals resulting from surface and/or subsurface OE, ORS, and non-OE scrap metal items. The search radius was later revised to a 48–inch-diameter (2-ft radius) from the flagged location. Following the surface sweep, the UXO Technicians performed a subsurface investigation to a minimum depth of 4 ft, or until the anomaly was either located or the signal was eliminated. Once the item was located and removed, a description of the item and its removal depth were entered into the PDA and logged on the dig sheet. Subsection 2.5 provides additional information the recording of results. The spoils material (consisting of soil removed from the investigation) was left on the surface to allow for QC inspection along with inspection of the open excavation. All OE items were demilitarized for disposal while ORS and non-ORS scrap metal items were also removed for disposal.

Once WESTON started acquiring and removing the anomalies in a grid by grid pattern, WESTON was directed by USACE to start removal of anomalies that had a response greater than or equal to 50 mV pending further evaluation of the Phase I Geophysical Mapping Data.

Following the completion of the 5,393-50 mV and above anomalies (with the exception of those in the Open Burning Grounds), WESTON investigated the transects per direction from USACE.

The transects were removed of all vegetation above a height of 6 inches during Phase I activities every 50 linear ft from each other within the wooded areas. The length of the transect would be dependant on the density of the wooded area, restrictions due to various grade changes, accessibility for clearing equipment, and the distance to the adjacent open areas. The UXO Technicians began clearing the transects located along or in the vicinity of the 1,500-ft radius in order to establish evidence that the transects located closest the Open Detonation Hill were more saturated with OE/ORS. Since there was no geophysical data for transect areas, the only way to confirm the presence of OE/ORS located in the transects was to clear 100% of the area. The UXO Technicians using the Schonstedt GA-52Cx swept the transect two times in opposite directions ensuring that all anomalies were located. Any contact the instrument reported was investigated and removed if safe to do so.

A total of 220 transects were cut into wooded areas during Phase I. A total of 169 of these transects were investigated by the UXO Technicians in Phase II. The remaining 51 transects were not investigated either due to limited access restrictions, i.e., equipment accessibility, safety concerns (ponded water or numerous stumps), or due to extreme grade changes. Any anomalies discovered during the investigation of the transects were removed. In addition, the use of a MOFB was required whenever intrusive activities took place within a 1,233 ft distance to the Army property line or an inhabited building.

Table 2-1 lists total number of OE, ORS, non-OE, No-Contacts, and QC items found within the open areas and transects during both Phase I and Phase II. In addition, the table lists total targets within the open area and the total number of digs within the open area.

Table 2-1

PHASE I and II - ANOMALY REMOVAL SUMMARY

	Open Area Targets*	Wooded Transects	Open Area Total Digs
OE	897	105	1082
ORS	3471	5236	4116
Non-OE	2697	1318	3229
No-Contacts	845	4	1032
QC Items	30	NA	38
Totals	**7,940**	**6,663**	**9,497**

Note: "*" Initial number of targets within the ODG to be removed.

The above totals include all anomalies removed during Phase I reacquisition QC and Phase II anomaly reacquisition and removal operations. The numbers shown for the open area are consistent with the amount of anomalies removed and listed in UXOfast.

During Phase I and II removal activities, the following OE items were identified and removed: Fuzes (20 millimeters (mm), 25mm, 37mm, 40mm, 57mm, 75mm, 76mm, 106mm, M47, M51, M66, and M103,) Smoke Pots, 2.36 inches WP Warheads, 20mm Projectiles; 37mm Projectiles; 57mm Projectiles; a 1.1 Anti-Aircraft round, and a 20 pound fragmentation bomb. In addition, the following non-OE items were identified and removed: ORS, nails, cans, wire, and fencing, and ORS of various sizes. A master listing of OE found during Phase I and II within the open areas can be found in Appendix A. A master list of all items found in transects is included in Appendix B.

2.5 ANOMALY REACQUISITION DOCUMENTATION

WESTON developed a web based documentation system for annotating daily dig data based on the information presented in USACE Data Item Description OE-005-05.01. The data from Phase I was set up in a central database called UXOfast. The UXO QC Officer downloaded daily dig lists from UXOfast into each dig teams PDA. The UXO teams would enter dig information (i.e., ordnance description, comments, offset direction, offset distance, and depth to top of item)

into a PDA while in the field during reacquisition. At the end of the day, the UXO QC Officer uploaded the data via internet to the central database. After the upload was complete, the QC Officer logged-on to the system to review and verify the information prior to approving the data. Upon approval, the data was posted and all authorized users of UXOfast were allowed to view the data. From UXOfast, a Master Dig Sheet was created (Appendix C) to store all dig data including: Anomaly ID; original Derived Easting and Northing; Original Amplitude Response (EM-61 MkII); Anomaly Type Code; Ordnance Description Code; Comments; Offset Distance; Offset Direction; Depth to Top; Dig Date; Status Code; and Disposal Code. The Status Code reflects either blow-in-place, detonation, or thermal treatment. The disposal code reflects the disposition of the material.

Photos of all OE items are located in Appendix D. The photos are arranged by month and date.

2.6 DEMILITARIZATION AND DISPOSAL

During the course of Phase II anomaly reacquisition, demilitarization operations consisting of either a blow-in-place, intentional detonation, or thermal treatment (open burn) were conducted as needed to prepare OE for demilitarization and disposal off-site.

A total of 5 out of 1,187 OE items were found to be fuzed. As these items were still fuzed, they were considered unsafe to move and had to be blown-in-place. A total of 66 out of 1,187 OE items were found to be unfuzed but contained energetic (explosive) material and were considered safe to move. These items were transported to a locked storage bunker on a daily basis and destroyed by intentional detonation as required under the ESS. A total of 1,084 out of the 1,187 OE items were identified as various fuzes and 20mm Projectiles. As these items could not be positively identified as being free of explosive residue, they were demilitarized/destroyed by thermal treatment. A total of 32 out of the 1,187 OE items were acquired between January 2005 and March 2005. These items, which consisted of various fuzes, were found within the transects and are currently being stored within Magazine A705 pending demilitarization and disposal.

The thermal treatment consisted of an open burn utilizing the existing SEDA burn tray. Temperatures in excess of 1,300 Degrees Fahrenheit were using a thermocouple. Materials

utilized during the burns included: wood dunnage, Charcoal, and diesel fuel.

The OE destroyed between June 2003 and December 2003 took place within the ODG. The OE destroyed between October 2004 and November 2004 took place at the Demolition Range, SEAD 57. Disposal at SEAD 57 was necessary as a second OE contractor was performing soil sifting and OE removal activities within the ODG.

Prior to disposal off-site of all OE, non-OE and ORS was inspected by both the UXO Safety/QC Officer and the SUXOS.

In addition, all ORS and non-OE scrap were subjected to thermal treatment to ensure all explosive residue was destroyed prior to shipment off-site. WESTON turned in scrap on 29 December 2003 and on 23 November 2004 using DD Form 1348-1a (Appendix E), the total weight of all OE scrap, ORS, and non-OE was 10,640 pounds. All scrap was disposed of at Empire - Seneca Iron and Metal Co., Inc. in Waterloo, New York.

In addition all explosive operations were documented using WESTON's *Ammunition Consumption Reports* (Appendix F).

2.7 DEMOBILIZATION

Demobilization occurred in March 2005 following completion of Phase II activities (removal of all items 50 mV and above). Equipment removed from the site included: a skid steer; ferrous and non-ferrous locators; MOFBs; GPS survey equipment; all terrain vehicles, and miscellaneous equipment.

SECTION 3

QUALITY CONTROL

3. QUALITY CONTROL

During Phase II, QC inspections were conducted to verify that the anomaly investigation operations were being completed as stated in the USACE SOW and the approved *Implementation Work Plan.* A total of 10% of all anomalies were inspected by WESTON's SUXO/QC Officer and Site Manager. Quality control inspections were conducted on the following days: October 4, 2004, October 13, 2004, October 28, 2004, October 28, 2004, and November 1, 2004. A total of 138 anomalies were inspected for QC.

In addition to the 138 anomalies inspected by the SUXOS/QC Officer and Site Manager another 43 anomalies identified as No-Contacts were inspected. All 43 were found to have no ferrous material associated with them.

Quality control inspections were also conducted on the transects cleared. During the investigation of the transects by the UXO technician, 100% of the areas were cleared. The UXO Technicians swept the entire length of each transect in two directions in order to ensure that all possible contacts were identified. The SUXO/UXO QC Officer and Site Manager conducted a QC inspection on 15 out of 145 completed transects. All transects that were inspected passed QC.

The UXO Technicians and WESTON's UXO QC Officer insured all instruments were operating properly by checking each instrument daily (with few exceptions) on the South Geophysical Prove Out Grid. Instruments not meeting calibration standards and functionality tests were taken out of service and repaired.

The instruments would be checked at the beginning of the day, after lunch, and at the end of the day. The instruments were not checked against the South Geophysical Prove Out (GPO) when other contractors were using the GPO or during periods of darkness.

SECTION 4

RESULTS

4. RESULTS

As a result of the anomaly reacquisition and removal, the following data was produced: OE items were located at depths ranging from the surface to 36 inches below ground surface (bgs). A total of five OE items considered hazardous and unsafe to move were located at depths ranging from 3 to 8 inches bgs. All five of these OE items were fuzed 37-mm Projectiles. Two were located exactly where indicated at 3 inches and 4 inches bgs; two were located 6 inches and 16 inches south from their indicated position at 4 inches and 8 inches bgs, respectively; and one was found 4 inches east of its indicated position at a depth of 3 inches bgs. Additional OE found that were considered safe to move included a 1.1-inch Anti-Aircraft Projectile, Smoke Pots, 2.36-inch WP Warheads and Rocket Motors, 20mm Projectiles, 25mm Projectiles, 30mm Projectiles, 37mm Projectiles (unfuzed), 4.2 inch Mortar Fuzes, 40mm Projectiles (unfuzed), 57mm Projectiles (unfuzed), 76mm APHE Projectile with a base fuze, 75mm projectiles (unfuzed), and assorted Fuzes.

Of the 1,082 OE items found in open areas, a total of 1,020 were found within a 48-inch-diameter of the flagged location. The remaining 62 OE items were located outside the 48-inch-diameter. In addition, it was confirmed based on the density of items removed adjacent to the 1,200-ft radius that targets within this radius will not be able to be economically removed using the traditional mag and flag approach. Although all target anomalies were not removed during Phase II activities, surface clearance was performed and all items greater than 50 mV were removed.

SECTION 5

CONCLUSION

5. CONCLUSION

Between September 2003 and March 2005, WESTON performed OE Reacquisition and Removal operations under Contract with USACE, removed 7,940 out of the 8,500 identified anomalies within the open area of the ODG. In addition to the open area, WESTON investigated and removed and cleared 169 of the 220 transects. This reacquisition was accomplished in accordance with Section 6 of the ESS.

In the open area, total of 9,497 individual items were removed between the 1,500-ft and 2,500-ft radius representing targets with responses of between 9.5 mV and 2,861 mV. It was found that generally the larger the millivolt response the greater the chance of finding an object. Additionally, the frequency of OE increased towards the ODG center. From the wooded areas WESTON removed 6,663 individual items.

Based upon these observations, it can be determined that the density of OE significantly increases near the ODG center. Between the ODG center and the 1,500 ft inner radius, manual removal of OE and munition debris is not economically feasible. Based on the remaining 28,559 targets within the 1,500-ft radius (15,686 items between the 1,000 to 1,250-ft radius and 12,873 items between the 1,250 to 1,500-ft radius) representing 754 targets/acre and 479 targets/acre, respectively, the area will need to be addressed via conventional automated methods, i.e., excavation, sifting, ferrous metals separation to safely and effectively remove all hazardous items. The total cost of Phase II activities was $1,061,165. Based on this total and the number of targets removed, the cost to acquire and remove each target is $134 per target. A breakdown of costs is included in Appendix F for Phase II activities.

APPENDIX A

MASTER OE LIST

Appendix A is included on the attached Compact Disk of this report.

APPENDIX B

MASTER TRANSEC DIG LIST

Appendix B is included on the attached Compact Disk of this report.

APPENDIX C

MASTER DIG LIST

Appendix C is included on the attached Compact Disk of this report.

APPENDIX D

PHOTO LOG

Appendix D is included on the attached Compact Disk of this report.

APPENDIX E

FORM 1348's

Appendix E is included on the attached Compact Disk of this report.

APPENDIX F

AMMUNITION CONSUMPTION REPORTS

Appendix F is included on the attached Compact Disk of this report.

APPENDIX G

COST SUMMARY

Appendix G is included on the attached Compact Disk of this report.