US Army
Engineering &
Support Center
Huntsville, AL

FEASIBILITY STUDY REPORT
MUNITIONS RESPONSE ACTION OPEN DETONATION GROUNDS
SENECA ARMY DEPOT ACTIVITY

DRAFT FINAL

PARSONS

APRIL 2013

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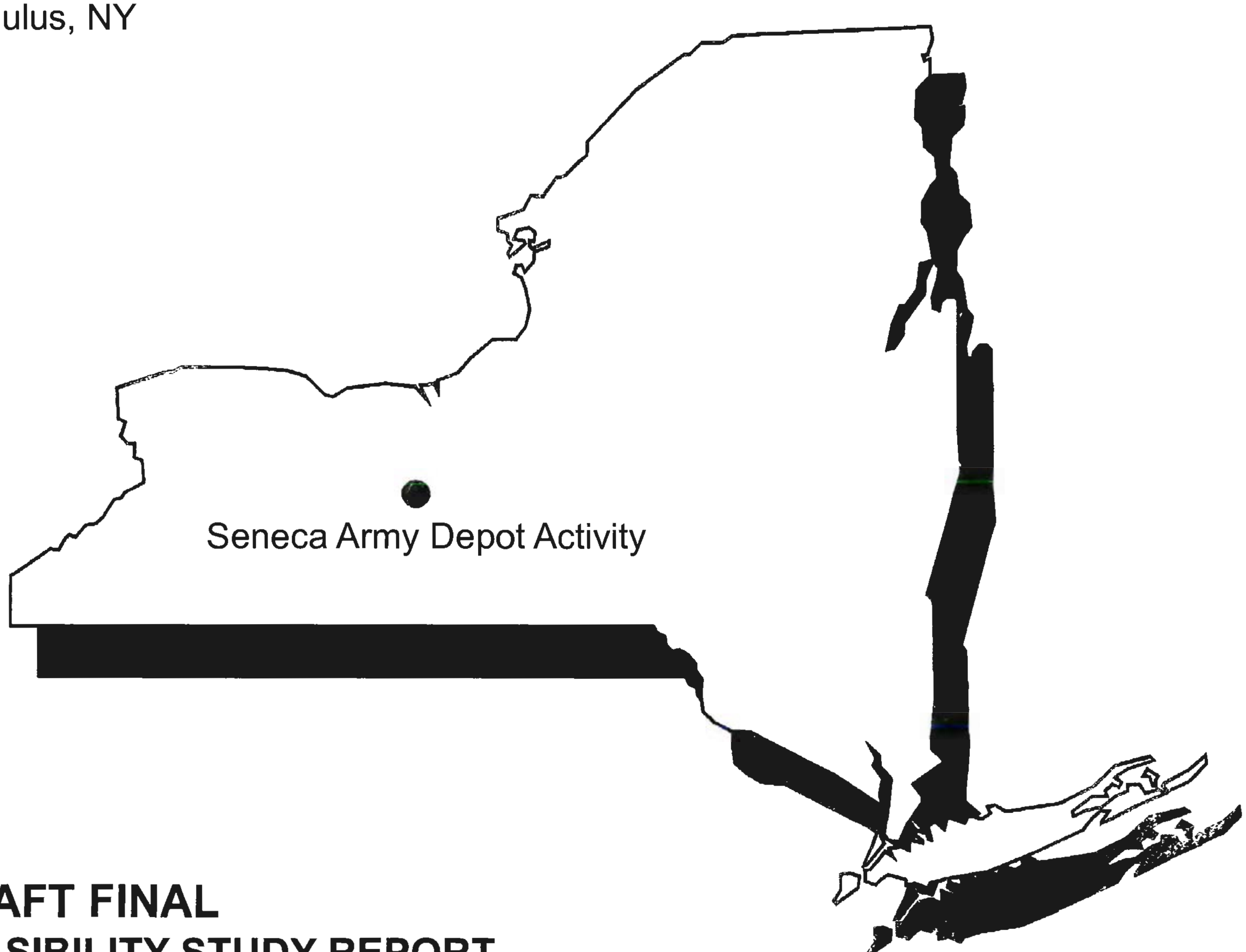
US Army, Engineering & Support Center
Huntsville, AL

Seneca Army Depot Activity
Romulus, NY



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Contract No. W912DY-08-D-0003
Task Order No. 0013
EPA Site ID# NY0213820830
NY Site ID# 8-50-006

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APRIL 2013

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FEASIBILITY STUDY REPORT

for

OPEN DETONATION GROUNDS MUNITIONS RESPONSE ACTION

SENECA ARMY DEPOT ACTIVITY
ROMULUS, SENECA COUNTY, NEW YORK

Prepared for:

U.S. Army Engineering and Support Center, Huntsville

and
SENECA ARMY DEPOT ACTIVITY
ROMULUS, NEW YORK

Prepared by:

PARSONS
100 High Street
Boston, MA 02110

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APRIL 2013

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AOI	Area of Interest
ARAR	Applicable or Relevant and Appropriate Requirements
Army	U.S. Army
AWQS	Ambient Water Quality Standards
BIP	Blow in Place
BRAC	Base Realignment and Closure
CD	Cultural Debris
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COPC	Chemicals of Potential Concern
CWA	Clean Water Act
CY	Cubic Yards
DGM	Digital Geophysical Mapping
DMM	Discarded Military Munitions
DoD	Department of Defense
DOE	Department of Energy
DOT	Department of Transportation
ECL	Environmental Conservation Law
EE/CA	Engineering Evaluation and Cost Analysis
EM	Electromagnetic
EP	Extraction Procedure
EPA	Environmental Protection Agency
ESI	Expanded Site Investigation
ESQD	Explosive Safety Quantity-Distance
FS	Feasibility Study
GA	Classification: The best usage of Class GA waters is as a source of potable water supply. Class GA waters are fresh groundwaters.
GPR	Ground Penetrating Radar
HA	Hazard Assessment
HASP	Health and Safety Plan
HE	High Explosive
HEAT	High Explosive Anti-Tank
HFD	Hazardous Fragment Distance
HMX	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine
LORAN	Long-Range Navigation
LPS	Low Permeability Soil
LRA	Local Redevelopment Authority
LTM	Long Term Monitoring

LUC	Land Use Control
MCL	Maximum Contaminant Level
MC	Munitions Constituents
MD	Munitions Debris
MDAS	Material Documented as Safe
MEC	Munitions and Explosives of Concern
mg/kg	milligrams per kilogram
mg/L	milligrams per Liter
MPPEH	Material Potentially Presenting an Explosive Hazard
MRS	Munitions Response Site
MSL	Mean sea level
mV	Millivolt
MW	Monitoring Well
N/A	Not Applicable
NCP	National Contingency Plan
NFA	No Further Action
NRC	Nuclear Regulatory Commission
NTU	Nephelometric Turbidity Unit
NYCRR	New York Code of Rules and Regulations
NYS	New York State
NYSDEC	New York State Department of Environmental Conservation
O&M	Operation and Maintenance
OB	Open Burning
OD	Open Detonation
OE	Ordnance Explosive
OSHA	Occupational Safety and Health Act
OSWER	Office of Solid Waste and Emergency Response
Parsons ES	Parsons Engineering Science, Inc.
PCB	Polychlorinated Biphenyl
ppm	parts per million
QC	Quality Control
RAO	Remedial Action Objectives
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RSL	Regional Screening Levels
SAP	Sampling and Analysis Plan
SARA	Superfund Amendments and Reauthorization Act
SCIDA	Seneca County Industrial Development Agency
SCO	Soil Cleanup Objective

SEAD	Seneca Army Depot (old name)
SEDA	Seneca Army Depot Activity
SPDES	State Pollutant Discharge Elimination System
SPLP	Synthetic Precipitation Leaching Procedure
SVOC	Semivolatile Organic Compound
SW	Surface water
SWMU	Solid Waste Management Unit
TAGM	Technical and Administrative Guidance Memorandum
TAL	Total Analyte List
TBC	To Be Considered
TCL	Target Compound List
TCLP	Toxicity Characteristics Leaching Procedure
TP	Test Pit
TPV	Total Present Value
UFP-QAPP	Uniform Federal Policy for Quality Assurance Project Plans
µg/kg	Micrograms per kilogram
µg/L	Micrograms per liter
USACE	United States Army Corps of Engineers
USC	United States Code
UXO	Unexploded Ordnance
VOA	Volatile Organic Analysis
VOC	Volatile Organic Compound
WP	White Phosphorus

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EXECUTIVE SUMMARY

Parsons, on behalf of the U.S. Army (Army), is submitting this Feasibility Study (FS) Report for the Open Detonation (OD) Grounds (SEAD-006-R-01) [formerly SEAD-45 and SEAD-115] located at the Seneca Army Depot Activity (SEDA) in Romulus, New York. This FS considers the nature and extent of impacts that have been characterized during previous investigations, including the Site Investigation, Ordnance Explosive Engineering Evaluation and Cost Analysis (OE EE/CA), Phase I and Phase II OE Removal and Supplemental Munitions Response. This report is part of the Remedial Investigation/Feasibility Study (RI/FS) process required for compliance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980 and the Superfund Amendments and Reauthorization Act (SARA) of 1986. SEDA has officially been closed by the Department of Defense (DoD) and the Army since its historic mission was ceased in 2000. This document has been prepared for the US Army Corps of Engineers, Huntsville District, under Contract No. W912DY-08-D-0003, DO 0013, Task Order No. 0013.

Based on the previous site investigations, it was determined that the OD Grounds requires further action. This FS presents the remedial action alternatives that were developed in accordance with the Guidance for Conducting RI/FS under CERCLA (EPA/540/G-89/004, 1988). Three alternatives were developed and evaluated using the US Environmental Protection Agency (EPA)'s nine evaluation criteria for the OD Grounds. These alternatives are:

- Alternative 1: No Further Action (NFA)
- Alternative 2: Geophysical mapping, intrusive investigation, capping, and land use controls (LUCs)
- Alternative 3: Geophysical mapping, intrusive investigation, excavation, off-site disposal, and LUCs

Alternative 1, NFA, was included for comparative purposes. Alternatives 2 and 3 are similar, with the following difference: under Alternative 2, soils near the OD Hill would be capped and under Alternative 3 soils near the OD Hill would be excavated, processed, and disposed off-Site. The munitions and explosives of concern (MEC) Hazard Assessment (HA), which was completed as part of this FS Report, demonstrates that both Alternatives 2 and 3 similarly protective and limit the exposure pathway to potential material potentially presenting an explosive hazard (MPPEH). Alternative 3 rates more favorably for permanence and volume reduction and Alternative 2 rates more favorably for implementability. The cost of Alternative 3 is substantially higher than the cost of Alternative 2. The capital cost of Alternative 2 is $8.0M, with a present worth value over 30 years of $8.9M. The capital cost of Alterative 3 is $27.6M, with a present worth value of $28.0M. Based on the thorough evaluation of the seven criteria, Alternative 2 is the preferred alternative.

The implementation of Alternative 2 includes the following elements:

- Conducting digital geophysical mapping (DGM) of the Area, acquisition and removal of anomalies; all identified MPPEH will be handled and managed appropriately by trained personnel.
- Mag and dig operations with a handheld magnetometer, such as a Schonstedt, in areas that are wooded or inaccessible.
- In the metallic saturation (likely near the OD Hill), excavation of the top 6 inches of soil. Soil will be screened to remove potential MPPEH, followed by additional DGM, and intrusive investigation, (and additional excavation, if needed). The excavated overburden will be staged on-site for potential reuse and/or incorporation under the site cap.
- Design and construction of an engineered cap to cover contaminated soils and be at least 18 inches thick over the OD Hill area. Excavated soil that passed through the screen will be placed on the OD Hill under the cap. The cap will comply with applicable requirements of New York State (NYS) Part 360 requirements for leaving waste in-place.
- LUCs will be placed on the site to prohibit the use of groundwater, prohibit digging, and prevent the use of the site for use as a daycare or a residential facility.
- Long-term monitoring (LTM) will be conducted annually to monitor and maintain the cap.
- A five year review will be conducted.

Implementation of this alternative would be highly effective in achieving the Remedial Action Objectives (RAOs), long-term effectiveness, preventing exposure, and implementability. The costs for this alternative are moderate.

1.0 INTRODUCTION

1.1 PURPOSE AND ORGANIZATION OF REPORT

Parsons, on behalf of the Army, is submitting this FS Report for the OD Grounds located at the SEDA in Romulus, New York. This report is part of the RI/FS process required for compliance with CERCLA and SARA. The RI/FS at OD Grounds is being performed under the guidance of the EPA, EPA Region II, and the New York State Department of Environmental Conservation (NYSDEC). This document was prepared for the U.S. Army Corps of Engineers (USACE), Huntsville District, under Contract No. W912DY-08-D-0003, DO 0013, Task Order No. 0013.

Several characterization efforts and investigations for MPPEH and impacted soils were conducted at the OD Grounds and were summarized in the following documents:

- Expanded Site Investigation (ESI) for Seven High Priority Solid Waste Management Units (SWMU) SEAD 1, 16, 17, 24, 25, 26, 45, Seneca Army Depot (Engineering Science, Inc, December 1995);
- Final Ordnance and Explosives Engineering Evaluation/Cost Analysis Report (OE EE/CA), Seneca Army Depot (Parsons ES, February 2004);
- Final Site Specific Project Report SEAD 45/115 Open Detonation Grounds Ordnance and Explosives Removal Phase I Geophysical Survey and Cost Estimate, Seneca Army Depot (Weston, March 2005);
- Draft Phase II Ordnance and Explosives Removal Report (Weston, March 2006); and
- Additional Munitions Response Site (MRS) Investigation Report, Seneca Army Depot (Parsons ES, May 2010).

These reports serve as the basis to characterize the nature and extent of operational impacts and to assess human health and environmental risks at the OD Grounds. The MEC HA, which is part of this document, is used to evaluate the existing and residual risk at this site. This FS considers the nature and extent of impacts that were characterized in these documents, evaluates remedial action alternatives, and selects the most appropriate remedy for the OD grounds. This report is organized in accordance with the Guidance for Conducting RI/FIs under CERCLA (EPA, 1988).

Section 1.2 provides a brief overview of the characterization efforts, including background information, nature and extent of contamination, and the MEC HA. **Section 2.0** presents the remedial action objectives (RAO) for each medium of concern and considers general response actions that meet the remedial objectives. **Section 3.0** evaluates the alternatives for each medium by preliminary screening to determine their relative merits for use in the remedial action. **Section 4.0** evaluates the remedial action alternatives in detail and provides the basis for selection of the remedy for the OD Grounds.

1.2 OD GROUNDS BACKGROUND

1.2.1 OD Grounds Description

The SEDA is located approximately 40 miles south of Lake Ontario, near Romulus, New York as shown in **Figure 1-1**. The facility is located in an uplands area, at an elevation of approximately 600 feet mean sea level (MSL), that forms a divide separating two of the New York Finger Lakes; Cayuga Lake on the east and Seneca Lake on the west. Sparsely populated farmland covers most of the surrounding area. NYS Highways 96 and 96A adjoin SEDA on the east and west boundaries, respectively.

The SEDA previously occupied approximately 10,600 acres of land located in the Towns of Varick and Romulus in Seneca County, New York. The former military facility was owned by the U.S. Government and operated by the Army between 1941 and approximately 2000, when the SEDA military mission ceased. The SEDA's historic military mission included receipt, storage, distribution, maintenance, and demilitarization of conventional ammunition, explosives, and special weapons. In 1995, the SEDA was designated for closure under the DoD's Base Realignment and Closure (BRAC) process. With the SEDA's inclusion on the BRAC list, the Army's emphasis expanded from expediting necessary investigations and remedial actions at prioritized SWMUs to including the release of non-affected portions of the Depot to the surrounding community so that the land can be reused for non-military purposes (i.e., industrial, municipal, and residential). Since the inclusion of the SEDA in the BRAC program, approximately 8,000 acres were released to the community. An additional 250 acres of land were transferred to the U.S. Coast Guard for continued operation of a long-range navigation (LORAN) station.

The OD Grounds site is located in the northwestern corner of the Depot in Seneca County, New York and is also known as SEAD-006-R-01 (formerly SEAD-45 and SEAD-115). The site, shown in **Figure 1-2**, is largely meadow with some wooded and heavily brushed areas. The OD Grounds consists of 403 acres and was used to perform open detonation and burning of munitions. This acreage includes the area surrounded by a 2,500-foot radius centered around the OD Hill. Note that the Open Burning (OB) Grounds (also known as SEAD-23) is a separate site that was previously addressed and is not included in the calculation of the OD Grounds acreage. For ease of discussion in this FS, two different portions of the OD Grounds Site were identified. They are referred to as the "Kickout Area" and the "OD Hill Area". The OD Hill Area is the location of demolition activities. The Kickout Area is the area in which blast fragments emanating from the OD Hill activity are expected to land. The boundaries of these areas are defined on **Figure 1-2**.

Access into the greater OD Grounds demolition area is possible via a paved road that enters the area from the southeast and roughly parallels the path of Reeder Creek along its western bank. The unnamed access road branches off North-South Baseline Road near Building 2104, which is located in the southeastern corner of the OD Grounds (**Figure 1-2**). Building 2104 was built in 1951 and is described as "Change House (OB/OD Grounds)". The building is not included in any lists of structures with potential unexploded ordnance (UXO) hazards or in which potentially hazardous materials were stored (Woodward-Clyde, 1997). A change house is a location for military personnel to change clothes and uniforms.

1.2.2 Future Land Uses

CERCLA guidance, Land Use in the CERCLA Remedy Selection Process, Office of Solid Waste and Emergency Response (OSWER) Directive 9355.7-04, directs decision makers to achieve cleanup levels associated with the reasonably anticipated future land use over as much of the site as possible. As part of the 1995 BRAC process, a Local Redevelopment Authority (LRA) comprised of representatives from the local community was established. DoD policy described in Responsibility for Additional Environmental Cleanup after Transfer of Real Property also states that "For BRAC properties, the LRA's redevelopment and land use plan, will be the basis for the land use assumptions DoD will consider during the remedy selection process." A Land Reuse Plan was prepared and approved by the LRA in 1996 which designated parcels of land within the Depot for reuse into eight categories: Planned Industrial/Office Development, Warehousing, Prison, Conservation/Recreation, Institutional, Housing, Airfield/Special Events, and Federal to Federal Transfer. The area that encompasses the OD Grounds was determined to be "Conservation/Recreation Area". In 2005, the Seneca County Industrial Development Agency (SCIDA) revised the planned future use of property within the former Depot and added Institutional Training, Residential/Resort, Green Energy, Development Reserve, Training Area, and Utility uses. Under this revised future use plan, the OD Grounds is located in the "Conservation/Recreation" parcel of the former Depot (see **Figure 1-3**). That is, the planned future use for OD Grounds is for Conservation and Recreational purposes. In addition to the consideration of future land use during the remedy selection process, NYS regulations, New York Code of Rules and Regulations (NYCRR) Title 6, Chapter IV, Subchapter B, Part 375, Subpart 375-2.8 Remedial Program, requires evaluation of remedies that will restore the site conditions to "pre-disposal conditions to the extent feasible." (NYSDEC, 2013a)

1.2.3 Geological Setting

The Finger Lakes uplands area is underlain by a broad north-to-south trending series of rock terraces mantled by glacial till. As part of the Appalachian Plateau, the region is underlain by a tectonically undisturbed sequence of Paleozoic rocks consisting of shales, sandstones, conglomerates, limestones and dolostones. In the vicinity of SEDA, Devonian age (approximately 385 million years ago) rocks of the Hamilton Group are monoclinally folded and dip gently to the south. No evidence of faulting or folding is present. The Hamilton Group is a sequence of limestones, calcareous shales, siltstones, and sandstones.

SEDA geology is characterized by gray Devonian shale with a thin weathered zone where it contacts the overlying mantle of Pleistocene glacial till. This stratigraphy is consistent over the entire SEDA facility. The predominant surficial geologic unit present at the site is dense glacial till. The till is distributed across the entire facility and ranges in thickness from less than 2 feet to as much as 15 feet although it is generally only a few feet thick. The till is generally characterized by brown to gray-brown silt, clay and fine sand with few fine to coarse gravel-sized inclusions of weathered shale. Larger diameter weathered shale clasts (as large as 6-inches in diameter) are more prevalent in basal portions of the till and are probably ripped-up clasts removed by the active glacier.

The bedrock underlying the site is composed of the Ludlowville Formation of the Devonian age, Hamilton Group. Merin (1992) also cites three prominent vertical joint directions of northeast, north-northwest, and east-northeast in outcrops of the Genesee Formation 30 miles southeast of SEDA near

Ithaca, New York. Three predominant joint directions, N60E, N30W, and N20E are present within this unit (Mozola, 1951). These joints are primarily vertical. The Hamilton Group is a gray-black, calcareous shale that is fissile and exhibits parting (or separation) along bedding planes.

1.2.4 Hydrogeology

Regionally, four distinct hydrologic units have been identified within Seneca County (Mozola, 1951). These include two distinct shale formations, a series of limestone units, and unconsolidated beds of Pleistocene glacial drift. Overall, the groundwater in the county is very hard, and therefore, the quality is minimally acceptable for use as potable water.

Regionally, the water table aquifer of the unconsolidated surficial glacial deposits of the region would be expected to flow in a direction consistent with the ground surface elevations. Geologic cross-sections from Seneca Lake and Cayuga Lake can be found in Mozola (1951) and Crain (1974). The geologic cross-sections suggest that a groundwater divide exists approximately half way between the two Finger Lakes. SEDA is located on the western slope of this divide and therefore regional groundwater flow is expected to be primarily westward towards Seneca Lake. Except for local variations in the hydrogeology, the Site hydrogeology is overall consistent with the regional hydrogeology.

Surface drainage from SEDA flows to five primary creeks. In the southern portion of the Depot, the surface drainage flows through man-made drainage ditches and streams into Indian and Silver Creeks. These creeks then merge and flow into Seneca Lake just south of the SEDA airfield. The central part and administration area of the SEDA drain into Kendaia Creek. Kendaia Creek flows in a predominant westerly direction, and discharges into Seneca Lake at a location north of Pontius Point and the SEDA's former Lake Shore Housing Area. The majority of the northwestern and north-central portion of the SEDA drains into Reeder Creek. Reeder Creek flows predominantly northwesterly and leaves the Depot at a point that is north of the Open Detonation Area (i.e., SEAD-45) and west of the former Weapons Storage Area or the "Q" (i.e., SEAD-12) before it turns to the west and flows into Seneca Lake. The northeastern portion of the Depot, which includes a marshy area called the Duck Pond, drains into Kendig Creek and then flows north into the Cayuga-Seneca Canal and to Cayuga Lake. Other minor creeks are also present and drain portions of the Depot.

Surface water flow from precipitation events at OD Grounds is controlled by local topography which slopes gently to the east-northeast, as there is little relief on-site other than the demolition mound. In general, surface water flows east making its way into a network of drainage swales throughout the site that eventually lead into Reeder Creek, a sustained surface water body. Reeder Creek flows to the north-northwest along the eastern border of the OD Hill.

The groundwater flow direction in the till/weathered shale aquifer on the site is to the east-northeast based on the groundwater elevations measured in nine monitoring wells (MW) on April 4, 1994. Note that the wells at the OD Grounds have not been sampled or gauged since the 1995 ESI was conducted. The distribution of groundwater in the till aquifer is characterized by moist soil with coarse-grained lenses of water-saturated soil and in most instances the deeper weathered shale horizons were saturated. The recharge of water to the wells during sampling in 1994 was generally poor. Groundwater elevations collected within the Open Burning Grounds between 2007 and 2012 show a general groundwater flow to the northeast (**Figure 1-4**). Comparison between the 1994 data and the recent groundwater elevations suggests an approximately NNW-SSE trending groundwater divide through the western portion of the Open Burning Grounds (approximately at the large C-shaped berm visible in **Figure 1-4**) (Parsons, 2013). Groundwater east of the divide flows to the northeast while groundwater west of the divide flows to the southwest. Groundwater elevations measured during the ESI suggest a northeasterly direction of groundwater flow in the in the OD Grounds (**Figure 1-4**) (Parsons, 1995).

1.2.5 SWMU History

The OD Grounds was used to destroy munitions. Operations at the OD Grounds began circa 1941 when the Depot was first constructed and continued at regular intervals until circa 2000 when the military mission of the Depot ceased. This facility operated under Interim Status as a Subpart X Miscellaneous Unit for open burning and open detonation of explosives, propellants and pyrotechnics and other unserviceable ammunition under 40 Code of Federal Regulations (CFR) Part 265 and NYCRR 373-1. Due to the closure of the Site, the RCRA permit was not finalized as Final Status. RCRA Closure requirements and RCRA Corrective Action requirements were deferred to the CERCLA program by the NYSDEC. Under this deferment, the Army was permitted to open burn and open detonate all MPPEH to safely dispose and demilitarize the materials in association with any remedial activities. Final Closure of the open burning tray will occur at the end of these activities.

During operations, munitions were placed in a hole created in the hill with additional demolition material, covered with a minimum of 8 feet of soil, and detonated remotely. After demolition was completed, explosively displaced portions of the mound were reconstructed by bulldozing displaced and native soils back into the central earthen mound.

The historic operations resulted in MEC, MPPEH, munitions constituents (MC), and munitions debris (MD) being expelled from the OD Hill to the surrounding area. The investigations revealed that the area encompassing 1,000 feet to 2,000 feet from the OD Hill received "kickouts" from the demolition operation (**Figure 1-2**).

1.2.6 Previous Investigations and Activities

1.2.6.1 1995 Expanded Site Investigation for Seven High Priority SWMUs

Engineering Science, Inc. completed an ESI at the OD Grounds. During the ESI, surface and subsurface soil samples, groundwater and surface water samples, sediment samples were collected. The nature and extent of the impacts from the sample results is discussed in Section 1.3. In addition, ground penetrating radar (GPR) and Geonics Electromagnetic (EM) terrain conductivity meter (EM-31) surveys were performed in addition to anomaly removal. Five detailed GPR grids were conducted to further characterize several anomalies identified by the EM-31 survey. Ten test pits were excavated to identify the sources of various EM-31 anomalies.

Based on the ESI EM-31 surveys anomalies in test pits TP45-3, TP45-4, TP45-5, TP45-6 and TP45-10 were attributed to pipes, blasting wires, and conduit wires. The other test pits encountered a variety of material, including munitions fragments, wood, ash, wire, nails, etc., all of which may have contributed to the observed EM-31 anomalies. Parsons collected 14 soil samples and submitted them for laboratory analysis for volatile organic compounds (VOC), semivolatile organic compounds (SVOCs), Pesticides/Polychlorinated Biphenyl (PCB), metals, cyanide, explosives, herbicides, and nitrates. The results of the soil investigations are summarized in the Nature and Extent discussion in **Section 1.3.1** below.

1.2.6.2 2000 Ordnance and Explosives Engineering Evaluation and Cost Analysis

Parsons ES completed the field work for the EE/CA in 2000 and prepared the final report in 2004 (Parsons, 2004). The purpose of the EE/CA was to characterize the nature and extent of Ordnance and Explosives (OE), now referred to as MEC, identify potential safety problems associated with MEC, and study risk management alternatives at the various Areas of Interest (AOI). This objective was accomplished by characterizing MEC presence and developing and analyzing risk management alternatives.

The EE/CA fieldwork used geophysical survey techniques and intrusive investigations to estimate the density of the ordnance in different areas, which was then compared with the current and future activities and anticipated users. Data collected from this characterization project were also used to develop alternatives designed to reduce the risk of possible exposure to UXO within the AOIs, which included the OD Grounds. These alternatives were then evaluated to determine their effectiveness, implementability, and cost.

As part of the OE EE/CA, fifty-seven (57) 100-foot by 100-foot grids were surveyed at the OD Grounds using the EM61-MK2 (EM-61). Six grids in heavily wooded areas were also investigated by "mag and flag" surveys. In the majority of the grids surveyed with the EM61, a high density of buried metal was detected. Of the 1,337 anomalies identified in the EM61 surveyed grids, 86% were intrusively investigated. Two of the "mag and flag" surveyed grids were also intrusively investigated, although no statistics are available for these grids.

Approximately 3.5 acres of meandering path data were collected in the OD Grounds using the EM61. This data was all collected to the west and north of the grids surveyed in the OD Grounds. Due to extremely thick brush and forest to the east of the gridded area of the OD Grounds no meandering path data were collected in this direction. The meandering path data that was collected represented 2% of the 174-acre area outside of the 60-acre area investigated by the grid surveys. Of the 970 anomalies selected from the meandering path data, 72% were intrusively investigated. Of these, 19 (2.7%) were "false positives" as no discernable metallic debris was located.

Ordnance-related items were recovered from 666 of the 701 anomalies investigated (95%), and 21 of these were UXO items, now referred to as MEC/MPPEH. Density determinations were made using USACE's UXO Calculator, and the OD Grounds meandering path AOI was defined as 'high density' for having a density greater than 10 anomalies/acre.

Occasionally, anomalies identified on the Anomaly Dig Sheet could not be reacquired with the instrument that performed the survey. In such instances, the anomaly was flagged at the coordinate location and the inability to reacquire the anomaly was documented on the reacquisition team dig sheet. The intrusive teams would again geophysically search the immediate area around the flag using both Schonstedt® and Foerster® metal-detectors. 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 quality control (QC) purposes. No OE was ever found in locations where "false-positive" digs were performed.

1.2.6.3 2003 Phase I Geophysical Investigation

The Phase I Geophysical Investigation of the OD Hill was conducted between 2 June and 27 August 2003. An EM61 towed-array system was used to perform a geophysical survey in all accessible areas between 1,000 ft. and 2,500 ft. from the OD Hill (213 acres), and a "mag and flag" approach using hand-held magnetometers was used in a portion of the wooded/transect areas (9.65 acres). Results of the geophysical survey revealed that approximately 599 targets per acre exist in non-wooded areas between 1,000 ft. and 1,500 ft. of the OD Hill, approximately 139 targets per acre exist in non-wooded areas between 1,500 ft. and 2,500 ft. of the OD Hill, and approximately 208 targets per acre exist in wooded (transect) areas.

To verify the accuracy of results obtained both digitally and manually, Weston and EOTI UXO Technicians removed a total of 512 items from anomaly target locations within the non-wooded/open areas, and a total of 736 items from anomaly target locations within the transects. Of the 512 target anomalies excavated from the non-wooded/open areas, approximately 97% of the items were found at a maximum depth of 12 inches bgs. No items were identified at depths exceeding 20 inches bgs.

This investigation identified approximately 14,700 anomalies that are to be investigated in the open areas between 1,000 ft. and 1,500 ft. from the OD Hill under an area munitions response action. The anomalies identified within the 1,000 to 1,500 ft radius will be addressed as part of Alternatives 2 or 3 proposed in this FS.

1.2.6.4 2006 Phase II Ordnance and Explosives Removal Activities

The primary objective of Phase II was to reacquire, remove, and dispose of approximately 8,500 MEC/UXO[1] items and ordnance related scrap now referred to as MD located in non-wooded areas, between the 1,500 ft. and 2,500 ft. radius from the OD Hill to a depth of 4 ft. In addition, potential MEC/UXO and MD items located within 220 transects through wooded areas of the OD Grounds also required reacquisition, removal, and disposal.

Between September 2003 and March 2005, Weston removed 7,940 out of the 8,500 identified anomalies within the open area of the OD Grounds. In the wooded area, Weston investigated and removed and cleared 169 of the 220 transects.

In the open area, a total of 9,497 individual items were removed between the 1,500-ft and 2,500-ft. radius. Weston removed 6,663 individual items from the wooded areas. The percent of items recovered in both Phase I and Phase II investigations that were classified as OE (MEC or MPPEH) was 7%. Approximately

[1] The Phase II report, and other older reports, use the term UXO to describe unexploded ordnance. UXO items were reclassified and included in the broader category of MEC. In this paragraph, both terms were used for clarity.

58% of the items recovered were classified as MD and 28% were classified as cultural debris (CD) (i.e., non-munitions related debris such as barbed wire, horseshoes, and consumer hardware). Six percent (6%) of the items recovered were no-contacts.

1.2.6.5 2010 Supplemental Work

The focused site investigation was conducted by Parsons ES in 2010 and included topographic and geophysical surveys of specific areas within the OD Grounds and the collection and analysis of soil samples from TP and surface soil locations. The objectives of the site investigation included determining MC concentrations in sub-surface and surface soils in or adjacent to the OD Hill; depth of soil and debris in saturated areas for geophysical mapping to identify individual anomalies; determine the volume of soil in the OD Hill; and estimation of the bedrock surface at the OD Grounds. The results of the MC sampling indicated that metal concentrations are generally greatest in soils closest to the OD Hill and decrease with distance from OD Hill. With one exception, concentrations of metals detected at a distance greater than 1,000 ft from the OD Hill were below the relevant criteria levels. The topographic investigation concluded that bedrock underlying the area of the OD Hill mound is estimated to vary from 10 to 20 ft. bgs. Based on the topographic survey, the estimated volume of the earthen mound above ground surface is 38,000 cubic yards (cy). The estimated volume of soil in the OD Hill above bedrock surface is 75,000 cy (Parsons, 2010).

The Army selected five test plots in order to provide a preliminary assessment of the vertical deposition of MPPEH, MD, MC, and CD located at different distances and in different directions from the OD Hill. As part of this investigation, if the initial geophysical survey at a test plot location continued to show high levels of geophysical anomalies, additional one-foot excavations and repeat EM surveys were conducted as directed by the Army.

Review of the data gathered indicates that anomaly densities generally decrease with depth of excavation, especially at distances greater than 100 to 200 feet from the OD Hill mound. The overall assessment of the data suggest that there may be a directional component to the vertical deposition of anomalies, as is evidenced by the absence of anomalies to the southeast of the OD Hill and the presence of anomalies to the northeast and northwest at roughly comparable distances from the detonation site. Additionally, the results suggest that areas in close proximity to the OD Hill may have more subsurface anomalies due to the extensive amount of soil rework that was done at this Site during its operational period.

1.3 NATURE AND EXTENT OF IMPACTS

1.3.1 Soil

As part of the development of this FS, analytical data are compared to November 2012, EPA Regional Screening Levels (RSL) for industrial soil and the NYSDEC approved Remedial Program Soil Cleanup Objectives (EPA, 2012; NYSDEC, 2013a). 6 NYCRR Subpart 375-6, effective December 2006, includes the soil cleanup objective (SCO) tables developed for unrestricted use and restricted use scenarios (NYSDEC, 2013b). The OD Grounds is located in the future Conservation/Recreation area (**Figure 1-3**). Because the OD Grounds is a former MRS, any remedy will include LUCs implemented at this area that will prohibit digging, prevent use of/access to groundwater, and prohibit the area for use as a residential/child care facility. As a result, the NYSDEC restricted use SCOs for the commercial use scenario are considered to be appropriate criteria for the OD Grounds. Note that the SCOs in 6 NYCRR Subpart 375-6 had not been developed at the time of previous investigations and therefore were not considered in the 1995 ESI. The ESI report summarized that heavy metals are contaminants of concern.

Soil sampling was performed at the OD Grounds during several previous investigations. All data gathered were used to determine the nature and extent of impact on soil due to previous site activities. **Figure 1-5A** and **Figure 1-5B** show the approximate locations of the soil samples collected at the OD Grounds. A summary of surface and subsurface soil exceedances data are presented in **Table 1-1**. The full dataset is provided in **Appendix A**. A total of ninety seven soil samples were collected and analyzed for inorganic metals. Forty-seven samples collected were analyzed for explosives and thirty-five samples were analyzed for SVOCs, herbicides, pesticides, and PCBs. Sixteen samples were analyzed for VOCs. The analytical data are compared to the NYSDEC Commercial SCOs and EPA RSLs for Industrial Soil. None of the VOC, herbicide, or explosive results exceeded the Commercial SCOs or industrial RSLs. The SVOC concentrations were all below the Commercial SCOs; however, one SVOC (2,4 dinitrotoluene) exceeded its respective industrial RSL (note that there is no corresponding SCO value). The concentration of one PCB, Aroclor-1254, exceeded both its Commercial SCO and industrial RSL screening criteria in one sample. Among the metals, cadmium, copper and mercury were the only metals to exceed their respective Commercial SCOs. In comparison, arsenic, cadmium, and lead exceeded their respective industrial RSLs.

Figures 1-6A and **1-6B** illustrate that the concentrations of the metals in the soil are higher close to the OD Hill and the concentrations decrease as the distance increases into the Kickout area of the OD Grounds. The figures highlight that there were no exceedances of NYSDEC Commercial SCOs in the Kickout area. Samples collected for metals analysis were also sent for synthetic precipitation leaching procedure (SPLP) analysis during the 2010 Supplemental Work. The discussion of these results and samples are included in Section 1.4.1.

1.3.2 Groundwater

Groundwater results discussed below were sampled over an approximately 20 year time period from both the OD and OB Grounds. Water quality screening criteria used for comparison in this FS report includes the lower of the values from either NYS Ambient Water Quality Standards (AWQS) for Class GA groundwater or EPA National Primary Drinking Water Regulations Maximum Contaminant Level (MCL) (EPA, 2012; NYSDEC, 2004). A consolidated summary of groundwater exceedances from these reports is presented in **Table 1-2**.

Groundwater sample results from the 1995 ESI suggest no gross contamination of the groundwater within the OD Grounds. There were no VOC exceedances and no pesticides or herbicides were found in the groundwater samples collected. Two explosives were detected in the groundwater one time each. One of the explosives (1,3-Dinitrobenzene) was detected below its respective groundwater criteria. NYS AWQS and EPA MCL screening criteria for the other explosive (HMX) do not exist; however, the detected value (0.5 ug/L), for comparison, is far less than the EPA's tap water RSL of 780 ug/L.

One SVOC [Bis(2-Ethylhexyl)phthalate] was detected in four groundwater samples at concentrations above the criteria value. Ten metals (antimony, beryllium, chromium, iron, lead, manganese, mercury, nickel, sodium, and thallium) were found in one or more the groundwater samples at concentrations above the criteria value. The groundwater sampling methodology used during the 1995 ESI resulted in high turbidity in the samples. The elevated metals concentrations are likely due to the turbidity levels (e.g., values as high as 9860 nephelometric turbidity units [NTU]) and are associated with suspended particles rather than representative of actual conditions in the groundwater aquifer. Thallium was detected in one sample and only slightly exceeded its screening criterion (**Table 1-2**). The results of the 1995 ESI suggest that the groundwater at the OD Grounds is not impacted by historic site activities.

Adjacent to the OD Hill, the groundwater within the OB Grounds site was sampled prior to the 1994 OB Grounds RI and six wells from this site currently are part of a long-term monitoring (LTM) program (Parsons, 1994, 2013). Groundwater monitoring for explosives, metals, total organic carbon, total organic halides, pH, pesticides, and nitrates between 1981 through 1987 indicated no exceedances of then current NYS AWQS except for iron and manganese. In 1989, sampling was conducted on ten additional installed wells and six of the seven previous wells. This round of sampling examined Extraction Procedure (EP) Toxicity metals and explosives. No metals or explosives exceeded applicable screening criteria.

Results from Phase I and II groundwater sampling were compiled in the 1994 OB Grounds RI Report (Parsons, 1994). Analytes examined during these sampling events included volatile organic analysis (VOA), target compound list (TCL) for semi-volatiles, pesticides, and PCBs, total analyte list (TAL) metals, and explosives. Groundwater was found to be minimally impacted by metals and explosives. Based on these results, the 1996 OB Grounds FS Report determined that groundwater was not a medium of concern (Parsons, 1996).

Based on the 1998 Record of Decision (ROD) for the OB Grounds, lead and copper were the contaminants and media of concern proposed for the remedy in the site soils and sediments adjacent to Reeder Creek (Parsons, 1998). Between 2007 and 2012, LTM of wells within the OB Grounds for copper and lead has shown no evidence of lead or copper in the groundwater above the cleanup goals subsequent to the completion of the remedial action for the Site. These findings are consistent with the groundwater analytical results obtained during the RI stage (1990s) of work at the Site, indicating that there is no evidence of groundwater quality deterioration over approximately 20 years.

Although the OB Grounds are not immediately downgradient from the OD Grounds, the results from previous investigations at the OB Grounds site can be used as an analogue for the potential groundwater contamination expected in the adjacent OD Grounds. Potential contaminants, fate and transport, and exposure scenarios are expected to be the same as was discussed in previous studies. As such, groundwater is not expected to be a medium of concern within the OD Grounds; however, potential examination of the groundwater may be appropriate subsequent to the remedial alternative selected in this FS.

1.3.3 Surface Water

During the ESI, the NYSDEC AWQS for Class C surface water were used to evaluate the OD Grounds surface water conditions (NYSDEC, 2004). A summary of surface water data from the ESI is presented in **Table 1-3**. Four surface water samples were collected as part of the OD Grounds investigation. Three of the surface sample samples were collected from drainage ditches located downgradient of the OD Hill, and the fourth sample was collected from a low-lying area northwest of the OD Hill. No VOC, SVOC, pesticide, PCB, herbicide compounds were found in the samples collected. Seven metals aluminum, cadmium, copper, iron, lead, mercury, and zinc were found in three of the four surface water samples at concentrations above the associated criteria value. In addition, nitroaromatic compounds were found in two of the surface water sample collected. The surface water samples were collected from drainage swales that were typically dry and the water sampled likely represented surface runoff from a recent precipitation event, rather than site surface water. The four surface water samples collected were from ephemeral drainage ditches and a low-lying swale. These on-site surface water pools are not classified by NYSDEC as surface water bodies and therefore NY Ambient Water Quality Concentrations (AWQC) do not apply. Surface water is not considered a media of concern.

During the 1994 OB Grounds RI, surface water sampling was conducted within Reeder Creek (**Figure 1-4**) (Parsons, 1994). Reeder Creek is a recognized surface water body and therefore AWQCs would apply to human and ecological receptors. Surface water samples were collected from Reeder Creek up- and down-gradient of the OB Grounds. Reeder Creek serves as drainage for much of the OD Grounds; therefore, these samples were downgradient of various portions of the OD Grounds. Results from Reeder Creek were compared to recent NYS AWQC values. No significant impacts to the surface water were found; therefore, surface water is not considered a medium of concern.

1.3.4 Sediment

Four sediment samples were collected during the ESI. Three of the sediment samples were collected from the drainage ditches located downgradient of the OD Hill and the fourth sample was collected from a low-lying area northwest of the OD Hill. The material at the base of the drainage swales is site soil. The sediment samples collected during the ESI are located approximately 500 ft to 600 ft from the OD Hill, or within or close to the "OD Hill area". These samples were analyzed for VOCs, SVOCs, metals, PCBs, pesticides, herbicides and nitrate/nitrite nitrogen.

VOCs and herbicides were not detected in the sediment samples. Several SVOCs, nitroaromatics, pesticides, and PCBs were detected, primarily at low concentrations.

A summary of sediment (ditch soil) analytical results from the ESI is presented in **Table 1-4**, is compared to the commercial SCOs in **Table 1-4**. The results show that cadmium, copper, and mercury were detected at concentrations slightly elevated compared to their respective commercial SCOs. The single exceedence of the commercial SCOs was limited to cadmium, which was detected at the low-lying ditch soil sample location at a concentration of 25.6 mg/kg compared to the commercial SCO of 9.3 mg/kg. Cadmium, copper, and mercury were detected above the commercial SCOs in the drainage swale samples located downgradient of the OD Hill, with concentrations as follows: Cadmium 14.9 mg/kg (SCO = 9.3

mg/kg); Copper 814 mg/kg and 323 mg/kg (SCO = 270 mg/kg); Mercury 5.3 mg/kg and 4.4 mg/kg (SCO = 2.8 mg/kg). These concentrations of metals in the ditch soil are similar or lower than the levels observed at similar locations in the soil samples. The ditch soil will be grouped with the soil located in the OD Hill area.

In conjunction with surface water samples, collocated sediment samples were collected from within Reeder Creek (**Figure 1-4**) (Parsons, 1994). Arsenic, copper, lead, manganese, mercury, nickel and zinc exceeded NY Sediment Criteria values. These exceedances were for a "to be considered" (TBC), therefore sediment was retained as a media of interest in the 1996 OB Grounds FS. The inspection of Reeder Creek has found sediment in various sections. The sediment appears to be from decomposition of fallen leaves and tree material stockpiles by beavers in previous seasons and not the result of active erosion of the site soil and soil transport (Parsons, 2013). Evidence for excessive erosion into the creek was not found. Current monitoring at OB Grounds suggests no visual impacts to Reeder Creek.

1.3.5 Geophysics

All geophysics efforts conducted during previous investigations were followed by investigation of a select number of anomalies and target areas. The OD Grounds area was included in various geophysical investigations in the past. The results of the geophysical investigation and the following investigation of anomalies and targets are discussed in detail in **Section 1.2** – Previous Investigation.

1.4 FATE AND TRANSPORT

This section presents an overview of the fate and transport characteristics for the site contaminants identified as constituents that have an impact on the applicable matrix at the OD Grounds. Contaminants of concern may be selected because of their intrinsic toxicological properties, because they are present in large quantities, or because they are presently in or potentially may move into critical exposure pathways (e.g., drinking water supply) (EPA, 1988). Sediment and surface water collected on-site and downgradient of the site do not show gross contamination of site media indicative of an observed release. There was no evidence of a release to groundwater from either on-site samples or samples collected from an adjacent site. Constituents of concern for this site are MC (metals) in soil and potential items of MPPEH/MD.

Understanding the fate of the various MEC and MC contaminants potentially present in or released to the environment is important to evaluate the potential hazards or risks posed by those contaminants to human health and/or the environment. For example, MEC may be found on the ground surface or be below grade; however, it is possible for natural processes to result in the movement, relocation, or unearthing of the MEC, thereby increasing the chance of its subsequent exposure to human receptors. Furthermore, MC may remain inside intact munitions or chemicals that may have been released to the environment during operational activities.

Analytical results from environmental samples and observations from previous geophysical and anomaly investigations indicate the presence of MEC/MD, metals, nitrates and explosives at the OD Grounds. The following paragraphs discuss potential migration processes for, the persistence of, and the potential migration routes of MEC/MD and of the Chemicals of Potential Concern (COPCs) present at the site.

Many different environmental processes act upon MC, which may influence or alter their availability to interact with receptors. These processes depend on the media in which the source (MEC or MD) exists and the exposure of MC to the processes. These processes work through the different media: air, soil, surface water, groundwater, or biota. The following are short descriptions of these processes as described in Hewitt, et al. (2003).

- **Advection** – the passive movement of a solute with flowing water.
- **Dispersion** – the observed spreading of a solute plume, generally attributed to hydrodynamic dispersion and molecular diffusion.
- **Adsorption/desorption** – the process by which dissolved, chemical species accumulate (adsorption) at an interface or are released from the interface (desorption) into solution.
- **Diffusion** – the migration of solute molecules from regions of higher concentration to regions of lower concentration.
- **Biotic transformation** – the modification of a chemical substance in the environment by a biological mechanism.
- **Oxidation/reduction** – reactions in which electron(s) are transferred between reactants.
- **Covalent binding** – the formation of chemical bonds with specific functional groups in soil organic solids.
- **Polymerization** – the process by which the molecules of a discrete compound combine to form larger molecules with a molecular weight greater than that of the original compound, resulting in a molecule with repeated structural units.
- **Photolysis** – the chemical alteration of a compound due to the direct or indirect effects of light energy.
- **Infiltration** – the process by which water enters the soil at the ground surface and moves into deeper horizons.
- **Evapotranspiration** – the collective processes of evaporation of water from water bodies, soil and plant surfaces, and the transport of water through plants to the atmosphere.
- **Plant root uptake** – the transport of chemicals into plants through the roots.
- **Sedimentation** – The removal from the water column of suspended particles by gravitational settling.

1.4.1 Metals

The analytical results from the soil samples collected during the 2010 OD Grounds Supplemental work indicate that metal concentrations are highest in samples collected in close proximity to the OD Hill, and generally decrease in the Kickout area as distance from the OD Hill increases.

Once all total metal concentration results were received and evaluated, eight samples were selected for leachability determinations using the SPLP (EPA SW-846 Method 1312) in combination with EPA SW-

846 Method 6010 and 7471, as appropriate for the RCRA eight metals (i.e., arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver) and other metals of interest (e.g., antimony, cobalt, copper, vanadium, and zinc). The SPLP method was implemented in an effort to determine the ability of a material in the soil to potentially impact the groundwater or surface water, and, therefore, is relevant to the discussion of fate and transport. These samples were representative of the conditions within 500 feet distance from the center of the OD Hill. The results of these analyses are presented in **Appendix A-5**. Total metal analysis results presented were compared to EPA's RSLs for residential soils and NYSDEC Commercial SCO values, while the SPLP results are compared to NYSDEC GA Groundwater Effluent values. A detailed evaluation of the data is provided in the Completion Report for Additional MRS Investigation at Seneca Army Depot (Parsons, 2010).

A review of the data indicates that all of the metals detected show some potential to leach to groundwater. Two metals, mercury and lead, show the highest number of samples affected (i.e., six) at levels of potential concern, while cadmium and copper are also observed to be of potential concern when total soil concentrations move up to and above the Commercial SCOs.

While metals can be described by a range of mobilities, their transport abilities can generally be characterized by the same underlying principles. The mobility of metals within a soil system is primarily associated with the movement of water through that system. This mobility is affected by the solubility of the metal and its compounds, as well as chemical parameters affecting the oxidation state of the metal in solution. Metals associated with the aqueous phase of soil are subject to movement with soil water and may be transported through the vadose zone to groundwater. However, the rate of migration of the metal usually does not equal the rate of water movement through the soil due to fixation and adsorption reactions (Dragun, 1988). Metals, unlike organic compounds, cannot be degraded (McLean and Bledsoe, 1992). Metals become immobile due to mechanisms of adsorption and precipitation. Metal-soil interactions are such that when metals are introduced at the soil surface, downward transportation does not occur to any great extent unless the metal retention capacity of the soil is overloaded, or metal interaction with the associated waste matrix enhances mobility.

1.4.2 MPPEH/MEC/MD

There are two primary natural processes that can result in the migration or exposure of MPPEH/MEC items that might be present at a site: erosion and frost heave. Natural erosion of soil over time by the wind or by water (surface water or precipitation) can result in the exposure of MEC below grade by the removal of the overlying soil. In some cases, if soil is unstable and the erosive force is sufficient to act on the size of MEC item(s) present, this process can also result in the movement of MEC from its original position to another location (typically somewhere downstream of the wash). This is not anticipated to be the case at the OD Grounds as there has been no visual indication of this occurring on site during.

In addition to erosion, below grade objects have been known to move or migrate toward the surface during freezing and thawing cycles. This occurs when cold penetrates into the ground and water below the buried objects freezes and expands, gradually pushing the items upwards. This phenomenon is often referred to as "frost heave" and is most likely to affect items buried above the frost line. Soil type influences the occurrence of frost heave. Soil type influences the occurrence of frost heave: gravel, sand, and clay are not typically susceptible to the process, whereas silty soil is susceptible.

The 2010 Supplemental Work conducted at the OD Grounds concluded that the geophysical anomalies, which were indicative of potential presence of MPPEH showed a general decrease in density from saturated levels (i.e., 600 anomalies per acre) at surface elevations to lower densities at depth at each test plot; this is especially true for the test plots that are further from the initial point of detonation. The study also concluded that directional and point-of-detonation distance variations may be related to the vertical distribution of geophysical anomalies in the soil surrounding the detonation site.

1.5 HAZARD ASSESSMENT

A MEC HA was prepared to qualitatively assess the potential explosive hazards to human receptors associated with complete MEC exposure pathways at the OD Grounds. The results of the MEC HA show that implementation of a remedy would reduce the MEC hazard potential. A detailed description of the MEC HA conducted for the OD Grounds, including the information and assumptions used for this assessment, is included as **Appendix B** of this FS.

This MEC HA divides the OD Grounds into two areas for assessment purposes based on differing anticipated explosive hazard characteristics. Previous investigations indicate the density of potential MEC is highest at the center of the OD Grounds, in the vicinity of the OD Hill where the demolition activities took place and areas in the immediate vicinity that received most of the "kickouts" from those activities. This area is referred to as the "OD Hill area" in this MEC HA. The second assessment area includes areas further away from the OD Hill that received kickouts, but in lower densities. This second assessment area is referred to as the "Kickout area" in this MEC HA. The locations of these two assessment areas are shown on **Figure 1-3**.

The MEC HA method focuses on hazards to human receptors and does not directly address environmental or ecological concerns that might be associated with MEC. The process for conducting the MEC HA is described in the MEC HA interim guidance document (USEPA, 2008) and uses input data based on historical documentation, field observations, and the results of previous studies and removal actions. The MEC HA interim guidance was developed by the Technical Working Group for Hazard Assessment, which included representatives from the DoD, the U.S. Department of the Interior, the USEPA, and various states and tribes. NYSDEC is not a party to the MEC HA guidance. The DoD has encouraged use of this method on a trial basis (DoD 2009).

A qualitative baseline evaluation of the potential MEC hazards posed was conducted by reviewing each of the MEC HA input factors for the OD Hill and Kickout areas. Having generated baseline MEC HA scores for each assessment area, different remedial alternatives were further evaluated using the MEC HA method to compare how they might reduce the explosive hazards in each area. The remedial alternatives evaluated were (1) geophysical mapping, intrusive investigation, and installation of an 18-inch thick cap, followed by implementation of LUCs and (2) geophysical mapping, intrusive investigation, excavation, off-site soil disposal, followed by implementation of LUCs. These are referred to in this FS as Remedial

Alternatives 2 and 3, respectively. Remedial Alternative 1 represents the no action alternative, which is the baseline scenario for this MEC HA.

Under the MEC HA method, the potential MEC hazards are evaluated qualitatively for each area by evaluating site conditions and assigning related "input factors" that generate a total MEC HA score between 125 and 1,000, with the upper limit representing the maximum level of explosive hazard. The MEC HA method identified the associated hazard levels for these scores, which range from 1 to 4. A Hazard Level of 1 indicates the highest potential explosive hazard conditions and a hazard level of 4 indicates low potential explosive hazard conditions. The basis for these hazard levels is detailed in the MEC HA interim guidance document (USEPA 2008).

For the OD Hill area, the baseline score (the no action alternative) results in a MEC HA score of 865. Remedial Alternative 2 (geophysical mapping, intrusive investigation, and installation of an 18-inch thick cap, followed by implementation of LUCs) results in a MEC HA score of 470. Remedial Alternative 3 (geophysical mapping, intrusive investigation, excavation, off-site disposal, and implementation of LUCs) was also evaluated for the OD Hill area, and resulted in a MEC HA score of 470, the same as Alternative 2. The reduction in MEC HA score from 865 to 470 reduces the corresponding Hazard Level rating from 1 ('highest potential explosive hazard conditions') to 4 ('low potential explosive hazard conditions'). Based on these results, there is no significant difference between these remedial alternatives with respect to reduction of explosive hazards at the OD Hill area.

For the Kickout area, the baseline score (the no action alternative) results in a MEC HA score of 715. Remedial Alternatives 2 and 3 both result in a MEC HA score of 445. This reduction in MEC HA score reduces the corresponding Hazard Level rating from 3 ('moderate potential explosive hazard conditions') to 4 ('low potential explosive hazard conditions'). Based on these results, there is no significant difference between these remedial alternatives with respect to reduction of explosive hazards at the Kickout area.

In addition to providing a technique to evaluate baseline MEC hazards, the MEC HA method establishes a process to qualitatively evaluate the hazard mitigation that would be achieved by remedial actions. This process is based on assumptions made regarding the effects of a given remedial response (e.g., LUCs, surface cleanup, subsurface cleanup), coupled with modified scores for MEC HA input factors, to evaluate how the MEC HA score might be reduced following implementation of the response. The primary purpose of this process is to support the evaluation of response alternatives conducted during an FS; i.e., this evaluation should not be used as the sole basis upon which to recommend a remedial response. As with the baseline score, these total MEC HA scores and the associated hazard levels are *qualitative references only* and should <u>not</u> be interpreted as quantitative measures of explosive hazard.

Accounting for score modifications resulting from either Remedial Alternative 2 or 3, the total Hazard Level rating is reduced to a 4, 'low potential explosive hazard conditions" from a Hazard Level rating of 1 ('highest potential explosive hazard conditions'). Based on the scores, the evaluation indicates that implementation of Alternatives 2 or 3 would result in equivalent reduction of hazards.

Table 1-1
Summary of Surface and Subsurface Soil Samples
Feasibility Study Report - OD Grounds
Seneca Army Depot Activity

						NYS SCO Commercial Use[1]		EPA RSLs Industrial Soil[2]	
Parameter	Unit	Maximum Value	Frequency of Detection	Number of Times Detected	Number of Samples Analyzed	Criteria Value[1]	Number of Exceedances	Criteria Value[2]	Number of Exceedances
Volatile Organic Compounds									
Tetrachloroethene	µG/KG	19	38%	6	16	150,000	0	2,600	0
Semivolatile Organic Compounds									
2,4-Dinitrotoluene	µG/KG	14,000	37%	13	35	NA	0	5,500	1
2,6-Dinitrotoluene	µG/KG	700	6%	2	35	NA	0	620,000	0
Acenaphthylene	µG/KG	30	9%	3	35	500,000	0	NA	
Anthracene	µG/KG	18	6%	2	35	500,000	0	170,000,000	0
Benzo(a)anthracene	µG/KG	50	23%	8	35	5,600	0	2,100	0
Benzo(a)pyrene	µG/KG	82	23%	8	35	1,000	0	210	0
Benzo(b)fluoranthene	µG/KG	55	26%	9	35	5,600	0	2,100	0
Benzo(ghi)perylene	µG/KG	66	20%	7	35	500,000	0		
Benzo(k)fluoranthene	µG/KG	58	20%	7	35	56,000	0	21,000	0
Bis(2-Ethylhexyl)phthalate	µG/KG	740	26%	9	35	NA	0	120,000	0
Chrysene	µG/KG	130	34%	12	35	56,000	0	210,000	0
Diethyl phthalate	µG/KG	35	3%	1	35	NA	0	490,000,000	0
Di-n-butylphthalate	µG/KG	6,800	34%	12	35	NA	0	62,000,000	0
Fluoranthene	µG/KG	68	31%	11	35	500,000	0	22,000,000	0
Hexachlorobenzene	µG/KG	110	31%	11	35	6,000	0	1,100	0
Hexachloroethane	µG/KG	1,100	17%	6	35	NA	0	120,000	0
Indeno(1,2,3-cd)pyrene	µG/KG	52	11%	4	35	5,600	0	2,100	0
Naphthalene	µG/KG	30	14%	5	35	500,000	0	18,000	0
N-Nitrosodiphenylamine	µG/KG	320	6%	2	35	NA	0	350,000	0
N-Nitrosodipropylamine	µG/KG	1,600	14%	5	35	NA	0		
Phenanthrene	µG/KG	46	26%	9	35	500,000	0		
Pyrene	µG/KG	110	34%	12	35	500,000	0	17,000,000	0
Herbicides									
MCPA	µG/KG	9,400	6%	2	35	NA	0	310,000	0
Explosives									
1,3,5-Trinitrobenzene	µG/KG	190	60%	28	47	NA	0	27,000,000	0
2,4,6-Trinitrotoluene	µG/KG	1,400	81%	38	47	NA	0	79,000	0
2,4-Dinitrotoluene	µG/KG	1,100	77%	36	47	NA	0	5,500	0
2-amino-4,6-Dinitrotoluene	µG/KG	680	77%	36	47	NA	0	2,000,000	0
4-amino-2,6-Dinitrotoluene	µG/KG	500	57%	27	47	NA	0	1,900,000	0
HMX	µG/KG	470	68%	32	47	NA	0	49,000,000	0
Nitroglycerine	µG/KG	1,500	3%	1	31	NA	0	62,000	0
RDX	µG/KG	5,800	83%	39	47	NA	0	24,000	0
Tetryl	µG/KG	330	9%	4	47	NA	0	2,500,000	0

Table 1-1
Summary of Surface and Subsurface Soil Samples
Feasibility Study Report - OD Grounds
Seneca Army Depot Activity

Parameter	Unit	Maximum Value	Frequency of Detection	Number of Times Detected	Number of Samples Analyzed	NYS SCO Commercial Use[1] Criteria Value'	NYS SCO Commercial Use[1] Number of Exceedances	EPA RSLs Industrial Soil[2] Criteria Value'	EPA RSLs Industrial Soil[2] Number of Exceedances
Pesticides/PCBs									
Aroclor-1254	µG/KG	2,000	6%	2	34	1,000	1	740	1
4,4'-DDD	µG/KG	2.4	6%	2	34	92,000	0	7,200	0
4,4'-DDE	µG/KG	4.2	63%	22	35	62,000	0	5,100	0
4,4'-DDT	µG/KG	3.4	50%	17	34	47,000	0	7,000	0
Alpha-Chlordane	µG/KG	2	12%	4	34	24,000	0		
Dieldrin	µG/KG	3.2	41%	14	34	1,400	0	110	0
Endosulfan I	µG/KG	55	60%	21	35	200,000	0		
Endosulfan II	µG/KG	0.88	3%	1	34	200,000	0		
Endrin	µG/KG	3.6	3%	1	34	89,000	0	180,000	0
Endrin ketone	µG/KG	0.58	3%	1	34	NA	0		
Gamma-Chlordane	µG/KG	1.1	9%	3	34	NA	0		
Methoxychlor	µG/KG	45	3%	1	34	NA	0	3,100,000	0
Inorganics									
Aluminum	MG/KG	27,900	100%	97	97	NA	0	990,000	0
Antimony	MG/KG	5.1	33%	32	97	NA	0	410	0
Arsenic	MG/KG	12.6	100%	97	97	16	0	1.6	97
Barium	MG/KG	365	100%	97	97	400	0	190,000	0
Beryllium	MG/KG	1.2	98%	95	97	590	0	2,000	0
Cadmium	MG/KG	1,100	81%	77	95	9.3	11	800	1
Calcium	MG/KG	193,000	99%	96	97	NA	0		
Chromium	MG/KG	446	100%	97	97	1,500	0		
Cobalt	MG/KG	26.8	100%	97	97	NA	0	300	0
Copper	MG/KG	7,310	100%	97	97	270	52	41,000	0
Cyanide	MG/KG	0.7	13%	2	16	27	0	20,000	0
Iron	MG/KG	118,000	100%	97	97	NA	0	720,000	0
Lead	MG/KG	998	100%	97	97	1,000	0	800	1
Magnesium	MG/KG	15,000	100%	97	97	NA	0		
Manganese	MG/KG	5,040	100%	97	97	10,000	0	23,000	0
Nickel	MG/KG	59.3	100%	92	92	310	0	20,000	0
Potassium	MG/KG	4,880	100%	76	76	NA	0		
Selenium	MG/KG	0.92	4%	4	97	1,500	0	5,100	0
Silver	MG/KG	205	68%	66	97	1,500	0	5,100	0
Sodium	MG/KG	213	84%	81	97	NA	0		
Thallium	MG/KG	0.27	6%	6	97	NA	0	10	0
Vanadium	MG/KG	41.9	100%	97	97	NA	0	5,200	0
Zinc	MG/KG	1,470	100%	92	92	10,000	0	310,000	0
Mercury	MG/KG	9.1	99%	96	97	2.8	49	310	0

Notes:
1) Criteria values are the NYSDEC commerical SCOs (6 NYCRR Subpart 375-6).
2) Criteria values are the EPA Industrial RSL (June 2011).

Table 1-2
Summary of Groundwater Data
Feasibility Study Report - OD Grounds
Seneca Army Depot Activity

Parameter	Unit	Maximum Value	Frequency of Detection	Criteria Source[1]	Criteria Level	Number of Exceedances	Number of Times Detected	Number of Samples Analyzed
Volatile Organic Compounds								
Tetrachloroethene	µG/L	1	13%	GA	5	0	1	8
Semivolatile Organic Compounds								
Bis(2-Ethylhexyl)phthalate	µG/L	33	50%	GA	5	4	4	8
Explosives								
1,3-Dinitrobenzene	µG/L	0.067	13%	GA	5	0	1	8
HMX	µG/L	0.5	13%				1	8
Inorganics								
Aluminum	µG/L	63,300	75%				9	12
Antimony	µG/L	52.1	58%	GA	3	7	7	12
Arsenic	µG/L	9.5	25%	MCL	10	0	3	12
Barium	µG/L	751	100%	GA	1,000	0	12	12
Beryllium	µG/L	5	25%	MCL	4	1	3	12
Cadmium	µG/L	3.8	33%	GA	5	0	4	12
Calcium	µG/L	660,000	100%				12	12
Chromium	µG/L	106	42%	GA	50	1	5	12
Cobalt	µG/L	94.4	33%				4	12
Copper	µG/L	123	58%	GA	200	0	7	12
Iron	µG/L	113,000	83%	GA	300	5	10	12
Iron+Manganese	µG/L	117,640	100%	GA	500	6	12	12
Lead	µG/L	75.6	67%	MCL	15	2	8	12
Magnesium	µG/L	77,900	100%				12	12
Manganese	µG/L	4,640	100%	GA	300	4	12	12
Mercury	µG/L	1.8	25%	GA	0.7	1	3	12
Nickel	µG/L	209	42%	GA	100	1	5	12
Potassium	µG/L	18,700	75%				9	12
Selenium	µG/L	2.5	42%	GA	10	0	5	12
Silver	µG/L	4.6	17%	GA	50	0	2	12
Sodium	µG/L	40,000	100%	GA	20,000	1	12	12
Thallium	µG/L	3.4	8%	MCL	2	1	1	12
Vanadium	µG/L	93.1	25%				3	12
Zinc	µG/L	321	100%				12	12

Notes:
1) Criteria action level source document and web address.
- The NYS GA Standard and EPA MCL values were obtained from the provided links.
http://water.epa.gov/drink/contaminants/index.cfm#List

Table 1-3
Summary of Surface Water Data
Feasibility Study Report - OD Grounds
Seneca Army Depot Activity

Parameter	Unit	Maximum Value	Frequency of Detection	Criteria Level[1]	Number of Exceedances	Number of Times Detected	Number of Samples Analyzed
Explosives							
HMX	UG/L	0.49	50%			2	4
RDX	UG/L	2	50%			2	4
Inorganics							
Aluminum	UG/L	37,500	100%		0	4	4
Arsenic	UG/L	2.3	25%	360	0	1	4
Barium	UG/L	439	100%			4	4
Beryllium	UG/L	1.5	50%		0	2	4
Cadmium	UG/L	11.2	25%		0	1	4
Calcium	UG/L	194,000	100%			4	4
Chromium	UG/L	50.8	75%	4270	0	3	4
Cobalt	UG/L	18.2	50%		0	2	4
Copper	UG/L	612	100%	50	3	4	4
Cyanide	UG/L	47.7	25%	22	1	1	4
Iron	UG/L	60,400	100%	300	4	4	4
Lead	UG/L	68.7	100%	330	0	4	4
Magnesium	UG/L	24,300	100%			4	4
Manganese	UG/L	1,250	100%			4	4
Mercury	UG/L	3	100%			4	4
Nickel	UG/L	74.2	100%	4250	0	4	4
Potassium	UG/L	9,670	100%			4	4
Sodium	UG/L	4,340	100%			4	4
Vanadium	UG/L	54.9	75%	190	0	3	4
Zinc	UG/L	883	100%	800	1	4	4

Notes:
1) Criteria source are the NYS AWQS Class D Values.

Table 1-4
Summary of Sediment Data
Feasibility Study Report - OD Grounds
Seneca Army Depot Activity

Parameter	Units	Maximum Value	Frequency of Detection	Criteria Value[1]	Number of Exceedance	Number of Times Detected	Number of Samples Analyzed
Explosives							
2,4,6-Trinitrotoluene	UG/KG	120	25%		0	1	4
2,4-Dinitrotoluene	UG/KG	83	25%		0	1	4
2-amino-4,6-Dinitrotoluene	UG/KG	260	25%		0	1	4
RDX	UG/KG	210	25%		0	1	4
Tetryl	UG/KG	140	25%		0	1	4
Semivolatile Organic Compounds							
Benzo(a)anthracene	UG/KG	32	50%	5,600	0	2	4
Benzo(a)pyrene	UG/KG	37	50%	1,000	0	2	4
Benzo(b)fluoranthene	UG/KG	37	50%	5,600	0	2	4
Benzo(ghi)perylene	UG/KG	48	25%	500,000	0	1	4
Benzo(k)fluoranthene	UG/KG	28	50%	56,000	0	2	4
Chrysene	UG/KG	50	75%	56,000	0	3	4
Di-n-butylphthalate	UG/KG	25	25%		0	1	4
Fluoranthene	UG/KG	60	75%	500,000	0	3	4
Hexachlorobenzene	UG/KG	40	50%	6,000	0	2	4
Indeno(1,2,3-cd)pyrene	UG/KG	32	25%	5,600	0	1	4
Naphthalene	UG/KG	24	25%	500,000	0	1	4
Phenanthrene	UG/KG	34	75%	500,000	0	3	4
Pyrene	UG/KG	110	75%	500,000	0	3	4
Pesticides/PCBs							
4,4'-DDE	UG/KG	12	50%	62,000	0	2	4
Aldrin	UG/KG	2.2	25%	680	0	1	4
Alpha-Chlordane	UG/KG	5.7	25%	24,000	0	1	4
Aroclor-1254	UG/KG	580	50%	1,000	0	2	4
Dieldrin	UG/KG	7.4	25%	1,400	0	1	4
Endosulfan I	UG/KG	2.7	50%	200,000	0	2	4
Endrin aldehyde	UG/KG	3.2	25%		0	1	4
Inorganics							
Aluminum	MG/KG	35,000	100%		0	4	4
Arsenic	MG/KG	16.1	100%	16	1	4	4
Barium	MG/KG	308	100%	400	0	4	4
Beryllium	MG/KG	1.4	100%	590	0	4	4
Cadmium	MG/KG	25.6	100%	9	2	4	4
Calcium	MG/KG	84,400	100%		0	4	4
Chromium	MG/KG	48.4	100%		0	4	4
Cobalt	MG/KG	19.7	100%		0	4	4
Copper	MG/KG	814	100%	270	2	4	4
Iron	MG/KG	50,500	100%		0	4	4
Lead	MG/KG	101	100%	1,000	0	4	4
Magnesium	MG/KG	10,200	100%		0	4	4
Manganese	MG/KG	935	100%	10,000	0	4	4
Mercury	MG/KG	5.3	100%	3	2	4	4
Nickel	MG/KG	67.7	100%	310	0	4	4
Potassium	MG/KG	4,680	100%		0	4	4
Silver	MG/KG	5.8	75%	1,500	0	3	4
Sodium	MG/KG	377	100%		0	4	4
Vanadium	MG/KG	53.7	100%		0	4	4
Zinc	MG/KG	755	100%	10,000	0	4	4

Notes:
1) Criteria values are the NYSDEC commerical SCOs (6 NYCRR Subpart 375-6).

2.0 REMEDIAL ACTION OBJECTIVES

The purpose of this section is to develop RAOs and general response actions for each medium of interest identified at the OD Grounds. Based on the RAO and the general response actions, potential remedial technologies are identified and screened in **Section 2.0** and **3.0**, and a detailed analysis of remedial action alternatives is provided in **Section 4.0**. This process follows the USEPA and NYSDEC method of identifying and screening technologies/processes and consists of the following six steps:

- Develop RAOs that specify media of interest, chemical constituents of concern, exposure pathways, and preliminary remediation goals that permit a range of treatment and containment alternatives to be developed. The preliminary remediation goals will be based on chemical-specific Applicable or Relevant and Appropriate Requirements (ARARs) and the results of the Hazard Assessment (**Section 2.0**);
- Develop general response actions for each medium of interest that will satisfy each remedial action objective for the OD Grounds (**Section 2.0**);
- Identify estimates of volumes or areas, to the extent practical, of media to which general response actions might be applied (**Section 2.0**);
- Identify remediation technologies/processes associated with each general response action. Screen and eliminate technologies/processes based on technical implementability (**Section 2.0**);
- Evaluate technologies/processes and retain processes that are representative of each technology (**Section 2.0**); and
- Assemble and further screen the retained technologies/processes into a range of alternatives as appropriate (**Section 3.0** and **4.0**).

2.1 GENERAL REMEDIAL ACTION OBJECTIVES

As discussed in **Section 1**, the ESI, OE EE/CA, the munition response actions, and the 2010 supplemental work conclude that further actions are warranted for the OD Grounds. Based on the previous investigations and the proposed future site use, soil was identified as a medium of interest. RAOs address the goals for reducing the potential MPPEH and/or soil contamination hazards to ensure protection of human health, safety and the environment (USEPA, 1988). The RAOs are intended to be as specific as possible, but not so specific that the range of alternatives that can be developed is unduly limited. The intent of this FS is to select RAOs that are protective of human health and the environment for evaluation and that achieve an acceptable minimum level of risk at the OD Grounds. The future use for the OD Grounds is recreation/conservation for walking and hiking activities and no intrusive soil activities such as digging, camping, camp fires, tent staking, trail construction, etc. Therefore, the presence of potential MPPEH and/or soil contamination results in the potential for human receptors to come into contact with potential MPPEH and/or soil contamination in the OD Grounds.

The overall objective of any remedial response is to protect human health and the environment. RAOs have been developed to meet this overall objective. The objectives are then used as a basis for developing remedial alternatives.

CERCLA, as amended by SARA of 1986, requires that a CERCLA remedial action:

- At minimum, attain federal and more stringent state ARARs on completion of the remedial action for on-site remedial actions (unless an ARAR waiver becomes necessary).
- Use remedial alternatives that permanently and significantly reduce the volume, toxicity, or mobility of hazardous substances;
- Select remedial actions that protect human health and the environment, are cost effective, and involve permanent solutions, alternative solutions, and resource recovery technologies to the maximum extent possible;
- Avoid off-site transport and disposal of untreated hazardous substances or contaminated materials where practical technologies exist to treat these materials on-site.

The National Contingency Plan (NCP) regulations, which implement CERCLA, generally require ARAR compliance during remedial actions as well as at completion (40 CFR 300.435(b)(2)). However, a no-action decision does not require compliance with ARARs.

The RAOs for the OD Grounds consist of media specific objectives designed to be protective of human health and the environment. Where applicable, consideration was given to the NCP preference for permanent solutions. The general RAOs for the OD Grounds are as follows:

- Prevent public or other persons from direct contact with MEC or MPPEH, direct contact with soil, or inhalation of MC that may present a health risk due to potential contamination from MC. NYSDEC Commercial SCOs were determined to be an appropriate and acceptable contaminant level for protection of human health and the environment.
- Restore the area to a condition that would comply with the SEDA LRA determination that the future use of the OD Grounds would be for recreation/conservation. LUCs and compliance with proposed RAOs.

The investigation and remediation of the OD Grounds is subject to pertinent requirements of both federal environmental statutes or regulations (generally administered by EPA Region II for SEDA) and the State of New York environmental statutes and regulations (generally administered by the NYSDEC), determined in accordance with the CERCLA ARAR process. ARARs are promulgated standards that may be applicable to the site cleanup process after a remedial action has been selected for implementation.

Any standard, requirement, criterion, or limitation under any federal environmental or state environmental or facility siting law may be either applicable or relevant and appropriate to a specific action. The only state laws that may become ARARs are those promulgated such that they are legally enforceable and generally applicable and equivalent to or more stringent than federal laws. A determination of applicability is made for the requirements as a whole, whereas a determination of relevance and appropriateness may be made for only specific portions of a requirement. An action must comply with relevant and appropriate requirements to the same extent as an applicable requirement with regard to substantive conditions, but need not comply with the administrative conditions of the requirement.

Three categories of potentially applicable state and federal requirements were reviewed: (1) chemical-specific, (2) location-specific, and (3) action-specific. Chemical-specific ARARs address certain contaminants or class of contaminants and relate to the level of contamination allowed for a specific pollutant in various environmental media. Location-specific ARARs are based on the specific setting and nature of the site. Action-specific ARARs relate to specific actions proposed for implementation at a site. Both location-specific and action-specific ARARs are independent of the media. In addition to ARARs, advisories, criteria, or guidance may be evaluated as TBC. The NCP provides that the TBC category may include advisories, criteria, or guidance that were developed by EPA, other federal agencies, or states that may be useful in devising CERCLA remedies. These advisories, criteria, and guidance are not promulgated and, therefore, are not legally enforceable standards such as ARARs.

2.2 POTENTIAL CHEMICAL-SPECIFIC ARARS AND TBCS

Chemical-specific ARARs are usually health-based or risk-based numerical values or methodologies, established by promulgated standards, that are required to be used to determine acceptable concentrations of chemicals that may be found in or discharged to the environment. Chemical-specific TBCs can serve to indicate contaminant levels that may merit concern.

Potential federal and state chemical-specific ARARs and TBCs considered in connection with the FS at the OD Grounds are described in the following sections.

2.2.1 Soil

Cleanup levels for hazardous constituents in soil have been proposed by NYS surface and subsurface soil chemical exceedances of NYSDEC Subparts 375-1 through 375-4 and Subpart 375-6 under 6 NYCRR Part 375 - Environmental Remediation Programs. 6 NYCRR Subpart 375-6, effective December, 2006, includes the SCO tables developed for five categories of future land use (i.e., unrestricted use, residential, restricted-residential, commercial, and industrial). As the OD Grounds is located in the future recreational area, the NYSDEC SCOs for commercial use scenario are considered to be relevant and appropriate criteria for the Site. In addition, the SCOs for unrestricted use are discussed in this FS for comparison purposes.

USEPA RSLs for soil are considered TBCs for this FS.

2.3 POTENTIAL LOCATION-SPECIFIC ARARS

Location-specific ARARs may serve to limit contaminant concentrations, or even to restrict or to require some forms of remedial action in environmentally or historically sensitive areas at a site, such as natural features (including wetlands, flood-plains, and sensitive ecosystems) and manmade features (including landfills, disposal areas, and places of historic or archaeological significance). These ARARs generally restrict the concentration of hazardous substances or the conduct of activities based solely on the particular characteristics or location of the site.

Potential federal and state location-specific ARARs considered in connection with this response action include the following:

Federal:

- Executive Orders 11593, Floodplain Management (May 24, 1977), and 11990, Protection of Wetlands (May 24, 1977).
- National Historic Preservation Act (16 United States Code (USC) 470) Section 106 and 110(f) and the associated regulations (i.e. 36 CFR part 800) (requires federal agencies to identify all affected properties on or eligible for the National Register of Historic Places and consult with the State Historic Preservation Office and Advisory Council on Historic Presentation)
- Resource Conservation and Recovery Act (RCRA) Location Requirements and 100-year Floodplains (40 CFR 264.18(b)).
- Clean Water Act (CWA), Section 404, and Rivers and Harbor Act, Section 10 (requirements for Dredge and Fill Activities) and the associated regulations (i.e. 40 CFR part 230).
- Wetlands Construction and Management Procedures (40 CFR part 6, Appendix A).

New York State:

- NYS Freshwater Wetlands Law (New York Environmental Conservation Law (ECL) articles 24 and 71).
- NYS Freshwater Wetlands Permit and Classification Requirements (6 NYCRR 663 and 664).
- NYS Floodplain Management Act, ECL, article 36, and Floodplain Management regulations (6 NYCRR part 500).
- Endangered and Threatened Species of Fish and Wildlife, Species of Special Concern Requirements (6 NYCRR part 182).
- NYS Flood Hazard Area Construction Standards.

Based on the OD Grounds conditions and the land use determination, further consideration of these location-specific ARARs does not appear warranted at this time.

2.3.1 Action-Specific ARARs

Action-specific ARARs are usually technology or activity-based requirements or limitations that control actions involving specific substances. Action-specific ARARs generally set performance or design standards, controls, or restrictions on particular types of activities. To develop technically feasible alternatives, applicable performance or design standards must be considered during the development of all response action alternatives. Note that regulations that are not related to environmental law or do not govern activities that take place at the CERCLA site are not considered ARARs.

Potential federal and state action-specific regulations considered in connection with this response action include the following:

Federal:

- RCRA Groundwater Monitoring and Protection Standards (40 CFR, Part 265, Subpart F). [This regulation is not an ARAR because it does not contain cleanup standards, standards of control or other substantive requirements for this location.]
- RCRA Generator Requirements for Manifesting Waste for Off-site Disposal (40 CFR part 262, subpart B). [Transport regulations are never ARARs because ARARs apply only to work being conducted at the CERCLA site, not transport to and from the site.]
- RCRA Transporter Requirements for Off-Site Disposal (40 CFR part 263). [Transport regulations are never ARARs because ARARs apply only to work being conducted at the CERCLA site, not transport to and from the site.]
- RCRA, Subtitle D, Non-Hazardous Waste Management Standards (40 CFR part 257). [This regulation is not an ARARs because ARARs apply only to work being conducted at the CERCLA site.]
- Department of Transportation (DOT) Rules for Hazardous Materials Transport (49 CFR part 107, and 171.1-171.500). [Transport regulations are never ARARs because ARARs apply only to work being conducted at the CERCLA site, not transport to and from the site.]
- Occupational Safety and Health Act (OSHA) Standards for Hazardous Waste Operations and Emergency Response, 29 CFR 1910.120, and procedures for General Construction Activities (29 CFR parts 1910 and 1926). [This OSHA regulation is not an ARAR because it is not an environmental law.]

New York State:

- NYS State Pollutant Discharge Elimination System (SPDES) Permit Requirements (Standards for Stormwater Runoff, Surface Water, and Groundwater Discharges (6 NYCRR Chapter X, Subpart 750-757). [This regulation is not an ARAR unless it is more prohibitive than Federal requirements.]
- NYS Solid Waste Management and Siting Restrictions (6 NYCRR Chapter IV, Subchapter B, Parts 360-361). [This regulation is not an ARAR unless it is more prohibitive than Federal requirements.]
- NYS RCRA Generator and Transporter Requirements for Manifesting Waste for Off-Site Disposal (6 NYCRR 3 Subchapter B, Parts 64 and 372). [Transport regulations are never ARARs because ARARs apply only to work being conducted at the CERCLA site, not transport to and from the site.]

Based on the OD Grounds conditions, further consideration of these action-specific ARARs does not appear warranted at this time.

2.4 SITE-SPECIFIC CLEANUP GOALS

Remedial action at the OD Grounds is guided by the cleanup goal of preventing direct contact by receptors with MEC and with MC. These cleanup goals will have the effect of protecting human health and the environment, complying with ARARs, and meeting all other RAOs.

Table 2-1 OD Grounds Remedial Action Objectives

Media	Contaminant of Concern	Receptor	Exposure Route	Remedial Action Objective	Applicable ARAR/TBCs[1]
Soil	MC	Human (Current and Future Site Visitors, Recreational Users)	Incidental ingestion, dermal contact, inhalation	Prevent direct contact with soil, or inhalation of MC by receptors.	Commercial SCOs
Soil	MEC	Human (Current and Future Site Visitors, Recreational Users)	Physical Access to Site	Prevent direct contact with MEC by receptors	Removal of MEC to the extent practicable.
Not Applicable (N/A)	N/A	Human (Current and Future Site Visitors, Recreational Users)	N/A	Restore the area to a condition that would comply with the SEDA LRA determination that the future use of the OD Grounds would be for recreation/conservation.	N/A

(1) ARARs and TBCs are described in Subchapter 2.1 of this report.

2.5 GENERAL RESPONSE ACTIONS

General response actions are selected to satisfy the RAOs for each medium of concern at the project site. Identification of the general response actions also includes identification of ARARs. General response actions are those actions that will achieve the identified RAOs and may include treatment, containment, excavation, extraction, disposal, LUCs, or some combination of any or all of these. This subchapter describes the general response actions applicable to the OD Grounds. The general response actions identified include the following:

- No Action
- Hazard Management – LUCs (etc)
- Remedial Action (Mapping, excavation, disposal, capping, restoration) – MEC removal through geophysical mapping and excavation, soil excavation, MEC disposal, soil capping, site restoration

With the exception of the No Action alternative, the general response actions identified above may be combined in developing remedial action alternatives for the project site. Some areas may exhibit a higher MEC density and a correspondingly greater potential for MEC hazards so it may be appropriate to apply a different response action or combination of response actions in different parts of the site.

The No Action alternative refers to a site remedy where no active remediation or enforceable LUCs are implemented. Under CERCLA, evaluation of a No-Action alternative is required, pursuant to the NCP

(42 CFR 300.430 et seq.), to provide a baseline for comparison with other remedial technologies and alternatives.

Hazard management technologies include enforceable administrative institutional controls and/or physical measures (engineering controls) to prevent or limit exposure of receptors to MEC or MC. A deed notice/environmental easement is an example of an institutional control. Physical barriers and access restrictions (e.g., fencing, locked gates, and warning signs) or activity restrictions (prohibiting intrusive activities) are examples of engineering controls. LUCs can be cost-effective, reliable, and immediately effective, and can be implemented either alone or in conjunction with other remedial components. Inspections and monitoring typically are required to document long-term effectiveness of LUCs. The administrative feasibility of and cost to implement LUCs depend on site-specific circumstances (e.g., whether or not a site is under the direct operational control of the DoD, or has been transferred to non-federal ownership).

2.6 IDENTIFICATION AND SCREENING OF TECHNOLOGIES

Remedial action technologies and processes were identified for consideration as possible remedial options at the OD Grounds. The list of technologies and processes presented was developed from several sources including standard engineering handbooks, vendor information, and best engineering estimates.

2.6.1 MEC

2.6.1.1 Detection Technologies for MEC/MPPEH

The selection of the best technology depends on the properties of the MEC to be located, including whether the ordnance is found on the surface or below the surface, and the characteristics of the area where the MEC is located, such as soil type, topography, vegetation, and geology.

Detection technologies have two basic forms. One form, visual searching, has been successfully used on a number of sites where MEC 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 MEC. A metal detector is sometimes used to supplement the visual search in areas where ground vegetation may conceal MEC. Typically, any MEC found during these searches is flagged or marked on a grid sheet for later removal.

The other form of MEC detection, geophysics, includes a family of detection instruments designed to locate MEC. 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 MEC surveys. The equipment designed for MEC geophysical surveys is lightweight, easily maintained, and very effective. However, there are limitations to geophysics.

MEC can be readily detected at the site using geophysical techniques. The handheld flux-gate magnetometers (i.e., Schonstedt GA-52CX) have been successfully used to "mag and dig" around buildings and structures where the EM61 suffers more from interference. Use of the handheld magnetometers can also be indicated by terrain where the ground surface (e.g., sloped or wooded terrain) may not be conducive to use of an EM61. A high degree of confidence should be expected for successful detection with these methods. However, it should be noted that there are limitations to their detection capabilities such as the depth of detection and interference from utilities, structures, and other metal in the vicinity. Time-domain electromagnetic induction metal detectors (i.e., Geonics EM61–MK2) can also be successfully used for digital geophysical mapping (DGM) at areas of the site. Although these geophysical instruments can be successful in finding MEC, only a percentage of the anomalies identified result in actual MEC.

Geophysical equipment cannot usually distinguish MEC 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 MEC. 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. The use of geophysical equipment and surveys has proven to be one of the most cost effective methods currently available to detect subsurface MEC. At the OD Grounds, it will be most effective to use handheld flux-gate magnetometers in wooded or inaccessible terrain and to use an EM61 for DGM in the open areas that require the detection of potential MPPEH.

2.6.1.2 Removal Technologies for MEC/MPPEH

Once a site has been surveyed by either visual or geophysical means, the recovery of MEC/MPPEH can begin. MEC 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 MEC contamination as well as the intended future use of the site. Removal technologies include hand excavation and mass excavation and sifting (using heavy equipment). Hand excavation is considered the industry standard for MEC recovery and can be done very thoroughly. Hand excavation was conducted during previous investigations at the OD Grounds. Construction support would include UXO personnel to provide sweeps to detect MEC prior to any planned construction.

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

During a subsurface clearance operation subsurface MPPEH identified by the geophysical survey or other detection methods require excavation for removal. The excavation of the MPPEH item then takes place with either hand tools or mechanical equipment depending on the suspected depth of the object. Once the 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 inspection that the item cannot be safely moved, it will be destroyed in place.

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 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 evacuations will be necessary during MEC clearance activities.

At the OD Grounds it is anticipated that hand digging will be used to remove MPPEH in areas at most of the site (i.e., kickout area – 1,000 to 2,500 foot radius). In areas of the Site where a high density of potential MPPEH/MD appear to be present, it may be more efficient to use mechanical excavation equipment and a screening or sorting table to remove MPPEH from excavated soil.

2.6.1.3 Disposal Technologies for MEC

Disposal technologies include blow in place (BIP) and 'consolidate and blow.' For BIP, each munition is individually destroyed; whereas, the consolidated shot can be used for munitions that are "acceptable to move." 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 MEC items recovered.

A countercharge can be used to destroy the MEC item or the MEC item can be thermally treated as a means of destruction. Engineering controls, such as sandbag mounds and sandbag walls over and around the MEC item, are often used to minimize the blast and fragmentation effects when an MEC item is destroyed in this manner.

In some instances it is determined that an MPPEH item must be destroyed in-place. This technique is typically employed when the item cannot be safely moved to a remote location. This procedure utilizes techniques similar to those described above that will detonate the MEC 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 MEC item are often used to minimize the blast effects.

2.6.2 Technologies for Soil Remediation

Table 2-2 shows the remedial action processes arranged according to categories for general response actions for soil/debris at the OD Grounds and provides the basis for screening out of the various technologies/processes. This table indicates which technologies/processes were retained for further evaluation in Section 3.0.

2.6.2.1 Excavation: Earthmoving/Excavation

Removal of soils can be accomplished using standard mechanical technologies. Armored heavy equipment such as backhoes, excavators, front-end loaders, scrapers, bulldozers, and draglines are commonly used for the mechanical excavation of soils. Because the soil at the OD Grounds is readily accessible and can be easily removed using standard mechanical excavation techniques, this technology was retained for further consideration. In areas with a low density of potential MC, hand digging (activity associated with the MPPEH/MD removal) may be sufficient to remove the potential MC. As needed, physical separation of MPPEH from soil will be achieved using a screening table. After the separation, the MEC/MPPEH will be disposed of in a designated demolition area and soil will be backfilled (as necessary) to the excavated areas. Removal of contaminated soil by excavation and/or soil sifting could be retained for consideration without the presence of MEC.

Off-site disposal involves the certification that the material is free of MPPEH, consolidation of Material Documented as Safe (MDAS) and the affected soils into separate containers, and transportation off-site. This technology decreases continued on-site exposure to potential MPPEH and MC by receptors. MDAS was recycled or melted off-site. Off-site disposal of contaminated soils is preferable when on-site disposal is precluded or limited by site characteristics, when unimpaired future use of the site is a high priority, and when the volume for disposal is too small to warrant construction of a landfill. A permitted, off-site RCRA Subtitle D facility with the capacity and capability to handle the disposal material must be identified.

2.6.2.2 Capping and Containment Technologies

Capping involves placing a barrier over the impacted area to prevent contact (i.e. exposure to subsurface soil via direct contact and dust inhalation) with human and ecological receptors, and surface water runoff. Two single component cap options that are available to unlined landfill facilities consists of either a low permeability soil (LPS) cap or a geomembrane cap. The soil layer below the geomembrane will made free of sharp rocks and stones, to prevent damage to the overlying geomembrane to the possible extent. Remedial method may include 12-inches of sand above the geomembrane to promote drainage off of the cap, while also providing cap protection. A layer of sand could potentially be substituted by a geocomposite drainage layer and with 18 inches of select subsoil used. Six inches of topsoil would complete the protective layer to a total thickness of 18 inches. A non-woven geotextile fabric may be installed between the top soil and sand drainage layer if required. As required, surface and subsurface drainage will be controlled by swales or cap drains, respectively. These aspects are variable, depending on the relative geotechnical properties of each soil type used for the drainage layer and the top soil. Approximately 10 acres of the OD Hill area are expected to be capped with approximately 75,000 cy of material. This capping/containment method would be effective in reducing the potential exposure to potential metallic debris and metals contaminated soil, and therefore has been retained for further consideration.

Table 2-2 OD Grounds Feasibility Study – Technology Screening

General Response Action	Primary Remedial Technology	Process Options	Screening	Evaluation			
			Technically Implementable?	Effectiveness	Implementability	Cost	Retained for Consideration?
No Action	None	None	N/A[1]	Effectiveness at achieving RAOs would not be demonstrated. Utilized as baseline for alternative comparison.	Readily implementable	No Cost	Yes
Hazard Management	Land Use Controls	Access Restrictions (fencing, signage)	Yes	Potentially effective in meeting RAOs.	Readily implementable.	Negligible cost. (Low capital, low maintenance.)	Yes
		Activity Restrictions (e.g., no intrusive activities allowed)	Yes	Potentially effective in meeting RAOs.	Readily implementable.	Negligible cost. (Low capital, low maintenance.)	Yes
		Deed Notice	Yes	Potentially effective in meeting RAOs.	Readily implementable.	Negligible cost. (Low capital, low maintenance.)	Yes
Remedial Action	MEC or Soil Removal	Hand Excavation	Yes	Potentially effective in meeting RAOs.	Readily implementable in most areas of Site	Moderate capital, no O&M.	Yes
	MEC or Soil Removal	Heavy Equipment Excavation	Yes	Potentially effective in meeting RAOs.	Reasonably implementable with coordination	Moderate capital, no O&M.	Yes
	Soil Source Area Cover	Install soil cap	Yes	Potentially effective in meeting RAOs.	Readily implementable	Moderate capital, low O&M.	Yes
	MEC or Soil Disposal	Soil disposal off-site (after MEC risks removed)	Yes	Potentially effective in meeting RAOs.	Readily implementable in most areas of Site	High capital, no O&M.	Yes
	Land Use Controls	Prohibit digging and prevent use of site as daycare/residential facility.	Yes	Potentially effective in meeting RAOs.	Readily implementable	No Cost (Very low capital, low maintenance).	Yes

(1) Evaluation of the No-Action alternative is required to provide a baseline for comparison with other remedial technologies and alternatives; the No Action alternative is retained for further consideration throughout the FS.

2.6.3 Land Use Controls (LUCs)

Risk and hazard management technologies include enforceable administrative institutional controls and/or physical measures (engineering controls) to prevent or limit exposure of receptors to MEC or MC. Deed notices, zoning ordinances, special use permits, and restrictions on excavation are examples of institutional controls. Physical barriers and access restrictions (e.g., fencing, locked gates, and warning signs) or activity restrictions (prohibiting intrusive activities) are examples of engineering controls. LUCs can be cost-effective, reliable, and immediately effective, and can be implemented either alone or in conjunction with other remedial components. Inspections and monitoring typically are required to document long-term effectiveness of LUCs. The administrative feasibility of and cost to implement LUCs depend on site-specific circumstances (e.g., whether or not a site is under the direct operational control of the DoD, or has been transferred to non-federal ownership).

2.6.4 Evaluation of Technologies

In the CERCLA 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 the OD Grounds. The three general categories are described below along with the specific evaluation criteria contained within each of the categories.

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.

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.

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 Section 3.

3.0 DEVELOPMENT AND SCREENING OF ALTERNATIVES

3.1 INTRODUCTION

This section summarizes the remedial action alternatives that were developed from the technologies screened in **Section 2.0**. Prior to the development of alternatives, an evaluation of general response actions and a technology screening was performed for inclusion into proposed remedial action alternatives for the OD Grounds. Technologies were combined into alternatives considering potential waste-limiting and site-limiting factors unique to the OD Grounds and the level of technical development for each technology. This information was used to differentiate alternatives with respect to effectiveness and implementability. This FS focuses on identifying and evaluating alternatives for the OD Grounds.

3.2 DESCRIPTION OF ALTERNATIVES

The following remedial action alternatives were developed for the OD Grounds:

- Alternative 1: NFA
- Alternative 2: Geophysical mapping, intrusive investigation, capping, LUCs; and
- Alternative 3: Geophysical mapping, intrusive investigation, excavation, off-site disposal, and LUCs.

Technologies and processes associated with these actions were assembled into remedial action alternatives.

3.2.1 Alternative 1, No-Further Action

Alternative 1 is the no further action alternative. CERCLA and NYSDEC guidance for conducting feasibility studies recommends that the no-action alternative be considered against all other alternatives.

The no further action alternative would leave the OD Grounds undisturbed with the continuation of existing site security measures, such as locked gates, to prevent civilian access and direct contact with contaminated soil and possible exposure to potential MPPEH.

3.2.2 Alternative 2, Geophysical Mapping/Intrusive Investigation/Capping/LUCs

This alternative would complete the MPPEH clearance in areas that were not previously cleared by previous investigations. In the open and accessible areas, previously identified anomalies will be reacquired and removed. In areas that are wooded or inaccessible and were not previously cleared, mag and dig operations will be completed using a handheld magnetometer, such as a Schonstedt. In accessible areas that were not previously mapped (0 – 1,000 foot radius), DGM surveys will be conducted using EM61s over approximately 60 acres in the area surrounding the OD Hill. The newly mapped areas will be designated in two different categories:

1. metals saturated areas where the high density prohibits individual anomalies from being identified and manually removed (0 – 500 foot radius)
2. lower metals density areas where individual anomalies can be identified and manually removed (500 – 1,000 foot radius)

It is anticipated that metallic saturation (or a high density of potential MPPEH) will be encountered in areas located closer to the OD Hill (0 – 500 foot radius). At locations where the DGM survey indicates that there is metallic saturation, the top 6 inches of soil will be excavated. The soil will be screened to remove potential MPPEH, and the overburden will be staged on-site for potential reuse and/or incorporation into the site cap. The excavated area will then be resurveyed and the results of the DGM survey will be used to generate a dig list of target anomalies to be investigated. In the event that the results of the DGM survey indicate that areas are still saturated with metal an additional 6 inches of soil may be excavated, screened, and staged, as previously described, followed by a subsequent DGM survey of that area.

For the lower density metals areas, the anomalies on the generated dig list from the DGM surveys will be reacquired and intrusively investigated by a geophysicist and UXO dig team, in the same manner as the intrusive investigation in the Kickout area. A two-person UXO technician/ demolition team will perform any required MPPEH demolition procedures. The demolition team will dispose of any MPPEH suspected of containing explosives/spotting charges or inaccessible voids by detonation. All MD will be certified and disposed of as MDAS in accordance with current regulations.

The excavated soil that passed through the screen will be placed on the OD Hill and the resulting surface will be compacted and graded. An engineered cap, covering approximately 10 acres in aerial extent and approximately 75,000 cy (+/- 35%) of material, will be installed over the OD Hill and the surrounding area. The cap will comply with NYS Part 360 requirements. A geomembrane layer will be selected, and the total thickness of the cap will be at least 18 inches. Any identified soil with contaminant levels exceeding the selected soil cleanup goals would be incorporated under the cap. A design work plan will be prepared and the exact limits of the cap will be determined during the design phase of the project.

LTM would include maintenance of the cap and LUC inspections. Potential LTM of site groundwater conditions may be appropriate subsequent to the remedial alternative selected in this FS.

LUCs will be placed on the site to prohibit the use of groundwater, prohibit digging, and prevent the use of the site for use as a daycare or a residential facility.

Implementation of this alternative would be highly effective in achieving the RAOs, long-term effectiveness, preventing exposure, and implementability. The costs for this alternative are moderate.

3.2.3 Alternative 3, Geophysical Mapping/Intrusive Investigation/Excavation/Off-Site Disposal/LUCs

Alternative 3 is similar to Alternative 2, but this alternative would involve the excavation and off-site disposal of all soil containing MPPEH or contaminant concentrations that exceed cleanup goals in lieu of capping these soils. Similar to Alternative 2, reacquisition would be completed in the Kickout area. In areas outside of the OD Hill that are wooded or inaccessible and were not previously surveyed, mag and dig operations will be completed using a handheld magnetometer, such as a Schonstedt. In accessible areas that were not previously mapped (0 – 1,000 foot radius), DGM surveys will be conducted using EM61s over approximately 60 acres in the area surrounding the OD Hill. At locations where the DGM survey indicates that there is metallic saturation, the top 6 inches of soil will be excavated (estimate

3.3 SCREENING CRITERIA

The alternatives assembled above will be screened for effectiveness, implementability, and cost. This screening process is used to select the most favorable alternatives for a detailed analysis. Although this is a qualitative screening, care has been taken to ensure that screening criteria are applied consistently to each alternative and that comparisons have been made on an equal basis, at approximately the same level of detail. The screening criteria include the following:

- **Effectiveness** – the degree to which an alternative reduces the toxicity, mobility, or volume through treatment; minimizes residual risks; and affords long-term protection.
- **Implementability** – the technical and administrative feasibility of implementing the alternative.
- **Cost** – the costs of construction and any long-term costs to operate and maintain.
- **Reduction of Toxicity, Mobility, or Volume through Treatment** – the statutory preference for selecting remedial actions that employ treatment technologies that permanently and significantly reduce toxicity, mobility, or volume of the hazardous substances as their principal element.

The detailed analysis and evaluation in Section 4 compare additional criteria for each of the alternatives. Section 4 identifies the most practicable permanent solution as determined by the criteria specified in the NCP (40 CFR 300.430).

No Further Action (Alternative 1) does not implement any remedy to reduce the potential risk therefore the Alternative does not provide long-term protection of either human health or the environment. Implementation of this alternative does not meet the effectiveness screening criteria. The feasibility and the cost both screen well. Although this alternative does not meet the effectiveness requirements, it is retained for further evaluation for comparative purposes.

Geophysical Mapping/Intrusive Investigation/Capping/LUCs (Alternative 2) would meet the effectiveness criteria for MEC, MPPEH, and soil. The Alternative will minimize exposure to any potential MPPEH by the completion of the intrusive investigation and the installation of the cap. The alternative is effective at reducing the exposure to MPPEH by removing any MPPEH from the site, excavating contaminated soil, and installing a protective cap over soil potentially impacted by metals near the OD Hill. In the case that MEC is identified at the Site, the volume and/or mobility of the MEC would be reduced either through intrusive investigation or removal. The implementation of LUCs would be effective at limiting public exposure to any potential contaminants remaining at the Site below the surface. Implementation is administratively and technically feasible, and the skilled labor (e.g., UXO technicians) is readily available to perform this work. The costs to complete this alternative, which are presented in Section 4, are moderate.

Geophysical Mapping/Intrusive Investigation/Excavation/Off-Site Disposal/LUCs (Alternative 3) would meet the effectiveness criteria for MPPEH and soil. This alternative is similar to Alternative 2, with the addition of excavation and off-site disposal of soil from the OD Hill instead of placement beneath a cap. The alternative will minimize exposure to any MPPEH by the completion of intrusive investigation of anomalies outside of the OD Hill and the excavation of soil at the OD Hill. The alternative is effective at

15,000 cubic yards). The soil will be screened to remove MPPEH, and the overburden will be staged on-site for potential reuse and/or reincorporation to bring the excavated surface back to its original grade. The excavated area will then be resurveyed and the results of the DGM survey will be used to generate a dig list of target anomalies to be investigated. In the event that the results of the DGM survey indicate that areas are still saturated with metal, an additional 6 inches of soil may be excavated, screened, and staged, as previously described, followed by a subsequent DGM survey of that area. The anomalies on the generated dig list will be reacquired and intrusively investigated by a geophysicist and UXO dig team, in the same manner as the intrusive investigation in the Kickout area. All MD will be certified and disposed of as MDAS in accordance with current regulations.

In Alternative 3, the OD Hill and the soil immediately surrounding it will be addressed by excavation and off-site disposal. An armored excavator would be used to excavate soils, which would then be sifted using a screening table to ensure the removal of all MPPEH. Prior to disposal, excavated soils will be sampled for RCRA hazardous waste characteristics to include a full Toxicity Characteristics Leaching Procedure (TCLP) analysis (TCLP VOCs, TCLP SVOCs, TCLP pesticides and herbicides, TCLP metals plus ignitability, corrosivity, and reactivity). Soils deemed free from MPPEH and meeting site cleanup standards will be left for potential re-use at the Depot. Post-excavation confirmatory (in-situ) soil will be sampled for metals by EPA method SW846 6010C. A sampling strategy for the soil within the 0 to 1,000-foot radius, including sample locations and the number of samples, will be detailed in a follow-on document subsequent to MEC clearance activities.

Upon completion of excavation and confirmatory sampling, the excavated areas would be graded and re-vegetated to promote positive drainage. The disturbed areas would be restored to the natural grade. Soils not appropriate for reuse at the Site (e.g., soils intermixed with debris or above the cleanup standards) will be disposed of at an approved Subtitle D landfill. Trucks will be staged to haul the excavated soil off-site to an approved landfill. Identified MPPEH will be demolished appropriately, as described in Alternative 2.

The LTM of groundwater described as part of Alternative 2 would be a part of Alternative 3 as well. LUCs will be placed on the site to prohibit the use of groundwater prohibit digging and prevent the use of the site for use as a day care or a residential facility.

Implementation of this alternative using excavation and off-site disposal would be effective in reducing the on-site toxicity, mobility, and volume of MPPEH and MC at the OD Grounds, and transfer the impact of the overall toxicity and volume to a controlled environment. Approximately 10 acres of the OD Hill are expected to be capped. The associated costs for excavation and off-site disposal are extremely high.

reducing the exposure to MPPEH by permanently removing any MPPEH and contaminated soil at the Site. In the case that MEC is identified at the Site, the volume of the MEC would be reduced through intrusive investigation and excavation/off-site disposal. The implementation of LUCs would further be effective at limiting public exposure to any potential subsurface soil contamination remaining at the Site. Implementation is administratively and technically feasible, and the skilled labor (e.g., UXO technicians) is readily available to perform this work. The costs to complete this alternative, which are presented in Section 4, are high due to the excavation, screening, and off-site disposal costs.

4.0 DETAILED ANALYSIS OF RETAINED ALTERNATIVES

4.1 INTRODUCTION

The purpose of the detailed analysis is to evaluate and compare the identified alternatives and present a proposed plan for regulatory agencies and public review. The alternatives identified for the detailed analysis include the following:

- Alternative 1: No Further Action;
- Alternative 2: Geophysical mapping, intrusive investigation, capping, LUCs; and
- Alternative 3: Geophysical mapping, intrusive investigation, excavation, off-site disposal, and LUCs.

The alternatives are compared and evaluated with respect to seven evaluation criteria developed to address the statutory requirements and preferences of CERCLA. The seven criteria are as follows:

1. Overall protection of human health and the environment
2. Compliance with ARARs
3. Long-term effectiveness and permanence
4. Reduction of toxicity, mobility, or volume
5. Short-term effectiveness
6. Technical and administrative implementability
7. Cost

Two additional criteria, state acceptance and community acceptance of the remedy, can play a role in weighing the balance between remedies that are cost effective and meet other criteria. Public involvement activities help provide an understanding of these factors even though the Proposed Plan has not yet been issued.

The community and state acceptance criteria are based on the degree of assumed acceptance from the local public and from state agencies regarding the implementation of alternatives. These criteria cannot be fully evaluated and assessed until comments on the FS and the Proposed Plan are received.

Each of the three alternatives are analyzed individually against each criterion and then compared against one another to determine their respective strengths and weaknesses and to identify the key trade-offs. The alternative(s) identified as the most practicable solution in reducing the potential MPPEH and soil contamination exposure hazard is selected with respect to each evaluation criteria. The following sections describe each of the evaluation criteria and the evaluation process used for performing the analysis.

4.2 EVALUATION CRITERIA

Alternatives are compared and evaluated with the NCP criteria, including threshold factors, balancing factors, and modifying factors. The following sections describe the factors and each of the criteria.

4.2.1 Threshold Factors

Threshold factors (i.e., protectiveness, compliance with ARARs) are requirements that each alternative must meet or have specifically waived to be eligible for selection.

4.2.1.1 Overall Protection of Human Health and the Environment

The selected alternative must adequately protect human health and the environment from unacceptable risks posed by potential MPPEH. The overall protectiveness to human health and the environment from the threat of MPPEH/MEC was evaluated by completing a MEC HA (**Appendix B**) based on the impact each alternative has on the exposure hazard (MPPEH) and on the environment. Although the potential for human receptors to come into contact with potential MPPEH at the OD Grounds is currently limited, the protectiveness criterion was evaluated in terms of possible human interaction by commercial/industrial workers (e.g., SEDA employees), and/or recreational users (e.g., hunters or campers) based on the current and anticipated future land uses at the site. Exposure involves three components: the MPPEH source characteristics, the receptor, and interaction between them. All three components are required for a safety threat from MEC/MPPEH to exist. The protectiveness factor also considers the environmental impact that implementation of an alternative has on the existing environmental/ecological factors at the OD Grounds. **Appendix B** discusses this in more detail.

4.2.1.2 Compliance with ARARs

The NCP requires that all project sites meet ARARs (or that an ARAR waiver be obtained). The ARARs are identified in Section 2.0 of this FS Report. Chemical-specific, location-specific, and action-specific were evaluated. Compliance with the NYS SCOs was identified as a chemical-specific ARAR. The evaluation in Section 2.0 indicates that further evaluation of location-specific and action-specific ARARs is not warranted.

4.2.2 Balancing Factors

Primary balancing criteria (i.e., long-term effectiveness, reduction, short-term effectiveness, implementability, cost) are those that form the basis for comparison among alternatives that meet the threshold criteria. CERCLA requires that alternatives be developed for treating principal threats at the project site through reductions in toxicity, mobility, or volume. In addition, remedies are required to be permanent (e.g., removal of MPPEH or soil contamination), to the maximum extent practicable, and to be cost effective. The five balancing factors described below are weighed against each other to determine which remedies are cost effective and are "permanent" to the maximum extent practicable. The NCP explains that in general, preferential weight is given to alternatives that offer advantages in terms of the reduction of toxicity, mobility, or volume through treatment, and that achieve long-term effectiveness and permanence. However, the NCP also recognizes that some contamination problems will not be suitable for treatment and permanent remedies. The balancing process takes that preference into account, and weighs the proportionality of costs to effectiveness to select one or more remedies that are cost effective. The final risk management decision in the Decision Document is one that determines which cost-effective remedy offers the best balance of all factors to achieve permanence to the maximum extent practicable.

4.2.2.1 Long-term Effectiveness and Permanence

The permanence criterion evaluates the degree to which an alternative permanently reduces or eliminates the potential for MPPEH or soil contamination exposure hazard. This criterion also evaluates the magnitude of residual risk with the alternative in place, and the effectiveness of controls to manage the residual risk.

4.2.2.2 Reduction of Toxicity, Mobility, or Volume through Treatment

This criterion addresses the statutory preference for selecting remedies that employ treatment technologies that permanently and significantly reduce toxicity, mobility, or volume of the hazardous substances. This preference is satisfied when treatment is used to reduce the principal threats at a site through destruction of toxic contaminants, irreversible reduction in contaminant mobility, or reduction of total volume of contaminated media.

4.2.2.3 Short-term Effectiveness

The short-term effectiveness criterion addresses the potential consequences and risks of an alternative during the implementation phase. Alternatives were evaluated for their effects on human health and the environment prior to the remedy being completed. Short-term risks address adverse impacts to the workers and community during the construction and implementation phases of the remedy.

4.2.2.4 Technical and Administrative Implementability

The technical and administrative implementability criterion evaluates the difficulty of implementing a specific cleanup action alternative. The evaluation includes consideration of whether the alternative is technically possible; availability of necessary on-site and off-site facilities, services, and materials; administrative and regulatory requirements; and monitoring requirements.

4.2.2.5 Cost

The cost criterion evaluates the financial cost to implement the alternative. This includes direct, indirect, and long-term operation and maintenance (O&M) costs (30-year duration). Direct costs are those costs associated with the implementation of the alternative. Indirect costs are those costs associated with administration, oversight, and contingencies. Cost estimates presented are order-of-magnitude level estimates. Based on a variety of information, including productivity estimates (based on site conditions), cost estimating guides, and prior experience at SEDA. The actual costs will depend on true labor rates, actual weather conditions, final project scope, and other variable factors. A present value analysis is used to evaluate costs (capital and operations/maintenance) which occur over different time periods. The total present value (TPV) is the amount needed to be set aside at the initial point in time (base year) to assure that funds will be available in the future as they are needed. The discount rate of 7% per the USEPA guidance, *A Guide to Developing and Documenting Cost Estimates During the Feasibility Study,* (USEPA, 2000) was used to estimate TPV.

4.2.3 Modifying Factors

Community and state acceptance of the remedy can play a role in weighing the balance between remedies that are cost effective and meet other criteria. Public involvement helps to provide an understanding of these factors even though the Proposed Plan has not yet been issued. The community and state acceptance criteria are based on the degree of assumed acceptance from the local public and from state agencies regarding the implementation of alternatives. These criteria cannot be fully evaluated and assessed until comments on the FS and the Proposed Plan are received.

4.3 INDIVIDUAL ANALYSIS OF ALTERNATIVES

4.3.1 Alternative 1 – No Further Action

4.3.1.1 Description

The no further-action alternative would leave the OD Grounds undisturbed with the continuation of existing site security measures, such as locked gates, to prevent civilian access and direct contact with possible exposure to potential MPPEH and soil contamination. Because no remedial activities would be implemented with the NFA alternative, long-term human health and environmental risks for the site essentially would be the same as those represented in the baseline MEC HA (**Appendix B**).

4.3.1.2 Assessment

Threshold Factors

This alternative does not provide any protectiveness. The ARARs would not be met for the OD Grounds.

Balancing Factors

The no-action alternative includes no controls for exposure and no long-term management measures. All current and potential future risks would continue under this alternative.

This alternative provides no reduction in toxicity, mobility, or volume of MPPEH.

There would be no additional risks posed to workers or the environment as a result of this alternative being implemented.

There are no implementability concerns posed by this remedy, since no action would be taken.

The present worth cost and capital cost of Alternative 1 are estimated to be $0, since there would be no action.

Summary – Alternative 1

Alternative 1 does not reduce the potential exposure hazards. Alternative 1 does not provide overall protection to human health, as it does not implement a remedy to reduce potential MPPEH or contaminated soil exposure. In addition, there is no reduction in toxicity, mobility, or volume. No costs are associated with this alternative.

4.3.2 Alternative 2 – Geophysical Mapping, Intrusive Investigation, Capping, and LUCs

4.3.2.1 Description

This alternative includes a combination of activities to achieve a reduction in the MEC hazard. In the open and accessible areas, previously identified anomalies with a response greater than 50 millivolts (mV) will be reacquired and removed. In areas that are wooded or inaccessible and were not previously cleared, mag and dig operations will be completed using a handheld magnetometer, such as a Schonstedt. In areas that were not previously mapped, DGM surveys will be conducted using EM61s over approximately 60 acres in the area surround in the OD Hill. The mapped areas will be designated in two different ways:

1. metals saturated areas where individual anomalies cannot be identified and manually removed
2. lower metals density areas where individual anomalies can be identified and manually removed

At locations where the DGM survey indicates that there is metallic saturation, the top 6 inches of soil will be excavated. The soil will be screened to remove MPPEH, and the overburden will be staged on-site for potential reuse and/or incorporation into the site cap. The area will then be resurveyed and the results of the DGM survey will be used to generate a dig list of target anomalies to be investigated. In the event that the results of the DGM survey indicate that areas are still saturated with metal, an additional 6 inches of soil may be excavated, screened, and staged, as previously described, followed by a subsequent DGM survey of that area. The DGM results will be used to generate a dig list, and the anomalies will be reacquired and intrusively investigated. For the lower density metals areas, the anomalies on the generated dig list will be reacquired and intrusively investigated by a geophysicist and UXO dig team, and a "mag and dig" survey will be completed in areas near the OD Hill that are overgrown or sloped (e.g., where a DGM survey was not completed). A two-person UXO technician/ demolition team will perform any required MPPEH demolition procedures. The demolition team will dispose of any MPPEH suspected of containing explosives/spotting charges or inaccessible voids by detonation. All MD will be certified and disposed of as MDAS in accordance with current regulations. The excavated soil that passed through the screen will be placed on the OD Hill and the resulting surface will be compacted and graded. An engineered cap at least 18-inches thick will be installed over the OD Hill and the surrounding area. The exact extent of the cap will be defined during the remedial design based on geophysical data and soil results.

LTM would include monitoring of the cap. It is not anticipated that groundwater is a media of concern, but the water quality may be evaluated following completion of the construction. As such, LTM of existing and new groundwater wells would be assumed to be part of the alternative.

LUCs would be implemented at the Site to prohibit the use of groundwater, prohibit digging and prevent the use of the site for use as a daycare or a residential facility

4.3.2.2 Assessment

Threshold Factors

There is a high level of overall protectiveness of human health and the environment with the implementation of this remedy. Potential MPPEH would be removed from the Site and a cap would be installed to prevent contact with any metals-contaminated soil at the OD Hill. The implementation of this alternative would result in decreased human receptor interaction and reduced exposure to potential MPPEH. As a result of access controls which reduce exposure to MPPEH, Alternative 2 is protective of human health; however, Alternative 2 cannot completely control behavior or restrict access to residual soil contamination. Additionally, although access to potentially contaminated soils will be prevented by the cap, Alternative 2 will allow residual contamination above NYS Commercial SCOs to remain at the site therefore the Site is not suitable for residential activities. Alternative 2 prevents exposure to soil with concentrations above the SCO specified in the ARARs by preventing access to soils above the SCO through the use of a cap and LUCs.

Balancing Factors

It is possible that not all MPPEH contamination would be removed; therefore, risk would be managed not by source removal but through controls to limit an exposure pathway (i.e., interaction). Controls for exposure would include a NYS Part 360 cap, long-term management of the cap conditions, and LUC measures such as prohibition of digging or use for residential or daycare facilities. Long term management/monitoring would include annual inspections, maintenance of the cap and the LUCs, and performing five-year reviews. The LUCs would be maintained through the deed restriction/ environmental easement, and the implementation of the controls would be confirmed through annual LUC reviews and the 5-year review. Though MC may remain on-site under the cap, there is no residual risk for human exposure while the LUCs are in place.

This alternative does not employ treatment technologies that permanently and significantly reduce toxicity, mobility, or volume of the hazardous substances.

There would be a potential short term impact during the demolition of any MEC items. A health and safety plan (HASP) would be prepared and all work would be conducted in accordance with the HASP and USACE UXO requirements. Mitigations strategies will be implemented during the demolition such that any potential risk to public health would be minimized.

The long-term effectiveness for the alternative is high since the intrusive investigations, surface excavations, cap, and LUC would be effective at limiting exposure pathways.

There are no implementability concerns posed by this alternative, and Alternative 2 is readily implementable from a technical perspective. Hand digging anomalies is a common and proven technique to address MPPEH.

The total capital cost for this alternative is $8.0M. The TPV (30-year present worth) cost of this alternative is estimated to be $8.9M. The capital costs include document preparation, implementation of the field work for the remedial action, design, etc. The total costs include $31,500 per year for LUC inspections and cap maintenance, plus $40,300 per five-year review over the 30 year period.

Summary – Alternative 2

The RAOs are achieved through implementation of this alternative through decreased human exposure to MPPEH; this alternative provides significant reduction in toxicity, mobility, or volume of MPPEH. This alternative provides for good long-term effectiveness and permanence and is easily implemented. The cost associated with implementing this alternative is moderate. There are minimal long-term maintenance costs.

4.3.3 Alternative 3 – Geophysical Mapping/Intrusive Investigation/Excavation/Off-Site Disposal/LUCs

4.3.3.1 Description

This alternative is similar to Alternative 2, although it includes excavation of the soil at the OD Hill followed by off-site disposal instead of placement below a cap.

The DGM, reacquisition, mag and dig surveys, and intrusive investigations steps described in Alternative 2 are included in Alternative 3 as well. An area surrounding the OD Hill will be delineated based on the DGM survey results. Soils will be excavated to native material. Excavated soils would be sifted using a screening table to identify and remove any potential debris or MPPEH. Excavated soils will be sampled, and soils deemed free from MPPEH and meeting site cleanup standards will be staged on-site for potential re-use. The excavated area will be graded and re-vegetated to promote positive drainage and to match the natural ground contour. Soils not appropriate for reuse at the Site (e.g., soils intermixed with debris or above the cleanup standards) will be disposed of at an approved Subtitle D landfill. Identified MPPEH will be demolished appropriately, as described in Alternative 2.

It is not anticipated that groundwater is a media of concern, but the water quality may be evaluated following completion of the construction. As such, LTM of existing and new groundwater wells would be assumed to be part of the alternative.

LUCs will be placed on the site to prohibit the use of groundwater, prohibit digging, and prevent the use of the site for use as a day care or a residential facility.

Implementation of this alternative with excavation would be highly effective in reducing the toxicity, mobility, and volume of potential MPPEH and soil contamination. However, costs would for excavation and off-site disposal would be considered extremely high.

4.3.3.2 Assessment

Threshold Factors

There is a high level of overall protectiveness of human health and the environment with the implementation of this remedy. MPPEH and soil contamination would be removed from the Site through intrusive investigation and excavation. The implementation of this alternative would eliminate any potential exposure to MPPEH by permanently removing the soil and the MPPEH and minimizing concern of residual MPPEH. Alternative 3 will comply with the chemical-specific ARARs identified for the site by the client subsequent to selection of an alternative remedy detailed in this FS. Chemical-specific ARARs will be addressed by achieving the Commercial SCOs for soil remaining on-site.

Balancing Factors

Alternative 3 would meet the long-term effectiveness and permanence criteria through the removal and proper disposition of MPPEH and off-site disposal of soil contamination. There would be significant reduction of toxicity, mobility, or volume at the Site through removal of MPPEH and contaminated soil. Though it is noted that no treatment will be employed.

This alternative would have moderate implementability rating given the permitting and logistics requirements for the off-site disposal of the excavated material.

There would be a potential short term impact during the demolition of any MEC items. A HASP would be prepared and all work would be conducted in accordance with the HASP and USACE UXO requirements. Mitigations strategies will be implemented such that any potential risk to public health would be minimized.

The long-term effectiveness for the alternative is high since the intrusive investigations, excavation, off-site disposal, and LUCs would be effective at limiting exposure pathways. The risk of exposure to MC or MPPEH would be removed from the site.

There is a high cost for this alternative, with a total capital cost of $27.6M. The TPV (30-year present worth) cost of this alternative is estimated to be $28.0M. The capital costs include document preparation, implementation of the field work for the remedial action, design, excavation. The total costs include $10,800 per year for LUC inspections, plus $40,300 per five-year review over the 30 year period.

The MPPEH contamination would be removed; therefore, long-term management and permanence would be achieved by source removal.

Summary – Alternative 3

The RAOs are achieved through implementation of this alternative through decreased human exposure to potential MPPEH; this alternative provides good reduction in toxicity, mobility, or volume of MPPEH. This alternative provides for good long-term effectiveness and permanence. The alternative will require some permitting to be implemented. The cost associated with implementing this alternative is very high.

4.4 COMPARATIVE ANALYSIS OF ALTERNATIVES

In the following analysis, the alternatives are evaluated in relation to one another for each of the evaluation criteria to identify the relative advantages and disadvantages of each alternative in terms of the threshold and balancing criteria. **Table 4-1** ranks the alternatives, and **Table 4-2** summarizes the costs for these alternatives. Details regarding the comparative analysis are provided in the following sections.

4.4.1 Overall Protection of Human Health and the Environment

The protectiveness criterion was evaluated in terms of possible human and ecological interaction with potential MPPEH or soil contamination. Each alternative was evaluated in terms of whether it would reduce or remove the amount of MPPEH and/or soil contamination at the OD Grounds. Alternatives 2 and 3 are ranked equally favorably. Alternatives 2 and 3 both provide good protection of both human health and the environment by limiting exposure to MPPEH or soil contamination. The limitation of Alternative 2 with regards to environmental protection is the potential for soil contamination remaining under the soil cap above screening criteria; however, the implementation of LUC would make Alternative 2 equally protective of human health. Alternative 3 has a high level of permanence since soil and MPPEH would be removed off-site and analytical sampling would confirm that remaining in-situ soils were below the selected screening criteria. With both Alternatives 2 and 3, there continues to be the possibility that all MPPEH may not have been identified and there is a residual risk that some MPPEH may remain on-site. The LUCs component of the remedies proposed in Alternatives 2 and 3 makes each alternative equally protective of limiting exposure.

Alternative 1 provides the least overall protection of human health and the environment because it does not remove or restrict access to potential MPPEH or reduce the in-situ toxicity, mobility, and volume of soil contamination.

4.4.2 Compliance with ARARs and Issues To Be Considered

Alternatives 2 and 3 comply with the chemical-specific ARAR identified for the OD Grounds (NYSDEC Subpart 375 SCOs) since each of these alternatives provides a mechanism for either removing or controlling exposure to contaminated soil. However, Alternative 1 does not provide a mechanism for removing or controlling exposure to MPPEH contamination and does not comply with the ARAR.

4.4.3 Long-term Effectiveness and Permanence

The permanence criterion evaluates the degree to which an alternative permanently reduces or eliminates the potential for MPPEH or contaminated soil exposure hazards. Alternative 3 provides a higher degree of long-term effectiveness and permanence based on the permanence of removing metals contaminated soil from the OD Hill site. Alternative 2 was determined to provide good effectiveness by reducing possible receptor interaction with MPPEH or contaminated soil. Alternative 1 offers no long-term effectiveness and permanence.

4.4.4 Reduction of Toxicity, Mobility, or Volume through Treatment

Alternative 3 offers volume reduction on-site by disposal of soil off-Site; though it does not include any treatment. Alternatives 2 and 3 offer a reduction in toxicity and mobility by completing the intrusive investigations and either capping or excavating the saturated soil. Alternative 1 offers no reduction in toxicity, mobility, or volume of contaminants and was assigned the lowest ranking.

4.4.5 Short-term Effectiveness

Alternative 2 is the most favorable for short-term effectiveness as it eliminates exposure to human health and the environment by the active remediation steps and the implementation of the LUCs. Alternatives 2 and 3 include demolition of recovered MPPEH. Alternative 3, which includes off-site transportation and disposal, has a short-term negative impact of hauling materials on public roads outside of the Depot, which can impact the surrounding community. Alternative 1 is determined to have the greatest risk and least short-term effectiveness due to no actions taken to remove the MPPEH and contaminated soil risk.

4.4.6 Implementability

Alternative 1 is the easiest to implement since it requires no action. Alternatives 2 and 3 are both technically and administratively feasible. The DGM and intrusive investigations use standard techniques common to munitions work. Both alternatives will require LTM of the LUCs. Alternative 3 has the additional burden of satisfying local, state, and federal permitting require meetings for transportation and disposal.

4.4.7 Cost

The cost criterion evaluates the financial cost to implement the alternative. The cost criterion includes direct, indirect, and long-term maintenance (O&M) costs. Direct costs are those costs associated with the implementation of the alternative. Indirect costs are those costs associated with administration, oversight, and contingencies. These costs were adapted from costs associated with similar activities at the Depot. These costs presented do not include costs for SEDA to administer and provide oversight for the respective activities.

The actual costs will depend on true labor rates, actual site conditions, final project scope, and other variable factors. The alternative with the lowest cost to implement would be Alternative 1, which requires no action; therefore, no costs are incurred. Alternative 2 requires moderate costs compared to Alternative 3 which is the most costly to implement. Alternative 3 is an order of magnitude higher than the cost of Alternative 2.

Costs range from $0 (Alternative 1) to approximately $28.0M (Alternative 3). Alternative 3 has the highest cost because of the costs incurred for the excavation, transportation, and off-site disposal. **Table 4-2** summarizes costs for all alternatives, and **Appendix C** provides additional cost information.

4.4.8 State Acceptance

State acceptance cannot be fully evaluated and assessed until comments on the FS and the proposed plan are received. Modifying criteria (i.e., state and community acceptance), however, are considered in remedy selection. It is anticipated that Alternative 1 would not be acceptable to the state due to its lack of long-term effectiveness.

4.4.9 Community Acceptance

Community acceptance cannot be fully evaluated and assessed until comments on the proposed plan are received.

4.4.10 MEC Hazard Assessment Results

Based on the MEC HA conducted for each assessment area (see **Appendix B**), with regards to the reduction of potential MEC hazards, Alternative 2 and Alternative 3 provide identical levels of reduction of MEC hazards compared to the baseline condition. The MEC HA is summarized in Section 1.5 and presented in full in **Appendix B**. Implementation of Alternative 2 or 3 would decrease the hazard level rating to a "4", "low potential explosive hazard conditions". Note that these total MEC HA scores and the associated hazard levels are *qualitative references only* and should <u>not</u> be interpreted as quantitative measures of explosive hazard.

4.4.11 Summary of Comparative Analysis

The three alternatives were evaluated in terms of seven criteria. **Table 4-1** summarizes the alternatives and identifies the most practicable solution for reducing the potential MPPEH exposure hazard at the OD Grounds. In some cases, more than one alternative was identified within the same evaluation category, indicating that those alternatives have similar compliance with the criterion.

Alternative 1 must be ruled out because it is ineffective in long-term permanence and does not achieve the RAOs. Overall, Alternatives 2 and 3 have similar levels of protectiveness, permanence, long-term effectiveness, and short-term effectiveness. They will both limit exposure to potential MPPEH or contaminated soil. Alternative 3 ranks slightly higher for reduction of toxicity, mobility, or volume due to the volume reduction of off-site disposal. Alternative 2 rates more favorably for implementability. Alternative 2 ranks better in terms of cost.

4.5 RECOMMENDED ALTERNATIVE

Based on a comparison of the criteria, the most effective remedy for the OD Grounds is Alternative 2, DGM Mapping, intrusive investigation, cap, and LUCs. Alternative 2 limits human exposure to potential MPPEH or soil contamination, is implementable using known techniques, and is cost effective. The capital cost for the alternative is $8.0M. The TPV is $8.9M. The total costs include $31,500 per year for LUC inspections and cap maintenance, plus $40,300 per five-year review over the 30 year period.

Table 4-1
Ranking of Alternatives

Alternative No.	Description	Overall Protection of Human Health and the Environment	Compliance with ARARs	Long-Term Effectiveness and Permanence	Reduction through Treatment	Short-Term Effectiveness	Implementability	Cost	Total Score	Overall Ranking
1	**No Further Action**	1	1	1	1	1	3	3	11	# 3
2	**Geophysical Mapping/Intrusive Investigation/Capping/LUCs**	3	3	2	2	3	2	2	17	# 1
3	**Geophysical Mapping/Intrusive Investigation/Excavation/Off-Site Disposal/LUCs**	3	3	3	3	2	1	1	16	# 2

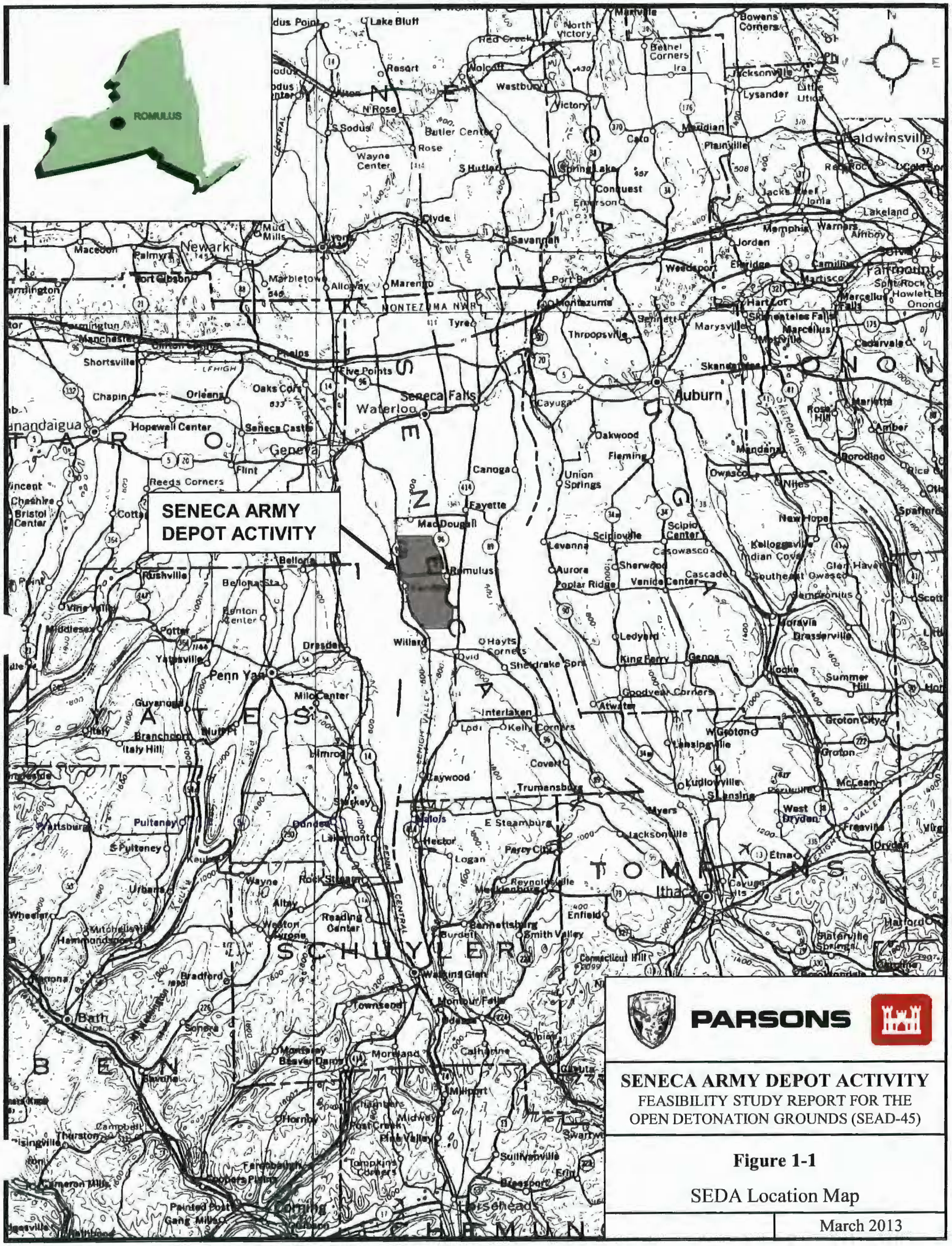
Note:
1) Alternatives were scored 1 to 3 for each screening criterion. A score of 1 represents the least favorable score and a score of 3 represents the most favorable score.
2) The alternative with the highest total score represents the most favorable alternative. Within each screening criterion, alternatives were scored from one to three for each subcategory.
3) The total score of all subcategories is the basis for the scoring for the screening criterion.

Table 4-2
Remedial Alternatives Cost Summary

Alternative	Description	Capital Cost	Annual LTM Cost	Five-Year Review Cost (per event)	TPV at 2% Discount Rate
1	No Further Action	$0	--		--
2	Geophysical Mapping/Intrusive Investigation/Capping/LUCs	$7,977,000	$31,500	$40,300	$8,856,000
3	Geophysical Mapping/Intrusive Investigation/Excavation/Off-Site Disposal/LUCs	$27,552,000	$10,800	$40,300	$27,967,000

Note:
1) Discount rate of 2% per USEPA (2011) guidance was used to estimate TPV.
2) TPV includes six five- year review events and the annual long-term monitoring.

FIGURES

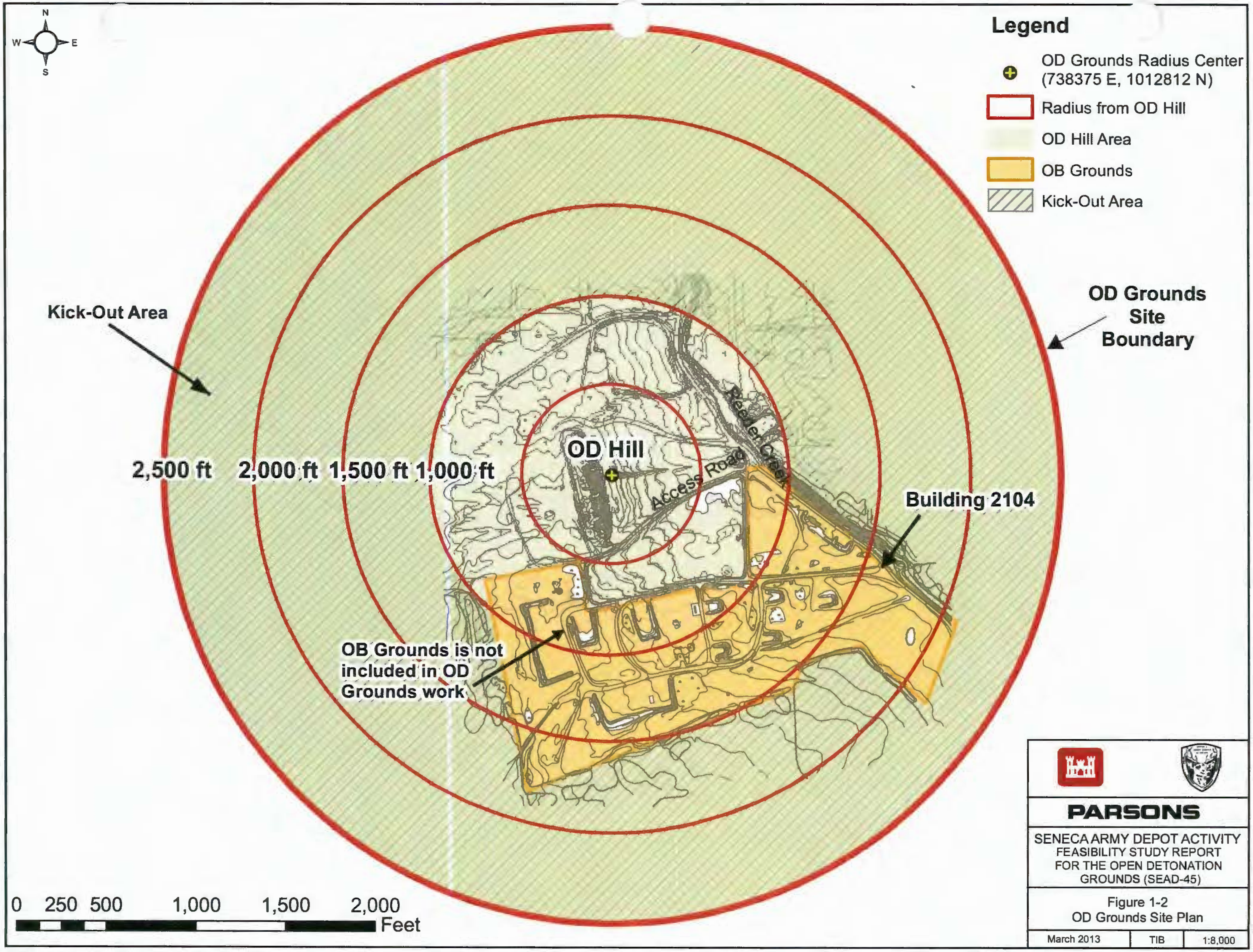


SENECA ARMY DEPOT ACTIVITY
FEASIBILITY STUDY REPORT FOR THE
OPEN DETONATION GROUNDS (SEAD-45)

Figure 1-1

SEDA Location Map

March 2013



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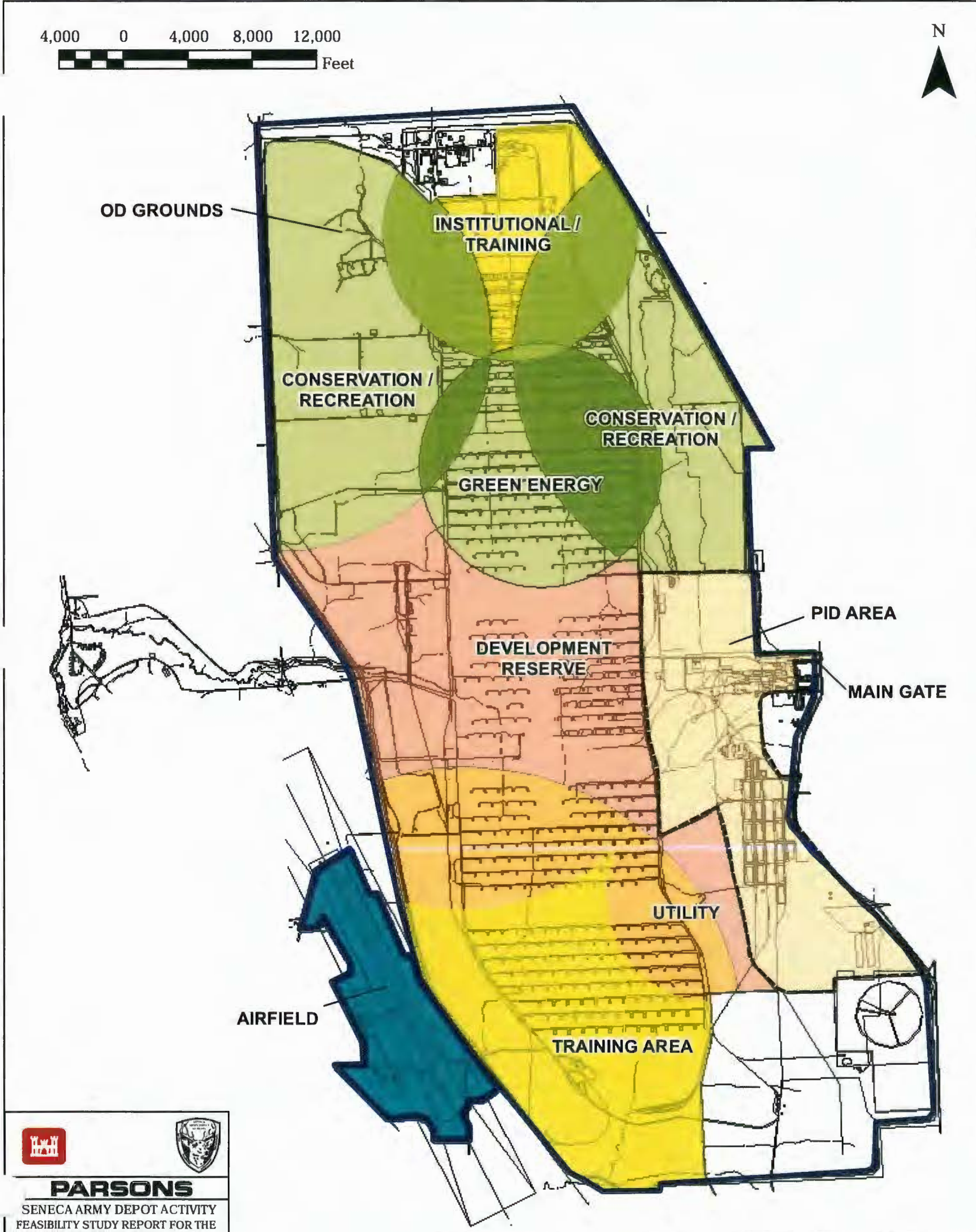

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FEASIBILITY STUDY REPORT FOR THE OPEN DETONATION GROUNDS (SEAD-45)

Figure 1-3
SEDA Future Land Use

March 2013 | BBO

Legend

- Site Boundaries
- Explosive Storage Magazines
- Planned Industrial & Office Development Area (PID Area)

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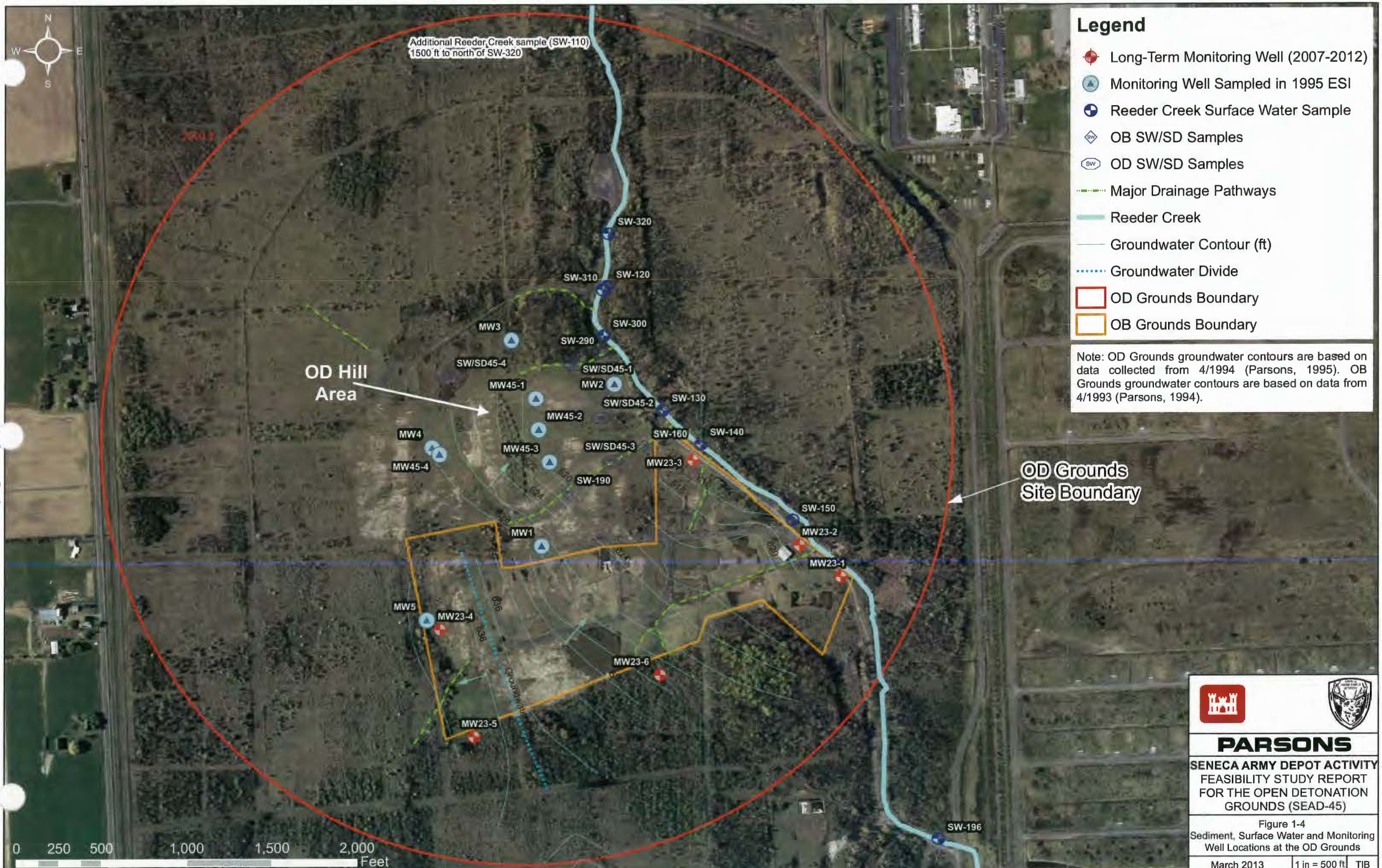

Additional Reeder Creek sample (SW-110) 1500 ft to north of SW-320
N
W
E
S
SW-320
SW-310
SW-120
SW-300
SW-290
MW3
SW/SD45-4
SW/SD45-1
OD Hill Area
MW45-1
MW2
SW/SD45-2
SW-130
MW45-2
MW4
SW-160
SW-140
MW45-3
SW/SD45-3
MW23-3
MW45-4
SW-190
OD Grounds Site Boundary
SW-150
MW1
MW23-2
MW23-1
MW5
MW23-4
MW23-6
MW23-5
SW-196
0 250 500 1,000 1,500 2,000 Feet
Legend
Long-Term Monitoring Well (2007-2012)
Monitoring Well Sampled in 1995 ESI
Reeder Creek Surface Water Sample
OB SW/SD Samples
OD SW/SD Samples
Major Drainage Pathways
Reeder Creek
Groundwater Contour (ft)
Groundwater Divide
OD Grounds Boundary
OB Grounds Boundary
Note: OD Grounds groundwater contours are based on data collected from 4/1994 (Parsons, 1995). OB Grounds groundwater contours are based on data from 4/1993 (Parsons, 1994).
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Figure 1-4
Sediment, Surface Water and Monitoring Well Locations at the OD Grounds
March 2013
1 in = 500 ft
TIB

Figure 1-5A
Historic Soil Sample Locations at OD Grounds

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Legend

500 ft — Radius Rings from OD Hill Distance from the Center

Center Point of all Radius Rings (N 1012812, E 738375)

OB Grounds Boundary

Surface Soil Sample Location

Subsurface Soil Sample Location

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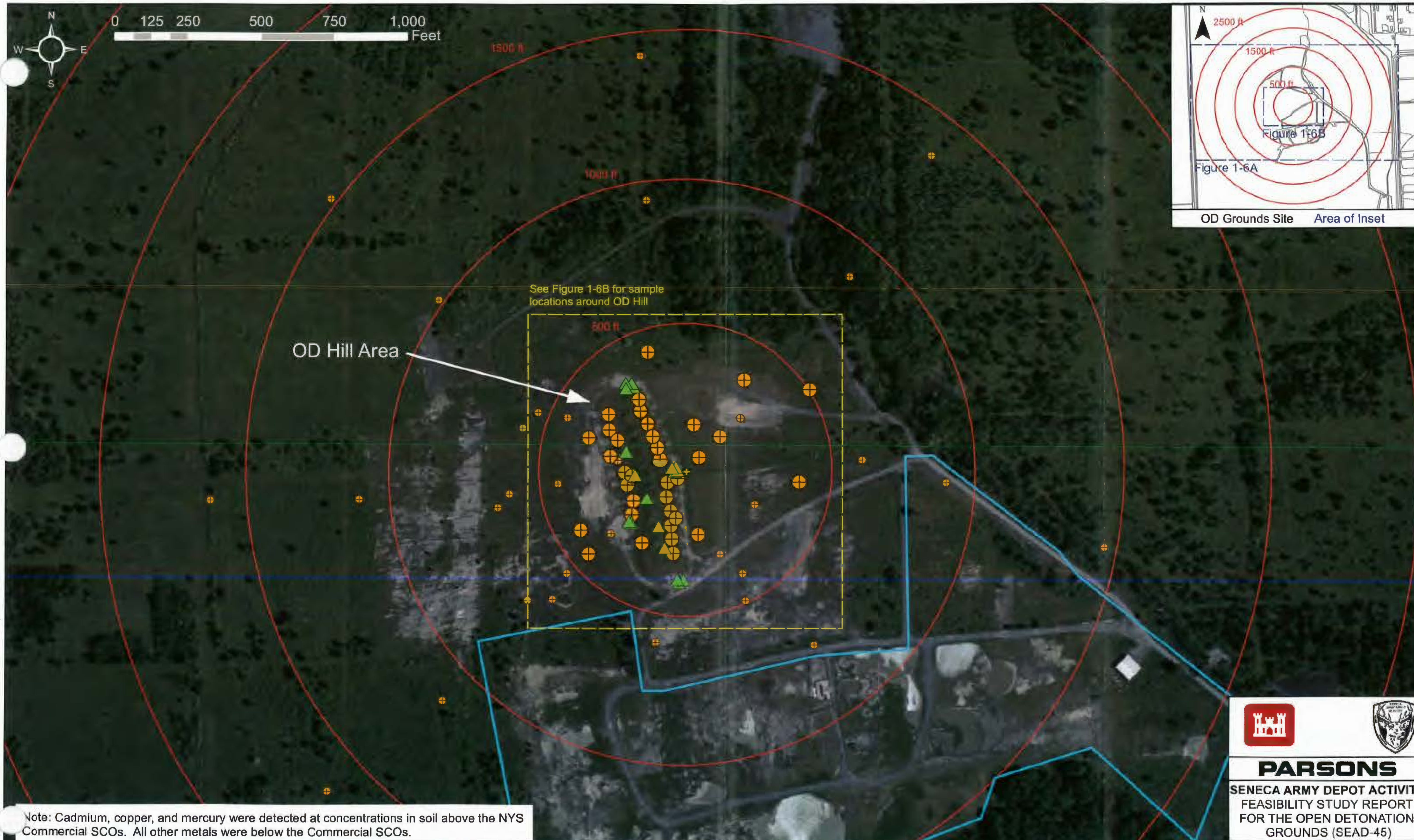
FEASIBILITY STUDY REPORT FOR THE OPEN DETONATION GROUNDS (SEAD-45)

Figure 1-5B
Historic Soil Sample Locations at OD Grounds (OD Hill Area)

March 2013		BBO



Legend

- 500 ft — Radius Rings from OD Hill Distance from Center
- Center Point of all Radius Rings (N 1012812, E 738375)
- OB Grounds Boundary
- Exceedance(s) for metal SCO(s) [surface soil]
- Exceedance(s) for metal SCO(s) [subsurface soil]
- No Exceedances for metals in surface soil
- No Exceedances for metals in subsuface soil

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FEASIBILITY STUDY REPORT
FOR THE OPEN DETONATION
GROUNDS (SEAD-45)

Figure 1-6A
Metals Exceedances in Soil
at the OD Grounds

March 2013		BBO

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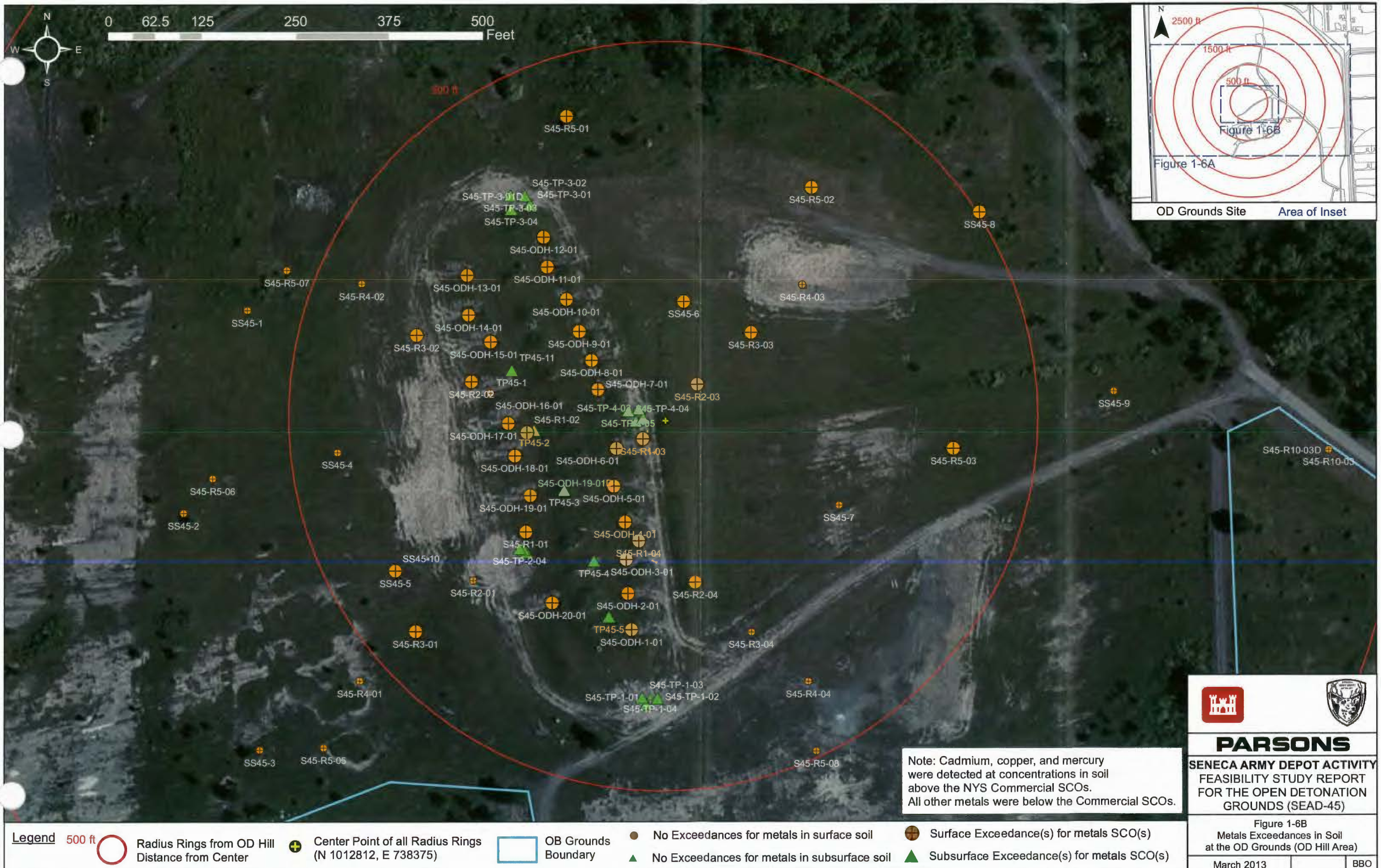

Figure 1-6B
Metals Exceedances in Soil at the OD Grounds (OD Hill Area)

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APPENDICES

APPENDIX A

OD GROUNDS ANALYTICAL DATA

Analytical Data for Surface and e Soil Samples at OD Grounds
Feasibility Stu. OD Grounds
Seneca Army Depot

Area								SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45
Loc ID								S45-ODH-10-01	S45-ODH-1-01	S45-ODH-11-01	S45-ODH-12-01	S45-ODH-13-01	S45-ODH-14-01
Sample ID								S45-ODH-10-01	S45-ODH-1-01	S45-ODH-11-01	S45-ODH-12-01	S45-ODH-13-01	S45-ODH-14-01
Matrix								SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Depth Interval (FT)								0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6
Sample Date								3/12/2010	3/12/2010	3/12/2010	3/12/2010	3/12/2010	3/12/2010
QC Type								SA	SA	SA	SA	SA	SA
Study ID								OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest
Parameter	Unit	Maximum Value	Frequency of Detection	Criteria Value	Number of Exceedances	Number of Times Detected	Number of Samples Analyzed	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual
Volatile Organic Compounds													
1,1,1-Trichloroethane	UG/KG	0	0%	500,000	0	0	16						
1,1,2,2-Tetrachloroethane	UG/KG	0	0%			0	16						
1,1,2-Trichloroethane	UG/KG	0	0%			0	16						
1,1-Dichloroethane	UG/KG	0	0%	240,000	0	0	16						
1,1-Dichloroethene	UG/KG	0	0%	500,000	0	0	16						
1,2-Dichloroethane	UG/KG	0	0%	30,000	0	0	16						
1,2-Dichloroethene (total)	UG/KG	0	0%	500,000	0	0	16						
1,2-Dichloropropane	UG/KG	0	0%			0	16						
Acetone	UG/KG	0	0%	500,000	0	0	16						
Benzene	UG/KG	0	0%	44,000	0	0	16						
Bromodichloromethane	UG/KG	0	0%			0	16						
Bromoform	UG/KG	0	0%			0	16						
Carbon disulfide	UG/KG	0	0%			0	16						
Carbon tetrachloride	UG/KG	0	0%	22,000	0	0	16						
Chlorobenzene	UG/KG	0	0%	500,000	0	0	16						
Chlorodibromomethane	UG/KG	0	0%			0	16						
Chloroethane	UG/KG	0	0%			0	16						
Chloroform	UG/KG	0	0%	350,000	0	0	16						
Cis-1,3-Dichloropropene	UG/KG	0	0%			0	16						
Ethyl benzene	UG/KG	0	0%	390,000	0	0	16						
Methyl bromide	UG/KG	0	0%			0	16						
Methyl butyl ketone	UG/KG	0	0%			0	16						
Methyl chloride	UG/KG	0	0%			0	16						
Methyl ethyl ketone	UG/KG	0	0%	500,000	0	0	16						
Methyl isobutyl ketone	UG/KG	0	0%			0	16						
Methylene chloride	UG/KG	0	0%	500,000	0	0	16						
Styrene	UG/KG	0	0%			0	16						
Tetrachloroethene	UG/KG	19	38%	150,000	0	6	16						
Toluene	UG/KG	0	0%	500,000	0	0	16						
Total Xylenes	UG/KG	0	0%	500,000	0	0	16						
Trans-1,3-Dichloropropene	UG/KG	0	0%			0	16						
Trichloroethene	UG/KG	0	0%	200,000	0	0	16						
Vinyl chloride	UG/KG	0	0%	13,000	0	0	16						
Semivolatile Organic Compounds													
1,2,4-Trichlorobenzene	UG/KG	0	0%			0	35		93 U	78 U			91 U
1,2-Dichlorobenzene	UG/KG	0	0%	500,000	0	0	35		100 U	85 U			99 U
1,3-Dichlorobenzene	UG/KG	0	0%	280,000	0	0	35		90 U	76 U			88 U
1,4-Dichlorobenzene	UG/KG	0	0%	130,000	0	0	35		99 U	83 U			97 U
2,2'-oxybis(1-Chloropropane)	UG/KG	0	0%			0	16						
2,4,5-Trichlorophenol	UG/KG	0	0%			0	35		180 U	150 U			170 U
2,4,6-Trichlorophenol	UG/KG	0	0%			0	35		180 U	150 U			170 U
2,4-Dichlorophenol	UG/KG	0	0%			0	35		170 U	140 U			170 U
2,4-Dimethylphenol	UG/KG	0	0%			0	35		190 U	160 U			190 U
2,4-Dinitrophenol	UG/KG	0	0%			0	35		430 U	360 U			420 U
2,4-Dinitrotoluene	UG/KG	14,000	37%			13	35		98 U	82 U			96 U
2,6-Dinitrotoluene	UG/KG	700	6%			2	35		91 U	76 U			89 U
2-Chloronaphthalene	UG/KG	0	0%			0	35		100 U	84 U			98 U
2-Chlorophenol	UG/KG	0	0%			0	35		190 U	160 U			180 U
2-Methylnaphthalene	UG/KG	0	0%			0	35		100 U	89 U			100 U
2-Methylphenol	UG/KG	0	0%	500,000	0	0	35		230 U	190 U			220 U
2-Nitroaniline	UG/KG	0	0%			0	35		86 U	73 U			84 U
2-Nitrophenol	UG/KG	0	0%			0	35		190 U	160 U			190 U
3 or 4-Methylphenol	UG/KG	0	0%			0	19		210 U	180 U			210 U
3,3'-Dichlorobenzidine	UG/KG	0	0%			0	35		130 U	110 U			130 U
3-Nitroaniline	UG/KG	0	0%			0	35		110 U	91 U			100 U
4,6-Dinitro-2-methylphenol	UG/KG	0	0%			0	35		390 U	330 U			380 U
4-Bromophenyl phenyl ether	UG/KG	0	0%			0	35		98 U	82 U			96 U
4-Chloro-3-methylphenol	UG/KG	0	0%			0	35		190 U	160 U			190 U
4-Chloroaniline	UG/KG	0	0%			0	35		140 U	120 U			130 U
4-Chlorophenyl phenyl ether	UG/KG	0	0%			0	35		90 U	76 U			88 U
4-Methylphenol	UG/KG	0	0%	500,000	0	0	16						
4-Nitroaniline	UG/KG	0	0%			0	35		150 U	130 U			150 U
4-Nitrophenol	UG/KG	0	0%			0	35		360 U	300 U			350 U
Acenaphthene	UG/KG	0	0%	500,000	0	0	35		75 U	63 U			73 U
Acenaphthylene	UG/KG	30	9%	500,000	0	3	35		80 U	68 U			79 U
Anthracene	UG/KG	18	6%	500,000	0	2	35		96 U	81 U			95 U
Benzo(a)anthracene	UG/KG	50	23%	5,600	0	8	35		99 U	83 U			97 U
Benzo(a)pyrene	UG/KG	82	23%	1,000	0	8	35		110 U	90 U			100 U
Benzo(b)fluoranthene	UG/KG	55	26%	5,600	0	9	35		150 U	130 U			150 U
Benzo(ghi)perylene	UG/KG	66	20%	500,000	0	7	35		120 UJ	100 UJ			120 UJ
Benzo(k)fluoranthene	UG/KG	58	20%	56,000	0	7	35		95 U	80 U			94 U

Table A-1
Analytical Data for Surface and Subsurface Soil Samples at OD Grounds
Feasibility Studies - OD Grounds
Seneca Army Depot

Parameter	Unit	Maximum Value	Frequency of Detection	Criteria Value	Number of Exceedances	Number of Times Detected	Number of Samples Analyzed	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual
Area								SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45
Loc ID								S45-ODH-10-01	S45-ODH-1-01	S45-ODH-11-01	S45-ODH-12-01	S45-ODH-13-01	S45-ODH-14-01
Sample ID								S45-ODH-10-01	S45-ODH-1-01	S45-ODH-11-01	S45-ODH-12-01	S45-ODH-13-01	S45-ODH-14-01
Matrix								SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Depth Interval (FT)								0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6
Sample Date								3/12/2010	3/12/2010	3/12/2010	3/12/2010	3/12/2010	3/12/2010
QC Type								SA	SA	SA	SA	SA	SA
Study ID								OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest
Bis(2-Chloroethoxy)methane	UG/KG	0	0%			0	35		110 U	93 U			110 U
Bis(2-Chloroethyl)ether	UG/KG	0	0%			0	35		93 U	78 U			91 U
Bis(2-Chloroisopropyl)ether	UG/KG	0	0%			0	19		100 U	86 U			100 U
Bis(2-Ethylhexyl)phthalate	UG/KG	740	26%			9	35		110 U	95 U			110 U
Butylbenzylphthalate	UG/KG	0	0%			0	35		110 U	90 U			100 U
Carbazole	UG/KG	0	0%			0	35		130 U	110 U			120 U
Chrysene	UG/KG	130	34%	56,000	0	12	35		110 U	92 U			110 U
Dibenz(a,h)anthracene	UG/KG	0	0%	560	0	0	35		150 U	120 U			140 U
Dibenzofuran	UG/KG	0	0%	350,000	0	0	35		91 U	76 U			89 U
Diethyl phthalate	UG/KG	35	3%			1	35		92 U	78 U			90 U
Dimethylphthalate	UG/KG	0	0%			0	35		90 U	76 U			88 U
Di-n-butylphthalate	UG/KG	6,800	34%			12	35		120 U	98 U			110 U
Di-n-octylphthalate	UG/KG	0	0%			0	35		240 U	200 U			240 U
Fluoranthene	UG/KG	68	31%	500,000	0	11	35		120 U	100 U			120 U
Fluorene	UG/KG	0	0%	500,000	0	0	35		93 U	78 U			91 U
Hexachlorobenzene	UG/KG	110	31%	6,000	0	11	35		94 U	79 U			92 U
Hexachlorobutadiene	UG/KG	0	0%			0	35		95 U	80 U			94 U
Hexachlorocyclopentadiene	UG/KG	0	0%			0	35		94 U	79 U			92 U
Hexachloroethane	UG/KG	1,100	17%			6	35		110 U	93 U			110 U
Indeno(1,2,3-cd)pyrene	UG/KG	52	11%	5,600	0	4	35		140 U	120 U			140 U
Isophorone	UG/KG	0	0%			0	35		86 U	73 U			84 U
Naphthalene	UG/KG	30	14%	500,000	0	5	35		100 U	84 U			98 U
Nitrobenzene	UG/KG	0	0%			0	35		100 U	88 U			100 U
N-Nitrosodiphenylamine	UG/KG	320	6%			2	35		310 J	210 U			250 U
N-Nitrosodipropylamine	UG/KG	1,600	14%			5	35		95 U	80 U			94 U
Pentachlorophenol	UG/KG	0	0%	6,700	0	0	35		270 UJ	230 UJ			270 UJ
Phenanthrene	UG/KG	46	26%	500,000	0	9	35		95 U	80 U			94 U
Phenol	UG/KG	0	0%	500,000	0	0	35		180 U	150 U			180 U
Pyrene	UG/KG	110	34%	500,000	0	12	35		120 U	98 U			110 U
Herbicides													
2,4,5-T	UG/KG	0	0%			0	35		18 U	18 U			19 U
2,4,5-TP/Silvex	UG/KG	0	0%	500,000	0	0	35		14 U	14 U			15 U
2,4-D	UG/KG	0	0%			0	35		36 U	37 U			38 U
2,4-DB	UG/KG	0	0%			0	35		26 U	27 U			28 U
Dalapon	UG/KG	0	0%			0	35		9.2 U	9.6 U			9.7 U
Dicamba	UG/KG	0	0%			0	35		12 U	13 U			13 U
Dichloroprop	UG/KG	0	0%			0	35		21 U	22 U			22 U
Dinoseb	UG/KG	0	0%			0	35		2.9 U	3 U			3 U
MCPA	UG/KG	9,400	6%			2	35		2,600 U	2,700 U			2,700 U
MCPP	UG/KG	0	0%			0	35		2,500 U	2,600 U			2,600 U
Explosives													
1,3,5-Trinitrobenzene	UG/KG	190	60%			28	47	55 J	51 JN	120 U	70 J	51 J	120 U
1,3-Dinitrobenzene	UG/KG	0	0%			0	47	7.7 U	6.7 U	7.3 U	7 U	7.2 U	7.8 U
2,4,6-Trinitrotoluene	UG/KG	1,400	81%			38	47	58 JN	45 JN	46 J	48 JN	40 J	55 JN
2,4-Dinitrotoluene	UG/KG	1,100	77%			36	47	110 J	150	88 J	100 J	110 J	92 J
2,6-Dinitrotoluene	UG/KG	0	0%			0	47	34 U	29 U	32 U	30 U	31 U	34 U
2-amino-4,6-Dinitrotoluene	UG/KG	680	77%			36	47	130 J	130 J	170 JN	190 J	120	200 JN
2-Nitrotoluene	UG/KG	0	0%			0	31	15 U	13 U	14 U	13 U	14 U	15 U
3,5-Dinitroaniline	UG/KG	0	0%			0	31	4.4 U	3.8 U	4.4 U	4 U	4.1 U	4.4 U
3-Nitrotoluene	UG/KG	0	0%			0	31	9.8 UJ	8.5 UJ	9.4 UJ	8.9 UJ	9.2 UJ	9.9 UJ
4-amino-2,6-Dinitrotoluene	UG/KG	500	57%			27	47	120 J	120	150 JN	150 J	120	190 J
4-Nitrotoluene	UG/KG	0	0%			0	31	34 U	29 U	32 U	30 U	31 U	34 U
HMX	UG/KG	470	68%			32	47	87 JN	72 JN	160 JN	100 J	79 J	190 JN
Nitrobenzene	UG/KG	0	0%			0	31	27 U	24 U	26 U	25 U	26 U	28 U
Nitroglycerine	UG/KG	1,500	3%			1	31	150 U	130 U	150 U	140 U	140 U	160 U
Pentaerythritol Tetranitrate	UG/KG	0	0%			0	31	300 U	260 U	280 U	270 U	280 U	300 U
RDX	UG/KG	5,800	83%			39	47	190 JN	170	440 JN	290 J	130 JN	350 JN
Tetryl	UG/KG	330	9%			4	47	6.7 U	5.8 U	6.4 U	6.1 U	6.3 U	6.8 U

Parameter	Unit	Maximum Value	Frequency of Detection	Criteria Value	Number of Exceedances	Number of Times Detected	Number of Samples Analyzed	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual
Area								SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45
Loc ID								S45-ODH-10-01	S45-ODH-1-01	S45-ODH-11-01	S45-ODH-12-01	S45-ODH-13-01	S45-ODH-14-01
Sample ID								S45-ODH-10-01	S45-ODH-1-01	S45-ODH-11-01	S45-ODH-12-01	S45-ODH-13-01	S45-ODH-14-01
Matrix								SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Depth Interval (FT)								0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6
Sample Date								3/12/2010	3/12/2010	3/12/2010	3/12/2010	3/12/2010	3/12/2010
QC Type								SA	SA	SA	SA	SA	SA
Study ID								OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest
Pesticides/PCBs													
Aroclor-1016	UG/KG	0	0%	1,000	0	0	34		7 U	6.9 U			7 U
Aroclor-1221	UG/KG	0	0%	1,000	0	0	34		16 U	16 U			16 U
Aroclor-1232	UG/KG	0	0%	1,000	0	0	34		11 U	11 U			11 U
Aroclor-1242	UG/KG	0	0%	1,000	0	0	34		6.8 U	6.7 U			6.8 U
Aroclor-1248	UG/KG	0	0%	1,000	0	0	34		7.1 U	7 U			7.1 U
Aroclor-1254	UG/KG	2,000	6%	1,000	1	2	34		5.5 U	5.4 U			5.5 U
Aroclor-1260	UG/KG	0	0%	1,000	0	0	34		7 U	6.9 U			7 U
4,4'-DDD	UG/KG	2.4	6%	92,000	0	2	34		0.23 U	0.23 U			0.23 U
4,4'-DDE	UG/KG	4.2	63%	62,000	0	22	35		0.82 J	1.3 J			1.2 J
4,4'-DDT	UG/KG	3.4	50%	47,000	0	17	34		0.87 J	1.3 JN			1.2 J
Aldrin	UG/KG	0	0%	680	0	0	34		0.33 U	0.32 U			0.33 U
Alpha-BHC	UG/KG	0	0%	3,400	0	0	34		0.4 U	0.39 U			0.4 U
Alpha-Chlordane	UG/KG	2	12%	24,000	0	4	34		0.24 U	0.24 U			0.24 U
Beta-BHC	UG/KG	0	0%	3,000	0	0	34		0.38 U	0.38 U			0.38 U
Delta-BHC	UG/KG	0	0%	500,000	0	0	34		0.37 U	0.37 U			0.37 U
Dieldrin	UG/KG	3.2	41%	1,400	0	14	34		0.77 J	1 J			0.96 J
Endosulfan I	UG/KG	55	60%	200,000	0	21	35		0.79 J	32 JN			1 J
Endosulfan II	UG/KG	0.88	3%	200,000	0	1	34		0.4 UJ	0.39 UJ			0.4 UJ
Endosulfan sulfate	UG/KG	0	0%	200,000	0	0	34		0.68 U	0.67 U			0.68 U
Endrin	UG/KG	3.6	3%	89,000	0	1	34		0.99 U	0.98 U			0.99 U
Endrin aldehyde	UG/KG	0	0%			0	34		0.57 U	0.56 U			0.57 U
Endrin ketone	UG/KG	0.58	3%			1	34		0.46 U	0.58 J			0.47 U
Gamma-BHC/Lindane	UG/KG	0	0%	9,200	0	0	34		0.31 U	0.31 U			0.31 U
Gamma-Chlordane	UG/KG	1.1	9%			3	34		0.27 U	0.26 U			0.27 U
Heptachlor	UG/KG	0	0%	15,000	0	0	34		0.34 U	0.33 U			0.34 U
Heptachlor epoxide	UG/KG	0	0%			0	34		0.26 U	0.25 U			0.26 U
Methoxychlor	UG/KG	45	3%			1	34		0.58 U	0.57 U			0.58 U
Toxaphene	UG/KG	0	0%			0	34		8.2 U	8 U			8.2 U
Inorganics													
Aluminum	MG/KG	27,900	100%			97	97	18,000	19,100	17,900	16,500	19,000	23,600
Antimony	MG/KG	5.1	33%			32	97	0.13 UJ	0.16 J	0.2 UJ	0.2 UJ	0.89 UJ	0.19 UJ
Arsenic	MG/KG	12.6	100%	16	0	97	97	5 J	5.1 J	8.6 J	6.2 J	4.7 J	4.6 J
Barium	MG/KG	365	100%	400	0	97	97	195	186	193	189	171	182
Beryllium	MG/KG	1.2	98%	590	0	95	97	0.8	0.85	0.79	0.73	0.85	0.8
Cadmium	MG/KG	1,100	81%	9.3	11	77	95	8.1	7	23.6	6.3	7.8	7.4
Calcium	MG/KG	193,000	99%			96	97	24,400	27,800	23,200	19,400	31,400	26,700
Chromium	MG/KG	446	100%	1,500	0	97	97	28.1	28.5	446	30.1	27.8	30.5
Cobalt	MG/KG	26.8	100%			97	97	13.5	11.2	13.1	10.8	11.2	12.6
Copper	MG/KG	7,310	100%	270	52	97	97	448	436	1,060	914	515	635
Cyanide	MG/KG	0.7	13%	27	0	2	16						
Iron	MG/KG	118,000	100%			97	97	25,800	27,200	53,100	27,700	26,300	26,500
Lead	MG/KG	998	100%	1,000	0	97	97	62.6	55.6	64	43.1	51.7	56.7
Magnesium	MG/KG	15,000	100%			97	97	6,780	7,140	7,040	5,860	7,710	7,000
Manganese	MG/KG	5,040	100%	10,000	0	97	97	742	581	799	655	590	624
Nickel	MG/KG	59.3	100%	310	0	92	92	39.5	37.3	59.3	37.8	36.6	39.6
Potassium	MG/KG	4,880	100%			76	76	2,760 R	3,400 R	2,880 R	2,400 R	3,320 R	2,980 R
Selenium	MG/KG	0.92	4%	1,500	0	4	97	0.29 U	0.25 U	0.44 U	0.43 U	0.24 U	0.43 U
Silver	MG/KG	205	68%	1,500	0	66	97	3.6	3.8	5	3 U	3.6	3.5
Sodium	MG/KG	213	84%			81	97	106 J	131 J	112 J	103 J	128 J	135 J
Thallium	MG/KG	0.27	6%			6	97	0.12 U	0.23 J	0.19 U	0.18 U	0.1 J	0.18 U
Vanadium	MG/KG	41.9	100%			97	97	29.2	31.4	30.6	25.9	31.7	29.8
Zinc	MG/KG	1,470	100%	10,000	0	92	92	359	327	421	225	314	312
Mercury	MG/KG	9.1	99%	2.8	49	96	97	3.9	16	4.5	[illegible]	1.6	4.4

Notes.

1) Chemical result qualifiers are assigned by the laboratory and are evaluated and modified (if necessary) by during data validation.

U = non-detect, i.e. not detected equal to or above this value. J = estimated (detect or non-detect) value.

[blank] = detect, i.e. detected chemical result value. R = Rejected, data validation rejected the results.

2) Num of Analyses is the number of detected and non-detected results excluding rejected results. Sample duplicate pairs have not been averaged.

3) Chemical results greater than the action level are highlighted, bolded and boxed

4) Criteria action level source document and web address.

- The NYS SCO Commercial Use values were obtained from the NYSDEC Soil Cleanup Objectives.

http://www.dec.ny.gov/regs/15507.html

Table A-1
Analytical Data for Surface and Subsurface Soil Samples at OD Grounds
Feasibility Studies - OD Grounds
Seneca Army Depot

Parameter	Unit	Maximum Value	Frequency of Detection	Criteria Value	Number of Exceedances	Number of Times Detected	Number of Samples Analyzed						
Area								SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45
Loc ID								S45-ODH-15-01	S45-ODH-16-01	S45-ODH-17-01	S45-ODH-18-01	S45-ODH-19-01	S45-ODH-19-01
Sample ID								S45-ODH-15-01	S45-ODH-16-01	S45-ODH-17-01	S45-ODH-18-01	S45-ODH-19-01	S45-ODH-19-01D
Matrix								SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Depth Interval (FT)								0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6
Sample Date								3/12/2010	3/12/2010	3/12/2010	3/12/2010	3/12/2010	3/12/2010
QC Type								SA	SA	SA	SA	SA	DU
Study ID								OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest
								Value Qual	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual
Volatile Organic Compounds													
1,1,1-Trichloroethane	UG/KG	0	0%	500,000	0	0	16						
1,1,2,2-Tetrachloroethane	UG/KG	0	0%			0	16						
1,1,2-Trichloroethane	UG/KG	0	0%			0	16						
1,1-Dichloroethane	UG/KG	0	0%	240,000	0	0	16						
1,1-Dichloroethene	UG/KG	0	0%	500,000	0	0	16						
1,2-Dichloroethane	UG/KG	0	0%	30,000	0	0	16						
1,2-Dichloroethene (total)	UG/KG	0	0%	500,000	0	0	16						
1,2-Dichloropropane	UG/KG	0	0%			0	16						
Acetone	UG/KG	0	0%	500,000	0	0	16						
Benzene	UG/KG	0	0%	44,000	0	0	16						
Bromodichloromethane	UG/KG	0	0%			0	16						
Bromoform	UG/KG	0	0%			0	16						
Carbon disulfide	UG/KG	0	0%			0	16						
Carbon tetrachloride	UG/KG	0	0%	22,000	0	0	16						
Chlorobenzene	UG/KG	0	0%	500,000	0	0	16						
Chlorodibromomethane	UG/KG	0	0%			0	16						
Chloroethane	UG/KG	0	0%			0	16						
Chloroform	UG/KG	0	0%	350,000	0	0	16						
Cis-1,3-Dichloropropene	UG/KG	0	0%			0	16						
Ethyl benzene	UG/KG	0	0%	390,000	0	0	16						
Methyl bromide	UG/KG	0	0%			0	16						
Methyl butyl ketone	UG/KG	0	0%			0	16						
Methyl chloride	UG/KG	0	0%			0	16						
Methyl ethyl ketone	UG/KG	0	0%	500,000	0	0	16						
Methyl isobutyl ketone	UG/KG	0	0%			0	16						
Methylene chloride	UG/KG	0	0%	500,000	0	0	16						
Styrene	UG/KG	0	0%			0	16						
Tetrachloroethene	UG/KG	19	38%	150,000	0	6	16						
Toluene	UG/KG	0	0%	500,000	0	0	16						
Total Xylenes	UG/KG	0	0%	500,000	0	0	16						
Trans-1,3-Dichloropropene	UG/KG	0	0%			0	16						
Trichloroethene	UG/KG	0	0%	200,000	0	0	16						
Vinyl chloride	UG/KG	0	0%	13,000	0	0	16						
Semivolatile Organic Compounds													
1,2,4-Trichlorobenzene	UG/KG	0	0%			0	35			89 U		94 U	87 U
1,2-Dichlorobenzene	UG/KG	0	0%	500,000	0	0	35			97 U		100 U	94 U
1,3-Dichlorobenzene	UG/KG	0	0%	280,000	0	0	35			86 U		91 U	84 U
1,4-Dichlorobenzene	UG/KG	0	0%	130,000	0	0	35			94 U		100 U	92 U
2,2'-oxybis(1-Chloropropane)	UG/KG	0	0%			0	16						
2,4,5-Trichlorophenol	UG/KG	0	0%			0	35			170 U		180 U	170 U
2,4,6-Trichlorophenol	UG/KG	0	0%			0	35			170 U		180 U	170 U
2,4-Dichlorophenol	UG/KG	0	0%			0	35			160 U		180 U	160 U
2,4-Dimethylphenol	UG/KG	0	0%			0	35			180 U		190 U	180 U
2,4-Dinitrophenol	UG/KG	0	0%			0	35			410 U		440 U	400 U
2,4-Dinitrotoluene	UG/KG	14,000	37%			13	35			260 J		280 J	91 U
2,6-Dinitrotoluene	UG/KG	700	6%			2	35			87 U		92 U	85 U
2-Chloronaphthalene	UG/KG	0	0%			0	35			96 U		100 U	93 U
2-Chlorophenol	UG/KG	0	0%			0	35			180 U		190 U	180 U
2-Methylnaphthalene	UG/KG	0	0%			0	35			100 U		110 U	99 U
2-Methylphenol	UG/KG	0	0%	500,000	0	0	35			220 U		230 U	210 U
2-Nitroaniline	UG/KG	0	0%			0	35			82 U		88 U	80 U
2-Nitrophenol	UG/KG	0	0%			0	35			180 U		190 U	180 U
3 or 4-Methylphenol	UG/KG	0	0%			0	19			200 U		220 U	200 U
3,3'-Dichlorobenzidine	UG/KG	0	0%			0	35			120 U		130 U	120 U
3-Nitroaniline	UG/KG	0	0%			0	35			100 U		110 U	100 U
4,6-Dinitro-2-methylphenol	UG/KG	0	0%			0	35			370 U		390 U	360 U
4-Bromophenyl phenyl ether	UG/KG	0	0%			0	35			93 U		99 U	91 U
4-Chloro-3-methylphenol	UG/KG	0	0%			0	35			180 U		190 U	180 U
4-Chloroaniline	UG/KG	0	0%			0	35			130 U		140 U	130 U
4-Chlorophenyl phenyl ether	UG/KG	0	0%			0	35			86 U		91 U	84 U
4-Methylphenol	UG/KG	0	0%	500,000	0	0	16						
4-Nitroaniline	UG/KG	0	0%			0	35			150 U		160 U	140 U
4-Nitrophenol	UG/KG	0	0%			0	35			340 U		360 U	330 U
Acenaphthene	UG/KG	0	0%	500,000	0	0	35			71 U		76 U	70 U
Acenaphthylene	UG/KG	30	9%	500,000	0	3	35			77 U		82 U	75 U
Anthracene	UG/KG	18	6%	500,000	0	2	35			92 U		98 U	90 U
Benzo(a)anthracene	UG/KG	50	23%	5,600	0	8	35			94 U		100 U	92 U
Benzo(a)pyrene	UG/KG	82	23%	1,000	0	8	35			100 U		110 U	100 U
Benzo(b)fluoranthene	UG/KG	55	26%	5,600	0	9	35			150 U		160 U	140 U
Benzo(ghi)perylene	UG/KG	66	20%	500,000	0	7	35			110 UJ		120 UJ	110 UJ
Benzo(k)fluoranthene	UG/KG	58	20%	56,000	0	7	35			91 U		97 U	89 U

Area								SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45
Loc ID								S45-ODH-15-01	S45-ODH-16-01	S45-ODH-17-01	S45-ODH-18-01	S45-ODH-19-01	S45-ODH-19-01
Sample ID								S45-ODH-15-01	S45-ODH-16-01	S45-ODH-17-01	S45-ODH-18-01	S45-ODH-19-01	S45-ODH-19-01D
Matrix								SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Depth Interval (FT)								0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6
Sample Date								3/12/2010	3/12/2010	3/12/2010	3/12/2010	3/12/2010	3/12/2010
QC Type								SA	SA	SA	SA	SA	DU
Study ID								OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest
Parameter	Unit	Maximum Value	Frequency of Detection	Criteria Value	Number of Exceedances	Number of Times Detected	Number of Samples Analyzed	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual
Bis(2-Chloroethoxy)methane	UG/KG	0	0%			0	35			100 U		110 U	100 U
Bis(2-Chloroethyl)ether	UG/KG	0	0%			0	35			89 U		94 U	87 U
Bis(2-Chloroisopropyl)ether	UG/KG	0	0%			0	19			98 U		100 U	96 U
Bis(2-Ethylhexyl)phthalate	UG/KG	740	26%			9	35			110 U		110 U	100 U
Butylbenzylphthalate	UG/KG	0	0%			0	35			100 U		110 U	100 U
Carbazole	UG/KG	0	0%			0	35			120 U		130 U	120 U
Chrysene	UG/KG	130	34%	56,000	0	12	35			100 U		110 U	100 U
Dibenz(a,h)anthracene	UG/KG	0	0%	560	0	0	35			140 U		150 U	140 U
Dibenzofuran	UG/KG	0	0%	350,000	0	0	35			87 U		92 U	85 U
Diethyl phthalate	UG/KG	35	3%			1	35			88 U		93 U	86 U
Dimethylphthalate	UG/KG	0	0%			0	35			86 U		91 U	84 U
Di-n-butylphthalate	UG/KG	6,800	34%			12	35			330 J		120 U	110 U
Di-n-octylphthalate	UG/KG	0	0%			0	35			230 U		250 U	230 U
Fluoranthene	UG/KG	68	31%	500,000	0	11	35			120 U		120 U	110 U
Fluorene	UG/KG	0	0%	500,000	0	0	35			89 U		94 U	87 U
Hexachlorobenzene	UG/KG	110	31%	6,000	0	11	35			90 U		96 U	88 U
Hexachlorobutadiene	UG/KG	0	0%			0	35			91 U		97 U	89 U
Hexachlorocyclopentadiene	UG/KG	0	0%			0	35			90 U		96 U	88 U
Hexachloroethane	UG/KG	1,100	17%			6	35			100 U		110 U	100 U
Indeno(1,2,3-cd)pyrene	UG/KG	52	11%	5,600	0	4	35			130 U		140 U	130 U
Isophorone	UG/KG	0	0%			0	35			82 U		88 U	80 U
Naphthalene	UG/KG	30	14%	500,000	0	5	35			96 U		100 U	93 U
Nitrobenzene	UG/KG	0	0%			0	35			100 U		110 U	98 U
N-Nitrosodiphenylamine	UG/KG	320	6%			2	35			240 U		260 U	240 U
N-Nitrosodipropylamine	UG/KG	1,600	14%			5	35			91 U		97 U	89 U
Pentachlorophenol	UG/KG	0	0%	6,700	0	0	35			260 UJ		280 UJ	250 UJ
Phenanthrene	UG/KG	46	26%	500,000	0	9	35			91 U		97 U	89 U
Phenol	UG/KG	0	0%	500,000	0	0	35			170 U		180 U	170 U
Pyrene	UG/KG	110	34%	500,000	0	12	35			110 U		120 U	110 U
Herbicides													
2,4,5-T	UG/KG	0	0%			0	35			18 U		18 U	18 U
2,4,5-TP/Silvex	UG/KG	0	0%	500,000	0	0	35			14 U		14 U	14 U
2,4-D	UG/KG	0	0%			0	35			36 U		36 U	35 U
2,4-DB	UG/KG	0	0%			0	35			26 U		26 U	26 U
Dalapon	UG/KG	0	0%			0	35			9.4 U		9.2 U	9.1 U
Dicamba	UG/KG	0	0%			0	35			12 U		12 U	12 U
Dichloroprop	UG/KG	0	0%			0	35			21 U		21 U	21 U
Dinoseb	UG/KG	0	0%			0	35			2.9 U		2.9 U	2.8 U
MCPA	UG/KG	9,400	6%			2	35			2,600 U		2,600 U	2,600 U
MCPP	UG/KG	0	0%			0	35			2,500 U		2,500 U	2,400 U
Explosives													
1,3,5-Trinitrobenzene	UG/KG	190	60%			28	47	54 JN	53 JN	64 JN	120 U	56 J	60 JN
1,3-Dinitrobenzene	UG/KG	0	0%			0	47	7 1 U	6.5 U	6.7 U	7.4 U	7.3 U	6.5 U
2,4,6-Trinitrotoluene	UG/KG	1,400	81%			38	47	44 JN	41 JN	42 JN	62 J	59 J	50 JN
2,4-Dinitrotoluene	UG/KG	1,100	77%			36	47	220	110	96 J	1,100	150	100 J
2,6-Dinitrotoluene	UG/KG	0	0%			0	47	31 U	28 U	29 U	32 U	32 U	28 U
2-amino-4,6-Dinitrotoluene	UG/KG	680	77%			36	47	150 J	160 J	150 J	160	190 J	220
2-Nitrotoluene	UG/KG	0	0%			0	31	14 U	12 U	13 U	14 U	14 U	13 U
3,5-Dinitroaniline	UG/KG	0	0%			0	31	4 U	3.7 U	3.8 U	4.2 U	4.2 U	3.7 U
3-Nitrotoluene	UG/KG	0	0%			0	31	9 UJ	8.2 UJ	8.6 UJ	9.4 UJ	9.3 UJ	8.3 UJ
4-amino-2,6-Dinitrotoluene	UG/KG	500	57%			27	47	160 J	180	160	120	180	220
4-Nitrotoluene	UG/KG	0	0%			0	31	31 U	28 U	29 U	32 U	32 U	28 U
HMX	UG/KG	470	68%			32	47	98 JN	100 J	100 J	87 JN	180 J	92 J
Nitrobenzene	UG/KG	0	0%			0	31	25 U	23 U	24 U	26 U	26 U	23 U
Nitroglycerine	UG/KG	1,500	3%			1	31	140 U	130 U	130 U	150 U	1,500 J	130 U
Pentaerythritol Tetranitrate	UG/KG	0	0%			0	31	270 U	250 U	260 U	280 U	280 U	250 U
RDX	UG/KG	5,800	83%			39	47	180	230	180	160	540 J	200 J
Tetryl	UG/KG	330	9%			4	47	6.2 U	5.6 U	5.9 U	6.5 U	6.4 U	5.7 U

Table A-1
Analytical Data for Surface and Subsurface Soil Samples at OD Grounds
Feasibility Studies - OD Grounds
Seneca Army Depot

Area								SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45
Loc ID								S45-ODH-15-01	S45-ODH-16-01	S45-ODH-17-01	S45-ODH-18-01	S45-ODH-19-01	S45-ODH-19-01
Sample ID								S45-ODH-15-01	S45-ODH-16-01	S45-ODH-17-01	S45-ODH-18-01	S45-ODH-19-01	S45-ODH-19-01D
Matrix								SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Depth Interval (FT)								0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6
Sample Date								3/12/2010	3/12/2010	3/12/2010	3/12/2010	3/12/2010	3/12/2010
QC Type								SA	SA	SA	SA	SA	DU
Study ID								OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest
Parameter	Unit	Maximum Value	Frequency of Detection	Criteria Value	Number of Exceedances	Number of Times Detected	Number of Samples Analyzed	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual
Pesticides/PCBs													
Aroclor-1016	UG/KG	0	0%	1,000	0	0	34			6 U		7 U	6.7 U
Aroclor-1221	UG/KG	0	0%	1,000	0	0	34			14 U		16 U	16 U
Aroclor-1232	UG/KG	0	0%	1,000	0	0	34			9.2 U		11 U	10 U
Aroclor-1242	UG/KG	0	0%	1,000	0	0	34			5.8 U		6.8 U	6.5 U
Aroclor-1248	UG/KG	0	0%	1,000	0	0	34			6.1 U		7.1 U	6.8 U
Aroclor-1254	UG/KG	2,000	6%	1,000	1	2	34			4.7 U		5.5 U	5.3 U
Aroclor-1260	UG/KG	0	0%	1,000	0	0	34			6 U		7 U	6.7 U
4,4'-DDD	UG/KG	2.4	6%	92,000	0	2	34			0.2 U		1.4 J	0.22 U
4,4'-DDE	UG/KG	4.2	63%	62,000	0	22	35			0.95 J		2 J	1.6 J
4,4'-DDT	UG/KG	3.4	50%	47,000	0	17	34			1.1 J		1.9 J	1.2 J
Aldrin	UG/KG	0	0%	680	0	0	34			0.28 U		0.33 U	0.31 U
Alpha-BHC	UG/KG	0	0%	3,400	0	0	34			0.34 U		0.4 U	0.38 U
Alpha-Chlordane	UG/KG	2	12%	24,000	0	4	34			0.21 U		0.24 U	0.24 U
Beta-BHC	UG/KG	0	0%	3,000	0	0	34			0.33 U		0.39 U	0.37 U
Delta-BHC	UG/KG	0	0%	500,000	0	0	34			0.32 U		0.37 U	0.36 U
Dieldrin	UG/KG	3.2	41%	1,400	0	14	34			0.22 U		0.26 U	0.25 U
Endosulfan I	UG/KG	55	60%	200,000	0	21	35			0.24 UJ		1.6 J	1.2 J
Endosulfan II	UG/KG	0.88	3%	200,000	0	1	34			0.34 UJ		0.4 UJ	0.88 JN
Endosulfan sulfate	UG/KG	0	0%	200,000	0	0	34			0.58 U		0.68 U	0.65 U
Endrin	UG/KG	3.6	3%	89,000	0	1	34			0.84 U		1 U	0.95 U
Endrin aldehyde	UG/KG	0	0%			0	34			0.49 U		0.57 U	0.55 U
Endrin ketone	UG/KG	0.58	3%			1	34			0.4 U		0.47 U	0.45 U
Gamma-BHC/Lindane	UG/KG	0	0%	9,200	0	0	34			0.27 U		0.32 U	0.3 U
Gamma-Chlordane	UG/KG	1.1	9%			3	34			0.75 J		0.27 U	0.26 U
Heptachlor	UG/KG	0	0%	15,000	0	0	34			0.29 U		0.34 U	0.32 U
Heptachlor epoxide	UG/KG	0	0%			0	34			0.22 U		0.26 U	0.25 U
Methoxychlor	UG/KG	45	3%			1	34			0.5 U		0.58 U	0.56 U
Toxaphene	UG/KG	0	0%			0	34			7 U		8.2 U	7.8 U
Inorganics													
Aluminum	MG/KG	27,900	100%			97	97	19,400	17,100	16,000	14,400	17,500	16,600
Antimony	MG/KG	5.1	33%			32	97	0.19 UJ	0.18 UJ	0.15 UJ	0.76 UJ	0.21 UJ	1.6 J
Arsenic	MG/KG	12.6	100%	16	0	97	97	4.7 J	4.9 J	4.9 J	4 J	5.6 J	7.3 J
Barium	MG/KG	365	100%	400	0	97	97	222	161	160	138	176	203
Beryllium	MG/KG	1.2	98%	590	0	95	97	0.83	0.78	0.71	0.65	0.8	0.79
Cadmium	MG/KG	1,100	81%	9.3	11	77	95	8.6	5	4.7	4.8	[illegible]	[illegible]
Calcium	MG/KG	193,000	99%			96	97	25,300	22,200	26,000	27,600	24,400 J	18,600
Chromium	MG/KG	446	100%	1,500	0	97	97	32.4	25.9	25.3	22	28.8	32
Cobalt	MG/KG	26.8	100%			97	97	12.3	12.6	11.2	9	14.2	14.9
Copper	MG/KG	7,310	100%	270	52	97	97	**537**	209	**393**	**323**	**411 J**	**536**
Cyanide	MG/KG	0.7	13%	27	0	2	16						
Iron	MG/KG	118,000	100%			97	97	27,200	24,200	24,700	21,800	35,100	44,700
Lead	MG/KG	998	100%	1,000	0	97	97	67.8	38.4	54.8	41.5	81.4 J	74.9
Magnesium	MG/KG	15,000	100%			97	97	6,760	6,260	6,220	6,830	6,430	6,180
Manganese	MG/KG	5,040	100%	10,000	0	97	97	627	653	555	458	581 J	1,080 J
Nickel	MG/KG	59.3	100%	310	0	92	92	41.8	35	35.1	31.4	41.9	49.6
Potassium	MG/KG	4,880	100%			76	76	2,960 R	2,550 R	2,460 R	2,310 R	2,720 R	2,430 R
Selenium	MG/KG	0.92	4%	1,500	0	4	97	0.42 U	0.4 U	0.32 U	0.21 U	0.56 J	0.36 U
Silver	MG/KG	205	68%	1,500	0	66	97	3.5	2.8 U	2.6	2.6	3.3	4
Sodium	MG/KG	213	84%			81	97	125 J	115 J	106 J	116 J	114 J	103 J
Thallium	MG/KG	0.27	6%			6	97	0.18 U	0.17 U	0.14 U	0.2 J	0.2 U	0.15 U
Vanadium	MG/KG	41.9	100%			97	97	29.6	27.6	27.7	23.7	27.4	26.9
Zinc	MG/KG	1,470	100%	10,000	0	92	92	321	291	356	290	369	330
Mercury	MG/KG	9.1	99%	2.8	49	96	97	2	1.4	**[illegible]**	**[illegible]**	**3.3**	**3.8**

Notes:
1) Chemical result qualifiers are assigned by the laboratory and are evaluated and modified (if necessary) by during data validation.
U = non-detect, i.e. not detected equal to or above this value. J = estimated (detect or non-detect) value.
[blank] = detect, i.e. detected chemical result value. R = Rejected, data validation rejected the results.
2) Num of Analyses is the number of detected and non-detected results excluding rejected results. Sample duplicate pairs have not been averaged.
3) Chemical results greater than the action level are highlighted, bolded and boxed
4) Criteria action level source document and web address.
- The NYS SCO Commercial Use values were obtained from the NYSDEC Soil Cleanup Objectives.
http://www.dec.ny.gov/regs/15507.html

Parameter	Unit	Maximum Value	Frequency of Detection	Criteria Value	Number of Exceedances	Number of Times Detected	Number of Samples Analyzed	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual
Area								SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45
Loc ID								S45-ODH-20-01	S45-ODH-2-01	S45-ODH-3-01	S45-ODH-4-01	S45-ODH-5-01	S45-ODH-6-01
Sample ID								S45-ODH-20-01	S45-ODH-2-01	S45-ODH-3-01	S45-ODH-4-01	S45-ODH-5-01	S45-ODH-6-01
Matrix								SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Depth Interval (FT)								0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6
Sample Date								3/12/2010	3/12/2010	3/12/2010	3/12/2010	3/12/2010	3/12/2010
QC Type								SA	SA	SA	SA	SA	SA
Study ID								OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest
Volatile Organic Compounds													
1,1,1-Trichloroethane	UG/KG	0	0%	500,000	0	0	16						
1,1,2,2-Tetrachloroethane	UG/KG	0	0%			0	16						
1,1,2-Trichloroethane	UG/KG	0	0%			0	16						
1,1-Dichloroethane	UG/KG	0	0%	240,000	0	0	16						
1,1-Dichloroethene	UG/KG	0	0%	500,000	0	0	16						
1,2-Dichloroethane	UG/KG	0	0%	30,000	0	0	16						
1,2-Dichloroethene (total)	UG/KG	0	0%	500,000	0	0	16						
1,2-Dichloropropane	UG/KG	0	0%			0	16						
Acetone	UG/KG	0	0%	500,000	0	0	16						
Benzene	UG/KG	0	0%	44,000	0	0	16						
Bromodichloromethane	UG/KG	0	0%			0	16						
Bromoform	UG/KG	0	0%			0	16						
Carbon disulfide	UG/KG	0	0%			0	16						
Carbon tetrachloride	UG/KG	0	0%	22,000	0	0	16						
Chlorobenzene	UG/KG	0	0%	500,000	0	0	16						
Chlorodibromomethane	UG/KG	0	0%			0	16						
Chloroethane	UG/KG	0	0%			0	16						
Chloroform	UG/KG	0	0%	350,000	0	0	16						
Cis-1,3-Dichloropropene	UG/KG	0	0%			0	16						
Ethyl benzene	UG/KG	0	0%	390,000	0	0	16						
Methyl bromide	UG/KG	0	0%			0	16						
Methyl butyl ketone	UG/KG	0	0%			0	16						
Methyl chloride	UG/KG	0	0%			0	16						
Methyl ethyl ketone	UG/KG	0	0%	500,000	0	0	16						
Methyl isobutyl ketone	UG/KG	0	0%			0	16						
Methylene chloride	UG/KG	0	0%	500,000	0	0	16						
Styrene	UG/KG	0	0%			0	16						
Tetrachloroethene	UG/KG	19	38%	150,000	0	6	16						
Toluene	UG/KG	0	0%	500,000	0	0	16						
Total Xylenes	UG/KG	0	0%	500,000	0	0	16						
Trans-1,3-Dichloropropene	UG/KG	0	0%			0	16						
Trichloroethene	UG/KG	0	0%	200,000	0	0	16						
Vinyl chloride	UG/KG	0	0%	13,000	0	0	16						
Semivolatile Organic Compounds													
1,2,4-Trichlorobenzene	UG/KG	0	0%			0	35				93 U		98 U
1,2-Dichlorobenzene	UG/KG	0	0%	500,000	0	0	35				100 U		100 U
1,3-Dichlorobenzene	UG/KG	0	0%	280,000	0	0	35				89 U		94 U
1,4-Dichlorobenzene	UG/KG	0	0%	130,000	0	0	35				98 U		100 U
2,2'-oxybis(1-Chloropropane)	UG/KG	0	0%			0	16						
2,4,5-Trichlorophenol	UG/KG	0	0%			0	35				180 U		190 U
2,4,6-Trichlorophenol	UG/KG	0	0%			0	35				180 U		190 U
2,4-Dichlorophenol	UG/KG	0	0%			0	35				170 U		180 U
2,4-Dimethylphenol	UG/KG	0	0%			0	35				190 U		200 U
2,4-Dinitrophenol	UG/KG	0	0%			0	35				430 U		450 U
2,4-Dinitrotoluene	UG/KG	14,000	37%			13	35				97 U		100 U
2,6-Dinitrotoluene	UG/KG	700	6%			2	35				90 U		95 U
2-Chloronaphthalene	UG/KG	0	0%			0	35				100 U		100 U
2-Chlorophenol	UG/KG	0	0%			0	35				190 U		200 U
2-Methylnaphthalene	UG/KG	0	0%			0	35				100 U		110 U
2-Methylphenol	UG/KG	0	0%	500,000	0	0	35				230 U		240 U
2-Nitroaniline	UG/KG	0	0%			0	35				86 U		90 U
2-Nitrophenol	UG/KG	0	0%			0	35				190 U		200 U
3 or 4-Methylphenol	UG/KG	0	0%			0	19				210 U		220 U
3,3'-Dichlorobenzidine	UG/KG	0	0%			0	35				130 U		140 U
3-Nitroaniline	UG/KG	0	0%			0	35				110 U		110 U
4,6-Dinitro-2-methylphenol	UG/KG	0	0%			0	35				390 U		400 U
4-Bromophenyl phenyl ether	UG/KG	0	0%			0	35				97 U		100 U
4-Chloro-3-methylphenol	UG/KG	0	0%			0	35				190 U		200 U
4-Chloroaniline	UG/KG	0	0%			0	35				140 U		140 U
4-Chlorophenyl phenyl ether	UG/KG	0	0%			0	35				89 U		94 U
4-Methylphenol	UG/KG	0	0%	500,000	0	0	16						
4-Nitroaniline	UG/KG	0	0%			0	35				150 U		160 U
4-Nitrophenol	UG/KG	0	0%			0	35				350 U		370 U
Acenaphthene	UG/KG	0	0%	500,000	0	0	35				74 U		78 U
Acenaphthylene	UG/KG	30	9%	500,000	0	3	35				80 U		84 U
Anthracene	UG/KG	18	6%	500,000	0	2	35				96 U		100 U
Benzo(a)anthracene	UG/KG	50	23%	5,600	0	8	35				98 U		100 U
Benzo(a)pyrene	UG/KG	82	23%	1,000	0	8	35				110 U		110 U
Benzo(b)fluoranthene	UG/KG	55	26%	5,600	0	9	35				150 U		160 U
Benzo(ghi)perylene	UG/KG	66	20%	500,000	0	7	35				120 UJ		120 UJ
Benzo(k)fluoranthene	UG/KG	58	20%	56,000	0	7	35				95 U		100 U

Table A-1
Analytical Data for Surface and Subsurface Soil Samples at OD Grounds
Feasibility Studies - OD Grounds
Seneca Army Depot

Area								SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45
Loc ID								S45-ODH-20-01	S45-ODH-2-01	S45-ODH-3-01	S45-ODH-4-01	S45-ODH-5-01	S45-ODH-6-01
Sample ID								S45-ODH-20-01	S45-ODH-2-01	S45-ODH-3-01	S45-ODH-4-01	S45-ODH-5-01	S45-ODH-6-01
Matrix								SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Depth Interval (FT)								0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6
Sample Date								3/12/2010	3/12/2010	3/12/2010	3/12/2010	3/12/2010	3/12/2010
QC Type								SA	SA	SA	SA	SA	SA
Study ID								OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest
Parameter	Unit	Maximum Value	Frequency of Detection	Criteria Value	Number of Exceedances	Number of Times Detected	Number of Samples Analyzed	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual
Bis(2-Chloroethoxy)methane	UG/KG	0	0%			0	35				110 U		120 U
Bis(2-Chloroethyl)ether	UG/KG	0	0%			0	35				93 U		98 U
Bis(2-Chloroisopropyl)ether	UG/KG	0	0%			0	19				100 U		110 U
Bis(2-Ethylhexyl)phthalate	UG/KG	740	26%			9	35				110 U		120 U
Butylbenzylphthalate	UG/KG	0	0%			0	35				110 U		110 U
Carbazole	UG/KG	0	0%			0	35				130 U		130 U
Chrysene	UG/KG	130	34%	56,000	0	12	35				110 U		110 U
Dibenz(a,h)anthracene	UG/KG	0	0%	560	0	0	35				150 U		150 U
Dibenzofuran	UG/KG	0	0%	350,000	0	0	35				90 U		95 U
Diethyl phthalate	UG/KG	35	3%			1	35				92 U		96 U
Dimethylphthalate	UG/KG	0	0%			0	35				89 U		94 U
Di-n-butylphthalate	UG/KG	6,800	34%			12	35				120 U		120 U
Di-n-octylphthalate	UG/KG	0	0%			0	35				240 U		250 U
Fluoranthene	UG/KG	68	31%	500,000	0	11	35				120 U		130 U
Fluorene	UG/KG	0	0%	500,000	0	0	35				93 U		98 U
Hexachlorobenzene	UG/KG	110	31%	6,000	0	11	35				94 U		99 U
Hexachlorobutadiene	UG/KG	0	0%			0	35				95 U		100 U
Hexachlorocyclopentadiene	UG/KG	0	0%			0	35				94 U		99 U
Hexachloroethane	UG/KG	1,100	17%			6	35				110 U		120 U
Indeno(1,2,3-cd)pyrene	UG/KG	52	11%	5,600	0	4	35				140 U		150 U
Isophorone	UG/KG	0	0%			0	35				86 U		90 U
Naphthalene	UG/KG	30	14%	500,000	0	5	35				100 U		100 U
Nitrobenzene	UG/KG	0	0%			0	35				100 U		110 U
N-Nitrosodiphenylamine	UG/KG	320	6%			2	35				250 U		260 U
N-Nitrosodipropylamine	UG/KG	1,600	14%			5	35				95 U		100 U
Pentachlorophenol	UG/KG	0	0%	6,700	0	0	35				270 UJ		280 UJ
Phenanthrene	UG/KG	46	26%	500,000	0	9	35				95 U		100 U
Phenol	UG/KG	0	0%	500,000	0	0	35				180 U		190 U
Pyrene	UG/KG	110	34%	500,000	0	12	35				120 U		120 U
Herbicides													
2,4,5-T	UG/KG	0	0%			0	35				17 U		19 U
2,4,5-TP/Silvex	UG/KG	0	0%	500,000	0	0	35				13 U		15 U
2,4-D	UG/KG	0	0%			0	35				34 U		38 U
2,4-DB	UG/KG	0	0%			0	35				25 U		28 U
Dalapon	UG/KG	0	0%			0	35				8.7 U		9.7 U
Dicamba	UG/KG	0	0%			0	35				12 U		13 U
Dichloroprop	UG/KG	0	0%			0	35				20 U		22 U
Dinoseb	UG/KG	0	0%			0	35				2.7 U		3 U
MCPA	UG/KG	9,400	6%			2	35				2,400 U		2,700 U
MCPP	UG/KG	0	0%			0	35				2,300 U		2,600 U
Explosives													
1,3,5-Trinitrobenzene	UG/KG	190	60%			28	47	100 U	79 JN	49 JN	62 JN	57 JN	46 J
1,3-Dinitrobenzene	UG/KG	0	0%			0	47	6.5 U	6 U	6.1 U	7.5 U	6.8 U	7.2 U
2,4,6-Trinitrotoluene	UG/KG	1,400	81%			38	47	51 J	29 JN	36 JN	45 JN	40 JN	39 JN
2,4-Dinitrotoluene	UG/KG	1,100	77%			36	47	220	99	120	83 J	100 J	64 J
2,6-Dinitrotoluene	UG/KG	0	0%			0	47	28 U	26 U	26 U	33 U	29 U	31 U
2-amino-4,6-Dinitrotoluene	UG/KG	680	77%			36	47	130 J	130 J	140	160 J	160 J	99 J
2-Nitrotoluene	UG/KG	0	0%			0	31	13 U	12 U	12 U	14 U	13 U	14 U
3,5-Dinitroaniline	UG/KG	0	0%			0	31	3.7 U	3.4 U	3.5 U	4.3 U	3.8 U	4.1 U
3-Nitrotoluene	UG/KG	0	0%			0	31	8.3 U	7.7 UJ	7.8 UJ	9.6 UJ	8.6 UJ	9.1 UJ
4-amino-2,6-Dinitrotoluene	UG/KG	500	57%			27	47	120	130	140	150 J	160 J	94 J
4-Nitrotoluene	UG/KG	0	0%			0	31	28 U	26 U	26 U	33 U	29 U	31 U
HMX	UG/KG	470	68%			32	47	68 JN	100 J	120 J	110 JN	120 J	120 U
Nitrobenzene	UG/KG	0	0%			0	31	23 U	21 U	22 U	27 U	24 U	25 U
Nitroglycerine	UG/KG	1,500	3%			1	31	130 U	120 U	120 U	150 U	140 U	140 U
Pentaerythritol Tetranitrate	UG/KG	0	0%			0	31	250 U	230 U	240 U	290 U	260 U	280 U
RDX	UG/KG	5,800	83%			39	47	140	180	220	210	210	120 J
Tetryl	UG/KG	330	9%			4	47	5.7 U	5.3 U	5.3 U	6.6 U	5.9 U	6.2 U

Analytical Data for Surface and ... :e Soil Samples at OD Grounds
Feasibility St... OD Grounds
Seneca Army Depot

Parameter	Unit	Maximum Value	Frequency of Detection	Criteria Value	Number of Exceedances	Number of Times Detected	Number of Samples Analyzed	SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45
Loc ID								S45-ODH-20-01	S45-ODH-2-01	S45-ODH-3-01	S45-ODH-4-01	S45-ODH-5-01	S45-ODH-6-01
Sample ID								S45-ODH-20-01	S45-ODH-2-01	S45-ODH-3-01	S45-ODH-4-01	S45-ODH-5-01	S45-ODH-6-01
Matrix								SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Depth Interval (FT)								0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6
Sample Date								3/12/2010	3/12/2010	3/12/2010	3/12/2010	3/12/2010	3/12/2010
QC Type								SA	SA	SA	SA	SA	SA
Study ID								OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest
								Value Qual	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual
Pesticides/PCBs													
Aroclor-1016	UG/KG	0	0%	1,000	0	0	34				6.6 U		7.2 U
Aroclor-1221	UG/KG	0	0%	1,000	0	0	34				15 U		17 U
Aroclor-1232	UG/KG	0	0%	1,000	0	0	34				10 U		11 U
Aroclor-1242	UG/KG	0	0%	1,000	0	0	34				6.4 U		7 U
Aroclor-1248	UG/KG	0	0%	1,000	0	0	34				6.8 U		7.3 U
Aroclor-1254	UG/KG	2,000	6%	1,000	1	2	34				**2,000**		5.6 U
Aroclor-1260	UG/KG	0	0%	1,000	0	0	34				6.6 U		7.2 U
4,4'-DDD	UG/KG	2.4	6%	92,000	0	2	34				0.22 U		0.24 U
4,4'-DDE	UG/KG	4.2	63%	62,000	0	22	35				0.21 U		0.89 J
4,4'-DDT	UG/KG	3.4	50%	47,000	0	17	34				0.34 U		0.88 J
Aldrin	UG/KG	0	0%	680	0	0	34				0.31 U		0.34 U
Alpha-BHC	UG/KG	0	0%	3,400	0	0	34				0.38 U		0.41 U
Alpha-Chlordane	UG/KG	2	12%	24,000	0	4	34				0.23 U		0.25 U
Beta-BHC	UG/KG	0	0%	3,000	0	0	34				0.36 U		0.4 U
Delta-BHC	UG/KG	0	0%	500,000	0	0	34				0.35 U		0.38 U
Dieldrin	UG/KG	3.2	41%	1,400	0	14	34				0.24 U		0.84 J
Endosulfan I	UG/KG	55	60%	200,000	0	21	35				0.26 UJ		0.79 J
Endosulfan II	UG/KG	0.88	3%	200,000	0	1	34				0.38 UJ		0.41 UJ
Endosulfan sulfate	UG/KG	0	0%	200,000	0	0	34				0.64 U		0.7 U
Endrin	UG/KG	3.6	3%	89,000	0	1	34				0.94 U		1 U
Endrin aldehyde	UG/KG	0	0%			0	34				0.54 U		0.59 U
Endrin ketone	UG/KG	0.58	3%			1	34				0.44 U		0.48 U
Gamma-BHC/Lindane	UG/KG	0	0%	9,200	0	0	34				0.3 U		0.32 U
Gamma-Chlordane	UG/KG	1.1	9%			3	34				0.25 U		0.28 U
Heptachlor	UG/KG	0	0%	15,000	0	0	34				0.32 U		0.35 U
Heptachlor epoxide	UG/KG	0	0%			0	34				0.24 U		0.26 U
Methoxychlor	UG/KG	45	3%			1	34				45		0.6 U
Toxaphene	UG/KG	0	0%			0	34				7.7 U		8.4 U
Inorganics													
Aluminum	MG/KG	27,900	100%			97	97	18,000	17,500	17,200	15,000	19,400	18,000
Antimony	MG/KG	5.1	33%			32	97	1.3 UJ	0.19 UJ	0.2 UJ	0.47 UJ	0.2 UJ	0.19 UJ
Arsenic	MG/KG	12.6	100%	16	0	97	97	5.3 J	12.4 J	11 J	12.6 J	5.6 J	4.6 J
Barium	MG/KG	365	100%	400	0	97	97	150	190	179	220	194	163
Beryllium	MG/KG	1.2	98%	590	0	95	97	0.79	0.78	0.77	0.67	0.86	0.8
Cadmium	MG/KG	1,100	81%	9.3	11	77	95	7.4	8.7	8.6	**1,100**	7.5	6.9
Calcium	MG/KG	193,000	99%			96	97	22,900	26,600	43,900	23,200	23,400	25,500
Chromium	MG/KG	446	100%	1,500	0	97	97	30	29.9	29.8	37.8	29.7	28
Cobalt	MG/KG	26.8	100%			97	97	12.7	12	12.9	14	12.3	11.9
Copper	MG/KG	7,310	100%	270	52	97	97	**434**	[illegible]	**477**	[illegible]	**411**	[illegible]
Cyanide	MG/KG	0.7	13%	27	0	2	16						
Iron	MG/KG	118,000	100%			97	97	27,900	34,200	29,600	118,000	27,200	24,700
Lead	MG/KG	998	100%	1,000	0	97	97	50.8	56.3	59.9	57.2	61.9	217
Magnesium	MG/KG	15,000	100%			97	97	7,310	6,720	6,410	5,680	7,010	7,190
Mangenese	MG/KG	5,040	100%	10,000	0	97	97	580	610	642	648	618	582
Nickel	MG/KG	59.3	100%	310	0	92	92	41.3	41.2	39.5	46.2	41.2	37
Potassium	MG/KG	4,880	100%			76	76	2,580 R	2,850 R	2,850 R	2,160 R	3,410 R	3,190 R
Selenium	MG/KG	0.92	4%	1,500	0	4	97	0.35 U	0.42 U	0.45 U	1.03 U	0.44 U	0.41 U
Silver	MG/KG	205	68%	1,500	0	66	97	3.8	3.4	4	205	3.2	2.8 U
Sodium	MG/KG	213	84%			81	97	107 J	110 J	110 J	103 J	116 J	121 J
Thallium	MG/KG	0.27	6%			6	97	0.15 U	0.18 U	0.19 U	0.44 U	0.19 U	0.17 U
Vanadium	MG/KG	41.9	100%			97	97	28.7	28.5	28.7	24.4	31.7	29.4
Zinc	MG/KG	1,470	100%	10,000	0	92	92	299	327	368	1,270	337	319
Mercury	MG/KG	9.1	99%	2.8	49	96	97	**3.5**	[illegible]	**4.3**	[illegible]	[illegible]	**3.6**

Notes:
1) Chemical result qualifiers are assigned by the laboratory and are evaluated and modified (if necessary) by during data validation.
U = non-detect, i.e. not detected equal to or above this value. J = estimated (detect or non-detect) value.
[blank] = detect, i.e. detected chemical result value. R = Rejected, data validation rejected the results.
2) Num of Analyses is the number of detected and non-detected results excluding rejected results. Sample duplicate pairs have not been averaged.
3) Chemical results greater than the action level are highlighted, bolded and boxed
4) Criteria action level source document and web address.
- The NYS SCO Commercial Use values were obtained from the NYSDEC Soil Cleanup Objectives.
http://www.dec.ny.gov/regs/15507.html

Table A-1
Analytical Data for Surface and Subsurface Soil Samples at OD Grounds
Feasibility Studies - OD Grounds
Seneca Army Depot

Parameter	Unit	Maximum Value	Frequency of Detection	Criteria Value	Number of Exceedances	Number of Times Detected	Number of Samples Analyzed	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual
Area								SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45
Loc ID								S45-ODH-7-01	S45-ODH-8-01	S45-ODH-9-01	S45-R10-01	S45-R10-02	S45-R10-03
Sample ID								S45-ODH-7-01	S45-ODH-8-01	S45-ODH-9-01	S45-R10-01	S45-R10-02	S45-R10-03
Matrix								SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Depth Interval (FT)								0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6
Sample Date								3/12/2010	3/12/2010	3/12/2010	3/16/2010	3/16/2010	3/16/2010
QC Type								SA	SA	SA	SA	SA	SA
Study ID								OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest
Volatile Organic Compounds													
1,1,1-Trichloroethane	UG/KG	0	0%	500,000	0	0	16						
1,1,2,2-Tetrachloroethane	UG/KG	0	0%			0	16						
1,1,2-Trichloroethane	UG/KG	0	0%			0	16						
1,1-Dichloroethane	UG/KG	0	0%	240,000	0	0	16						
1,1-Dichloroethene	UG/KG	0	0%	500,000	0	0	16						
1,2-Dichloroethane	UG/KG	0	0%	30,000	0	0	16						
1,2-Dichloroethene (total)	UG/KG	0	0%	500,000	0	0	16						
1,2-Dichloropropane	UG/KG	0	0%			0	16						
Acetone	UG/KG	0	0%	500,000	0	0	16						
Benzene	UG/KG	0	0%	44,000	0	0	16						
Bromodichloromethane	UG/KG	0	0%			0	16						
Bromoform	UG/KG	0	0%			0	16						
Carbon disulfide	UG/KG	0	0%			0	16						
Carbon tetrachloride	UG/KG	0	0%	22,000	0	0	16						
Chlorobenzene	UG/KG	0	0%	500,000	0	0	16						
Chlorodibromomethane	UG/KG	0	0%			0	16						
Chloroethane	UG/KG	0	0%			0	16						
Chloroform	UG/KG	0	0%	350,000	0	0	16						
Cis-1,3-Dichloropropene	UG/KG	0	0%			0	16						
Ethyl benzene	UG/KG	0	0%	390,000	0	0	16						
Methyl bromide	UG/KG	0	0%			0	16						
Methyl butyl ketone	UG/KG	0	0%			0	16						
Methyl chloride	UG/KG	0	0%			0	16						
Methyl ethyl ketone	UG/KG	0	0%	500,000	0	0	16						
Methyl isobutyl ketone	UG/KG	0	0%			0	16						
Methylene chloride	UG/KG	0	0%	500,000	0	0	16						
Styrene	UG/KG	0	0%			0	16						
Tetrachloroethene	UG/KG	19	38%	150,000	0	6	16						
Toluene	UG/KG	0	0%	500,000	0	0	16						
Total Xylenes	UG/KG	0	0%	500,000	0	0	16						
Trans-1,3-Dichloropropene	UG/KG	0	0%			0	16						
Trichloroethene	UG/KG	0	0%	200,000	0	0	16						
Vinyl chloride	UG/KG	0	0%	13,000	0	0	16						
Semivolatile Organic Compounds													
1,2,4-Trichlorobenzene	UG/KG	0	0%			0	35		93 U				
1,2-Dichlorobenzene	UG/KG	0	0%	500,000	0	0	35		100 U				
1,3-Dichlorobenzene	UG/KG	0	0%	280,000	0	0	35		89 U				
1,4-Dichlorobenzene	UG/KG	0	0%	130,000	0	0	35		98 U				
2,2'-oxybis(1-Chloropropane)	UG/KG	0	0%			0	16						
2,4,5-Trichlorophenol	UG/KG	0	0%			0	35		180 U				
2,4,6-Trichlorophenol	UG/KG	0	0%			0	35		180 U				
2,4-Dichlorophenol	UG/KG	0	0%			0	35		170 U				
2,4-Dimethylphenol	UG/KG	0	0%			0	35		190 U				
2,4-Dinitrophenol	UG/KG	0	0%			0	35		430 U				
2,4-Dinitrotoluene	UG/KG	14,000	37%			13	35		97 U				
2,6-Dinitrotoluene	UG/KG	700	6%			2	35		90 U				
2-Chloronaphthalene	UG/KG	0	0%			0	35		99 U				
2-Chlorophenol	UG/KG	0	0%			0	35		190 U				
2-Methylnaphthalene	UG/KG	0	0%			0	35		100 U				
2-Methylphenol	UG/KG	0	0%	500,000	0	0	35		230 U				
2-Nitroaniline	UG/KG	0	0%			0	35		86 U				
2-Nitrophenol	UG/KG	0	0%			0	35		190 U				
3 or 4-Methylphenol	UG/KG	0	0%			0	19		210 U				
3,3'-Dichlorobenzidine	UG/KG	0	0%			0	35		130 U				
3-Nitroaniline	UG/KG	0	0%			0	35		110 U				
4,6-Dinitro-2-methylphenol	UG/KG	0	0%			0	35		380 U				
4-Bromophenyl phenyl ether	UG/KG	0	0%			0	35		97 U				
4-Chloro-3-methylphenol	UG/KG	0	0%			0	35		190 U				
4-Chloroaniline	UG/KG	0	0%			0	35		140 U				
4-Chlorophenyl phenyl ether	UG/KG	0	0%			0	35		89 U				
4-Methylphenol	UG/KG	0	0%	500,000	0	0	16						
4-Nitroaniline	UG/KG	0	0%			0	35		150 U				
4-Nitrophenol	UG/KG	0	0%			0	35		350 U				
Acenaphthene	UG/KG	0	0%	500,000	0	0	35		74 U				
Acenaphthylene	UG/KG	30	9%	500,000	0	3	35		80 U				
Anthracene	UG/KG	18	6%	500,000	0	2	35		96 U				
Benzo(a)anthracene	UG/KG	50	23%	5,600	0	8	35		98 U				
Benzo(a)pyrene	UG/KG	82	23%	1,000	0	8	35		110 U				
Benzo(b)fluoranthene	UG/KG	55	26%	5,600	0	9	35		150 U				
Benzo(ghi)perylene	UG/KG	66	20%	500,000	0	7	35		120 UJ				
Benzo(k)fluoranthene	UG/KG	58	20%	56,000	0	7	35		95 U				

Analytical Data for Surface and .e Soil Samples at OD Grounds
Feasibility St OD Grounds
Seneca Army Depot

Parameter	Unit	Maximum Value	Frequency of Detection	Criteria Value	Number of Exceedances	Number of Times Detected	Number of Samples Analyzed	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual
Area								SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45
Loc ID								S45-ODH-7-01	S45-ODH-8-01	S45-ODH-9-01	S45-R10-01	S45-R10-02	S45-R10-03
Sample ID								S45-ODH-7-01	S45-ODH-8-01	S45-ODH-9-01	S45-R10-01	S45-R10-02	S45-R10-03
Matrix								SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Depth Interval (FT)								0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6
Sample Date								3/12/2010	3/12/2010	3/12/2010	3/16/2010	3/16/2010	3/16/2010
QC Type								SA	SA	SA	SA	SA	SA
Study ID								OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest
Bis(2-Chloroethoxy)methane	UG/KG	0	0%			0	35		110 U				
Bis(2-Chloroethyl)ether	UG/KG	0	0%			0	35		93 U				
Bis(2-Chloroisopropyl)ether	UG/KG	0	0%			0	19		100 U				
Bis(2-Ethylhexyl)phthalate	UG/KG	740	26%			9	35		110 U				
Butylbenzylphthalate	UG/KG	0	0%			0	35		110 U				
Carbazole	UG/KG	0	0%			0	35		130 U				
Chrysene	UG/KG	130	34%	56,000	0	12	35		130 J				
Dibenz(a,h)anthracene	UG/KG	0	0%	560	0	0	35		150 U				
Dibenzofuran	UG/KG	0	0%	350,000	0	0	35		90 U				
Diethyl phthalate	UG/KG	35	3%			1	35		91 U				
Dimethylphthalate	UG/KG	0	0%			0	35		89 U				
Di-n-butylphthalate	UG/KG	6,800	34%			12	35		120 U				
Di-n-octylphthalate	UG/KG	0	0%			0	35		240 U				
Fluoranthene	UG/KG	68	31%	500,000	0	11	35		120 U				
Fluorene	UG/KG	0	0%	500,000	0	0	35		93 U				
Hexachlorobenzene	UG/KG	110	31%	6,000	0	11	35		94 U				
Hexachlorobutadiene	UG/KG	0	0%			0	35		95 U				
Hexachlorocyclopentadiene	UG/KG	0	0%			0	35		94 U				
Hexachloroethane	UG/KG	1,100	17%			6	35		110 U				
Indeno(1,2,3-cd)pyrene	UG/KG	52	11%	5,600	0	4	35		140 U				
Isophorone	UG/KG	0	0%			0	35		86 U				
Naphthalene	UG/KG	30	14%	500,000	0	5	35		99 U				
Nitrobenzene	UG/KG	0	0%			0	35		100 U				
N-Nitrosodiphenylamine	UG/KG	320	6%			2	35		250 U				
N-Nitrosodipropylamine	UG/KG	1,600	14%			5	35		95 U				
Pentachlorophenol	UG/KG	0	0%	6,700	0	0	35		270 UJ				
Phenanthrene	UG/KG	46	26%	500,000	0	9	35		95 U				
Phenol	UG/KG	0	0%	500,000	0	0	35		180 U				
Pyrene	UG/KG	110	34%	500,000	0	12	35		120 U				
Herbicides													
2,4,5-T	UG/KG	0	0%			0	35		17 U				
2,4,5-TP/Silvex	UG/KG	0	0%	500,000	0	0	35		14 U				
2,4-D	UG/KG	0	0%			0	35		35 U				
2,4-DB	UG/KG	0	0%			0	35		25 U				
Dalapon	UG/KG	0	0%			0	35		9 U				
Dicamba	UG/KG	0	0%			0	35		12 U				
Dichloroprop	UG/KG	0	0%			0	35		20 U				
Dinoseb	UG/KG	0	0%			0	35		2.8 UJ				
MCPA	UG/KG	9,400	6%			2	35		2,500 U				
MCPP	UG/KG	0	0%			0	35		2,400 U				
Explosives													
1,3,5-Trinitrobenzene	UG/KG	190	60%			28	47	65 JN	60 JN	68 J			
1,3-Dinitrobenzene	UG/KG	0	0%			0	47	7.7 U	5.7 U	7.1 U			
2,4,6-Trinitrotoluene	UG/KG	1,400	81%			38	47	49 JN	51 J	47 J			
2,4-Dinitrotoluene	UG/KG	1,100	77%			36	47	91 J	86 J	110 J			
2,6-Dinitrotoluene	UG/KG	0	0%			0	47	34 U	25 U	31 U			
2-amino-4,6-Dinitrotoluene	UG/KG	680	77%			36	47	190 J	180	220			
2-Nitrotoluene	UG/KG	0	0%			0	31	15 U	11 U	14 U			
3,5-Dinitroaniline	UG/KG	0	0%			0	31	4.4 U	3.2 U	4 U			
3-Nitrotoluene	UG/KG	0	0%			0	31	9.8 UJ	7.2 UJ	9 UJ			
4-amino-2,6-Dinitrotoluene	UG/KG	500	57%			27	47	160 J	160	220			
4-Nitrotoluene	UG/KG	0	0%			0	31	34 U	25 U	31 U			
HMX	UG/KG	470	68%			32	47	150 J	150	190			
Nitrobenzene	UG/KG	0	0%			0	31	27 U	20 U	25 U			
Nitroglycerine	UG/KG	1,500	3%			1	31	150 U	110 U	140 U			
Pentaerythritol Tetranitrate	UG/KG	0	0%			0	31	300 U	220 U	270 U			
RDX	UG/KG	5,800	83%			39	47	310	340	420			
Tetryl	UG/KG	330	9%			4	47	6.7 U	5 U	6.2 U			

Table A-1
Analytical Data for Surface and Subsurface Soil Samples at OD Grounds
Feasibility Studies - OD Grounds
Seneca Army Depot

Parameter	Unit	Maximum Value	Frequency of Detection	Criteria Value	Number of Exceedances	Number of Times Detected	Number of Samples Analyzed	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual
Area								SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45
Loc ID								S45-ODH-7-01	S45-ODH-8-01	S45-ODH-9-01	S45-R10-01	S45-R10-02	S45-R10-03
Sample ID								S45-ODH-7-01	S45-ODH-8-01	S45-ODH-9-01	S45-R10-01	S45-R10-02	S45-R10-03
Matrix								SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Depth Interval (FT)								0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6
Sample Date								3/12/2010	3/12/2010	3/12/2010	3/16/2010	3/16/2010	3/16/2010
QC Type								SA	SA	SA	SA	SA	SA
Study ID								OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest
Pesticides/PCBs													
Aroclor-1016	UG/KG	0	0%	1,000	0	0	34		7 U				
Aroclor-1221	UG/KG	0	0%	1,000	0	0	34		16 U				
Aroclor-1232	UG/KG	0	0%	1,000	0	0	34		11 U				
Aroclor-1242	UG/KG	0	0%	1,000	0	0	34		6.8 U				
Aroclor-1248	UG/KG	0	0%	1,000	0	0	34		7.2 U				
Aroclor-1254	UG/KG	2,000	6%	1,000	1	2	34		5.5 U				
Aroclor-1260	UG/KG	0	0%	1,000	0	0	34		7 U				
4,4'-DDD	UG/KG	2.4	6%	92,000	0	2	34		0.23 U				
4,4'-DDE	UG/KG	4.2	63%	62,000	0	22	35		1.1 J				
4,4'-DDT	UG/KG	3.4	50%	47,000	0	17	34		1.1 J				
Aldrin	UG/KG	0	0%	680	0	0	34		0.33 U				
Alpha-BHC	UG/KG	0	0%	3,400	0	0	34		0.4 U				
Alpha-Chlordane	UG/KG	2	12%	24,000	0	4	34		0.25 U				
Beta-BHC	UG/KG	0	0%	3,000	0	0	34		0.39 U				
Delta-BHC	UG/KG	0	0%	500,000	0	0	34		0.38 U				
Dieldrin	UG/KG	3.2	41%	1,400	0	14	34		0.87 J				
Endosulfan I	UG/KG	55	60%	200,000	0	21	35		1 J				
Endosulfan II	UG/KG	0.88	3%	200,000	0	1	34		0.4 UJ				
Endosulfan sulfate	UG/KG	0	0%	200,000	0	0	34		0.68 U				
Endrin	UG/KG	3.6	3%	89,000	0	1	34		1 U				
Endrin aldehyde	UG/KG	0	0%			0	34		0.57 U				
Endrin ketone	UG/KG	0.58	3%			1	34		0.47 U				
Gamma-BHC/Lindane	UG/KG	0	0%	9,200	0	0	34		0.32 U				
Gamma-Chlordane	UG/KG	1.1	9%			3	34		0.27 U				
Heptachlor	UG/KG	0	0%	15,000	0	0	34		0.34 U				
Heptachlor epoxide	UG/KG	0	0%			0	34		0.26 U				
Methoxychlor	UG/KG	45	3%			1	34		0.59 U				
Toxaphene	UG/KG	0	0%			0	34		8.2 U				
Inorganics													
Aluminum	MG/KG	27,900	100%			97	97	22,200	17,700	20,300	20,700	22,100	18,100
Antimony	MG/KG	5.1	33%			32	97	0.28 J	0.2 UJ	0.22 UJ	0.12 UJ	0.13 UJ	0.88 J
Arsenic	MG/KG	12.6	100%	16	0	97	97	4.8 J	4.9 J	5.5 J	5.3	5.1	5.1
Barium	MG/KG	365	100%	400	0	97	97	174	187	266	141 J	109 J	167 J
Beryllium	MG/KG	1.2	98%	590	0	95	97	0.82	0.81	0.88	0.87 J	0.88 J	0.8 J
Cadmium	MG/KG	1,100	81%	9.3	11	77	95	8	8.9	8	1 J	1.3 U	1.8
Calcium	MG/KG	193,000	99%			96	97	24,500	23,300	22,800	3,790 J	2,750 J	27,800 J
Chromium	MG/KG	446	100%	1,500	0	97	97	40.8	30.9	30.8	24.1 J	29.6 J	31.4 J
Cobalt	MG/KG	26.8	100%			97	97	10.6	14	12.4	8.9 J	9.9 J	12.4 J
Copper	MG/KG	7,310	100%	270	52	97	97	**648**	**442**	**490**	32.8	47.2 J	92.6 J
Cyanide	MG/KG	0.7	13%	27	0	2	16						
Iron	MG/KG	118,000	100%			97	97	25,900	28,000	27,700	22,500 J	24,900 J	28,300 J
Lead	MG/KG	998	100%	1,000	0	97	97	59.3	61.2	62.5	19.4 J	46.4	123
Magnesium	MG/KG	15,000	100%			97	97	6,420	6,870	7,090	4,320 J	4,480 J	7,560 J
Manganese	MG/KG	5,040	100%	10,000	0	97	97	557	710	601	682 J	256 J	437 J
Nickel	MG/KG	59.3	100%	310	0	92	92	36.1	43.4	40.9	23.5 J	32.2 J	49.7 J
Potassium	MG/KG	4,880	100%			76	76	3,200 R	2,700 R	3,440 R	2,920 J	3,400 J	2,950 J
Selenium	MG/KG	0.92	4%	1,500	0	4	97	0.23 U	0.45 U	0.73 J	0.26 U	0.28 U	0.38 U
Silver	MG/KG	205	68%	1,500	0	66	97	3.8	3.4	4	0.08 U	0.18 J	0.11 U
Sodium	MG/KG	213	84%			81	97	120 J	110 J	135 J	138	130 U	126
Thallium	MG/KG	0.27	6%			6	97	0.1 U	0.19 U	0.2 U	0.11 U	1.9 U	2.6 U
Vanadium	MG/KG	41.9	100%			97	97	28.4	27.8	32.5	33.3 J	37.8 J	26.9 J
Zinc	MG/KG	1,470	100%	10,000	0	92	92	433	356	357	85.6 J	140 J	185 J
Mercury	MG/KG	9.1	99%	2.8	49	96	97	[illegible]	[illegible]	**3.6**	0.38	0.28	0.79

Notes.

1) Chemical result qualifiers are assigned by the laboratory and are evaluated and modified (if necessary) by during data validation.

U = non-detect, i.e. not detected equal to or above this value. J = estimated (detect or non-detect) value.

[blank] = detect, i.e. detected chemical result value. R = Rejected, data validation rejected the results.

2) Num of Analyses is the number of detected and non-detected results excluding rejected results. Sample duplicate pairs have not been averaged.

3) Chemical results greater than the action level are highlighted, bolded and boxed

4) Criteria action level source document and web address.

- The NYS SCO Commercial Use values were obtained from the NYSDEC Soil Cleanup Objectives.

http://www.dec.ny.gov/regs/15507.html

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Analytical Data for Surface and ! : Soil Samples at OD Grounds

Feasibility Stu... OD Grounds

Seneca Army Depot

Parameter	Unit	Maximum Value	Frequency of Detection	Criteria Value	Number of Exceedances	Number of Times Detected	Number of Samples Analyzed	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual
Area								SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45
Loc ID								S45-R10-03	S45-R10-04	S45-R10-05	S45-R10-06	S45-R10-07	S45-R1-01
Sample ID								S45-R10-03D	S45-R10-04	S45-R10-05	S45-R10-06	S45-R10-07	S45-R1-01
Matrix								SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Depth Interval (FT)								0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6
Sample Date								3/16/2010	3/16/2010	3/16/2010	3/16/2010	3/16/2010	4/1/2010
QC Type								DU	SA	SA	SA	SA	SA
Study ID								OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest
Volatile Organic Compounds													
1,1,1-Trichloroethane	UG/KG	0	0%	500,000	0	0	16						
1,1,2,2-Tetrachloroethane	UG/KG	0	0%			0	16						
1,1,2-Trichloroethane	UG/KG	0	0%			0	16						
1,1-Dichloroethane	UG/KG	0	0%	240,000	0	0	16						
1,1-Dichloroethene	UG/KG	0	0%	500,000	0	0	16						
1,2-Dichloroethane	UG/KG	0	0%	30,000	0	0	16						
1,2-Dichloroethene (total)	UG/KG	0	0%	500,000	0	0	16						
1,2-Dichloropropane	UG/KG	0	0%			0	16						
Acetone	UG/KG	0	0%	500,000	0	0	16						
Benzene	UG/KG	0	0%	44,000	0	0	16						
Bromodichloromethane	UG/KG	0	0%			0	16						
Bromoform	UG/KG	0	0%			0	16						
Carbon disulfide	UG/KG	0	0%			0	16						
Carbon tetrachloride	UG/KG	0	0%	22,000	0	0	16						
Chlorobenzene	UG/KG	0	0%	500,000	0	0	16						
Chlorodibromomethane	UG/KG	0	0%			0	16						
Chloroethane	UG/KG	0	0%			0	16						
Chloroform	UG/KG	0	0%	350,000	0	0	16						
Cis-1,3-Dichloropropene	UG/KG	0	0%			0	16						
Ethyl benzene	UG/KG	0	0%	390,000	0	0	16						
Methyl bromide	UG/KG	0	0%			0	16						
Methyl butyl ketone	UG/KG	0	0%			0	16						
Methyl chloride	UG/KG	0	0%			0	16						
Methyl ethyl ketone	UG/KG	0	0%	500,000	0	0	16						
Methyl isobutyl ketone	UG/KG	0	0%			0	16						
Methylene chloride	UG/KG	0	0%	500,000	0	0	16						
Styrene	UG/KG	0	0%			0	16						
Tetrachloroethene	UG/KG	19	38%	150,000	0	6	16						
Toluene	UG/KG	0	0%	500,000	0	0	16						
Total Xylenes	UG/KG	0	0%	500,000	0	0	16						
Trans-1,3-Dichloropropene	UG/KG	0	0%			0	16						
Trichloroethene	UG/KG	0	0%	200,000	0	0	16						
Vinyl chloride	UG/KG	0	0%	13,000	0	0	16						
Semivolatile Organic Compounds													
1,2,4-Trichlorobenzene	UG/KG	0	0%			0	35						
1,2-Dichlorobenzene	UG/KG	0	0%	500,000	0	0	35						
1,3-Dichlorobenzene	UG/KG	0	0%	280,000	0	0	35						
1,4-Dichlorobenzene	UG/KG	0	0%	130,000	0	0	35						
2,2'-oxybis(1-Chloropropane)	UG/KG	0	0%			0	16						
2,4,5-Trichlorophenol	UG/KG	0	0%			0	35						
2,4,6-Trichlorophenol	UG/KG	0	0%			0	35						
2,4-Dichlorophenol	UG/KG	0	0%			0	35						
2,4-Dimethylphenol	UG/KG	0	0%			0	35						
2,4-Dinitrophenol	UG/KG	0	0%			0	35						
2,4-Dinitrotoluene	UG/KG	14,000	37%			13	35						
2,6-Dinitrotoluene	UG/KG	700	6%			2	35						
2-Chloronaphthalene	UG/KG	0	0%			0	35						
2-Chlorophenol	UG/KG	0	0%			0	35						
2-Methylnaphthalene	UG/KG	0	0%			0	35						
2-Methylphenol	UG/KG	0	0%	500,000	0	0	35						
2-Nitroaniline	UG/KG	0	0%			0	35						
2-Nitrophenol	UG/KG	0	0%			0	35						
3 or 4-Methylphenol	UG/KG	0	0%			0	19						
3,3'-Dichlorobenzidine	UG/KG	0	0%			0	35						
3-Nitroaniline	UG/KG	0	0%			0	35						
4,6-Dinitro-2-methylphenol	UG/KG	0	0%			0	35						
4-Bromophenyl phenyl ether	UG/KG	0	0%			0	35						
4-Chloro-3-methylphenol	UG/KG	0	0%			0	35						
4-Chloroaniline	UG/KG	0	0%			0	35						
4-Chlorophenyl phenyl ether	UG/KG	0	0%			0	35						
4-Methylphenol	UG/KG	0	0%	500,000	0	0	16						
4-Nitroaniline	UG/KG	0	0%			0	35						
4-Nitrophenol	UG/KG	0	0%			0	35						
Acenaphthene	UG/KG	0	0%	500,000	0	0	35						
Acenaphthylene	UG/KG	30	9%	500,000	0	3	35						
Anthracene	UG/KG	18	6%	500,000	0	2	35						
Benzo(a)anthracene	UG/KG	50	23%	5,600	0	8	35						
Benzo(a)pyrene	UG/KG	82	23%	1,000	0	8	35						
Benzo(b)fluoranthene	UG/KG	55	26%	5,600	0	9	35						
Benzo(ghi)perylene	UG/KG	66	20%	500,000	0	7	35						
Benzo(k)fluoranthene	UG/KG	58	20%	56,000	0	7	35						

Table A-1
Analytical Data for Surface and Subsurface Soil Samples at OD Grounds
Feasibility Studies - OD Grounds
Seneca Army Depot

Area								SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45
Loc ID								S45-R10-03	S45-R10-04	S45-R10-05	S45-R10-06	S45-R10-07	S45-R1-01
Sample ID								S45-R10-03D	S45-R10-04	S45-R10-05	S45-R10-06	S45-R10-07	S45-R1-01
Matrix								SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Depth Interval (FT)								0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6
Sample Date								3/16/2010	3/16/2010	3/16/2010	3/16/2010	3/16/2010	4/1/2010
QC Type								DU	SA	SA	SA	SA	SA
Study ID								OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest
Parameter	Unit	Maximum Value	Frequency of Detection	Criteria Value	Number of Exceedances	Number of Times Detected	Number of Samples Analyzed	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual
Bis(2-Chloroethoxy)methane	UG/KG	0	0%			0	35						
Bis(2-Chloroethyl)ether	UG/KG	0	0%			0	35						
Bis(2-Chloroisopropyl)ether	UG/KG	0	0%			0	19						
Bis(2-Ethylhexyl)phthalate	UG/KG	740	26%			9	35						
Butylbenzylphthalate	UG/KG	0	0%			0	35						
Carbazole	UG/KG	0	0%			0	35						
Chrysene	UG/KG	130	34%	56,000	0	12	35						
Dibenz(a,h)anthracene	UG/KG	0	0%	560	0	0	35						
Dibenzofuran	UG/KG	0	0%	350,000	0	0	35						
Diethyl phthalate	UG/KG	35	3%			1	35						
Dimethylphthalate	UG/KG	0	0%			0	35						
Di-n-butylphthalate	UG/KG	6,800	34%			12	35						
Di-n-octylphthalate	UG/KG	0	0%			0	35						
Fluoranthene	UG/KG	68	31%	500,000	0	11	35						
Fluorene	UG/KG	0	0%	500,000	0	0	35						
Hexachlorobenzene	UG/KG	110	31%	6,000	0	11	35						
Hexachlorobutadiene	UG/KG	0	0%			0	35						
Hexachlorocyclopentadiene	UG/KG	0	0%			0	35						
Hexachloroethane	UG/KG	1,100	17%			6	35						
Indeno(1,2,3-cd)pyrene	UG/KG	52	11%	5,600	0	4	35						
Isophorone	UG/KG	0	0%			0	35						
Naphthalene	UG/KG	30	14%	500,000	0	5	35						
Nitrobenzene	UG/KG	0	0%			0	35						
N-Nitrosodiphenylamine	UG/KG	320	6%			2	35						
N-Nitrosodipropylamine	UG/KG	1,600	14%			5	35						
Pentachlorophenol	UG/KG	0	0%	6,700	0	0	35						
Phenanthrene	UG/KG	46	26%	500,000	0	9	35						
Phenol	UG/KG	0	0%	500,000	0	0	35						
Pyrene	UG/KG	110	34%	500,000	0	12	35						
Herbicides													
2,4,5-T	UG/KG	0	0%			0	35						
2,4,5-TP/Silvex	UG/KG	0	0%	500,000	0	0	35						
2,4-D	UG/KG	0	0%			0	35						
2,4-DB	UG/KG	0	0%			0	35						
Dalapon	UG/KG	0	0%			0	35						
Dicamba	UG/KG	0	0%			0	35						
Dichloroprop	UG/KG	0	0%			0	35						
Dinoseb	UG/KG	0	0%			0	35						
MCPA	UG/KG	9,400	6%			2	35						
MCPP	UG/KG	0	0%			0	35						
Explosives													
1,3,5-Trinitrobenzene	UG/KG	190	60%			28	47						
1,3-Dinitrobenzene	UG/KG	0	0%			0	47						
2,4,6-Trinitrotoluene	UG/KG	1,400	81%			38	47						
2,4-Dinitrotoluene	UG/KG	1,100	77%			36	47						
2,6-Dinitrotoluene	UG/KG	0	0%			0	47						
2-amino-4,6-Dinitrotoluene	UG/KG	680	77%			36	47						
2-Nitrotoluene	UG/KG	0	0%			0	31						
3,5-Dinitroaniline	UG/KG	0	0%			0	31						
3-Nitrotoluene	UG/KG	0	0%			0	31						
4-amino-2,6-Dinitrotoluene	UG/KG	500	57%			27	47						
4-Nitrotoluene	UG/KG	0	0%			0	31						
HMX	UG/KG	470	68%			32	47						
Nitrobenzene	UG/KG	0	0%			0	31						
Nitroglycerine	UG/KG	1,500	3%			1	31						
Pentaerythritol Tetranitrate	UG/KG	0	0%			0	31						
RDX	UG/KG	5,800	83%			39	47						
Tetryl	UG/KG	330	9%			4	47						

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Analytical Data for Surface and ! Soil Samples at OD Grounds

Feasibility Stu‿ ↄD Grounds

Seneca Army Depot

Parameter	Unit	Maximum Value	Frequency of Detection	Criteria Value	Number of Exceedances	Number of Times Detected	Number of Samples Analyzed						
Area								SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45
Loc ID								S45-R10-03	S45-R10-04	S45-R10-05	S45-R10-06	S45-R10-07	S45-R1-01
Sample ID								S45-R10-03D	S45-R10-04	S45-R10-05	S45-R10-06	S45-R10-07	S45-R1-01
Matrix								SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Depth Interval (FT)								0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6
Sample Date								3/16/2010	3/16/2010	3/16/2010	3/16/2010	3/16/2010	4/1/2010
QC Type								DU	SA	SA	SA	SA	SA
Study ID								OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest
								Value Qual	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual
Pesticides/PCBs													
Aroclor-1016	UG/KG	0	0%	1,000	0	0	34						
Aroclor-1221	UG/KG	0	0%	1,000	0	0	34						
Aroclor-1232	UG/KG	0	0%	1,000	0	0	34						
Aroclor-1242	UG/KG	0	0%	1,000	0	0	34						
Aroclor-1248	UG/KG	0	0%	1,000	0	0	34						
Aroclor-1254	UG/KG	2,000	6%	1,000	1	2	34						
Aroclor-1260	UG/KG	0	0%	1,000	0	0	34						
4,4'-DDD	UG/KG	2.4	6%	92,000	0	2	34						
4,4'-DDE	UG/KG	4.2	63%	62,000	0	22	35						
4,4'-DDT	UG/KG	3.4	50%	47,000	0	17	34						
Aldrin	UG/KG	0	0%	680	0	0	34						
Alpha-BHC	UG/KG	0	0%	3,400	0	0	34						
Alpha-Chlordane	UG/KG	2	12%	24,000	0	4	34						
Beta-BHC	UG/KG	0	0%	3,000	0	0	34						
Delta-BHC	UG/KG	0	0%	500,000	0	0	34						
Dieldrin	UG/KG	3.2	41%	1,400	0	14	34						
Endosulfan I	UG/KG	55	60%	200,000	0	21	35						
Endosulfan II	UG/KG	0.88	3%	200,000	0	1	34						
Endosulfan sulfate	UG/KG	0	0%	200,000	0	0	34						
Endrin	UG/KG	3.6	3%	89,000	0	1	34						
Endrin aldehyde	UG/KG	0	0%			0	34						
Endrin ketone	UG/KG	0.58	3%			1	34						
Gamma-BHC/Lindane	UG/KG	0	0%	9,200	0	0	34						
Gamma-Chlordane	UG/KG	1.1	9%			3	34						
Heptachlor	UG/KG	0	0%	15,000	0	0	34						
Heptachlor epoxide	UG/KG	0	0%			0	34						
Methoxychlor	UG/KG	45	3%			1	34						
Toxaphene	UG/KG	0	0%			0	34						
Inorganics													
Aluminum	MG/KG	27,900	100%			97	97	16,700	19,100	19,900	17,400	16,500	17,200
Antimony	MG/KG	5.1	33%			32	97	2.4	0.09 UJ	0.14 UJ	0.11 UJ	1.8 J	0.52 J
Arsenic	MG/KG	12.6	100%	16	0	97	97	5	4.8	4.6	4	4.5	5.9
Barium	MG/KG	365	100%	400	0	97	97	256 J	108 J	134 J	107 J	263 J	259
Beryllium	MG/KG	1.2	98%	590	0	95	97	0.76 J	0.77 J	0.86 J	0.68 J	0.76 J	0.75
Cadmium	MG/KG	1,100	81%	9.3	11	77	95	1.6 U	0.96 U	1.4 U	1.2 U	1.6 U	7.6
Calcium	MG/KG	193,000	99%			96	97	28,500 J	2,840 J	4,100 J	3,700 J	14,500 J	23,200
Chromium	MG/KG	446	100%	1,500	0	97	97	29.2 J	23.9 J	25.5 J	22.4 J	29.2 J	35.3
Cobalt	MG/KG	26.8	100%			97	97	12.5 J	10.5 J	9.6 J	7.7 J	12.1 J	12.2
Copper	MG/KG	7,310	100%	270	52	97	97	132	24.9 J	44.7 J	64 J	129 J	**475**
Cyanide	MG/KG	0.7	13%	27	0	2	16						
Iron	MG/KG	118,000	100%			97	97	28,800 J	21,900 J	22,700 J	20,500 J	27,500 J	31,400
Lead	MG/KG	998	100%	1,000	0	97	97	189	21.7	25.2	35.4	198	54.7
Magnesium	MG/KG	15,000	100%			97	97	6,880 J	3,630 J	4,050 J	3,650 J	6,640 J	6,460
Manganese	MG/KG	5,040	100%	10,000	0	97	97	436 J	999 J	627 J	446 J	393 J	657
Nickel	MG/KG	59.3	100%	310	0	92	92	46.9 J	21.6 J	27.1 J	21.4 J	47.4 J	43
Potassium	MG/KG	4,880	100%			76	76	2,610 J	2,580 J	3,250 J	2,320 J	2,400 J	2,590
Selenium	MG/KG	0.92	4%	1,500	0	4	97	0.34 U	0.21 U	0.3 U	0.25 U	0.92 J	1.7 U
Silver	MG/KG	205	68%	1,500	0	66	97	0.1 U	0.06 U	0.09 U	0.08 U	0.11 U	4.4
Sodium	MG/KG	213	84%			81	97	110	96 U	140 U	120 U	97.1	86 U
Thallium	MG/KG	0.27	6%			6	97	0.14 U	0.09 U	0.13 U	0.11 U	2.4 U	0.28 U
Vanadium	MG/KG	41.9	100%			97	97	25.3 J	32.4 J	33 J	29.6 J	24.5 J	28.5
Zinc	MG/KG	1,470	100%	10,000	0	92	92	298	85.7 J	130 ‿	136 J	237 J	319
Mercury	MG/KG	9.1	99%	2.8	49	96	97	1	0.17	0.45	0.71	0.38	**5.5**

Notes

1) Chemical result qualifiers are assigned by the laboratory and are evaluated and modified (if necessary) by during data validation

U = non-detect, i e not detected equal to or above this value

J = estimated (detect or non-detect) value

[blank] = detect, i e detected chemical result value

R – Rejected, data validation rejected the results

2) Num of Analyses is the number of detected and non-detected results excluding rejected results Sample duplicate pairs have not been averaged

3) Chemical results greater than the action level are highlighted, bolded and boxed

4) Criteria action level source document and web address

- The NYS SCO Commercial Use values were obtained from the NYSDEC Soil Cleanup Objectives

http://www.dec.ny.gov/regs/15507.html

Table A-1
Analytical Data for Surface and Subsurface Soil Samples at OD Grounds
Feasibility Studies - OD Grounds
Seneca Army Depot

Parameter	Unit	Maximum Value	Frequency of Detection	Criteria Value	Number of Exceedances	Number of Times Detected	Number of Samples Analyzed						
Area								SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45
Loc ID								S45-R1-02	S45-R1-03	S45-R1-04	S45-R1-04D	S45-R15-01	S45-R15-02
Sample ID								S45-R1-02	S45-R1-03	S45-R1-04	S45-R1-04D	S45-R15-01	S45-R15-02
Matrix								SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Depth Interval (FT)								0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6
Sample Date								4/1/2010	4/1/2010	4/1/2010	4/1/2010	3/15/2010	3/16/2010
QC Type								SA	SA	SA	DU	SA	SA
Study ID								OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest
								Value Qual	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual
Volatile Organic Compounds													
1,1,1-Trichloroethane	UG/KG	0	0%	500,000	0	0	16						
1,1,2,2-Tetrachloroethane	UG/KG	0	0%			0	16						
1,1,2-Trichloroethane	UG/KG	0	0%			0	16						
1,1-Dichloroethane	UG/KG	0	0%	240,000	0	0	16						
1,1-Dichloroethene	UG/KG	0	0%	500,000	0	0	16						
1,2-Dichloroethane	UG/KG	0	0%	30,000	0	0	16						
1,2-Dichloroethene (total)	UG/KG	0	0%	500,000	0	0	16						
1,2-Dichloropropane	UG/KG	0	0%			0	16						
Acetone	UG/KG	0	0%	500,000	0	0	16						
Benzene	UG/KG	0	0%	44,000	0	0	16						
Bromodichloromethane	UG/KG	0	0%			0	16						
Bromoform	UG/KG	0	0%			0	16						
Carbon disulfide	UG/KG	0	0%			0	16						
Carbon tetrachloride	UG/KG	0	0%	22,000	0	0	16						
Chlorobenzene	UG/KG	0	0%	500,000	0	0	16						
Chlorodibromomethane	UG/KG	0	0%			0	16						
Chloroethane	UG/KG	0	0%			0	16						
Chloroform	UG/KG	0	0%	350,000	0	0	16						
Cis-1,3-Dichloropropene	UG/KG	0	0%			0	16						
Ethyl benzene	UG/KG	0	0%	390,000	0	0	16						
Methyl bromide	UG/KG	0	0%			0	16						
Methyl butyl ketone	UG/KG	0	0%			0	16						
Methyl chloride	UG/KG	0	0%			0	16						
Methyl ethyl ketone	UG/KG	0	0%	500,000	0	0	16						
Methyl isobutyl ketone	UG/KG	0	0%			0	16						
Methylene chloride	UG/KG	0	0%	500,000	0	0	16						
Styrene	UG/KG	0	0%			0	16						
Tetrachloroethene	UG/KG	19	38%	150,000	0	6	16						
Toluene	UG/KG	0	0%	500,000	0	0	16						
Total Xylenes	UG/KG	0	0%	500,000	0	0	16						
Trans-1,3-Dichloropropene	UG/KG	0	0%			0	16						
Trichloroethene	UG/KG	0	0%	200,000	0	0	16						
Vinyl chloride	UG/KG	0	0%	13,000	0	0	16						
Semivolatile Organic Compounds													
1,2,4-Trichlorobenzene	UG/KG	0	0%			0	35						
1,2-Dichlorobenzene	UG/KG	0	0%	500,000	0	0	35						
1,3-Dichlorobenzene	UG/KG	0	0%	280,000	0	0	35						
1,4-Dichlorobenzene	UG/KG	0	0%	130,000	0	0	35						
2,2'-oxybis(1-Chloropropane)	UG/KG	0	0%			0	16						
2,4,5-Trichlorophenol	UG/KG	0	0%			0	35						
2,4,6-Trichlorophenol	UG/KG	0	0%			0	35						
2,4-Dichlorophenol	UG/KG	0	0%			0	35						
2,4-Dimethylphenol	UG/KG	0	0%			0	35						
2,4-Dinitrophenol	UG/KG	0	0%			0	35						
2,4-Dinitrotoluene	UG/KG	14,000	37%			13	35						
2,6-Dinitrotoluene	UG/KG	700	6%			2	35						
2-Chloronaphthalene	UG/KG	0	0%			0	35						
2-Chlorophenol	UG/KG	0	0%			0	35						
2-Methylnaphthalene	UG/KG	0	0%			0	35						
2-Methylphenol	UG/KG	0	0%	500,000	0	0	35						
2-Nitroaniline	UG/KG	0	0%			0	35						
2-Nitrophenol	UG/KG	0	0%			0	35						
3 or 4-Methylphenol	UG/KG	0	0%			0	19						
3,3'-Dichlorobenzidine	UG/KG	0	0%			0	35						
3-Nitroaniline	UG/KG	0	0%			0	35						
4,6-Dinitro-2-methylphenol	UG/KG	0	0%			0	35						
4-Bromophenyl phenyl ether	UG/KG	0	0%			0	35						
4-Chloro-3-methylphenol	UG/KG	0	0%			0	35						
4-Chloroaniline	UG/KG	0	0%			0	35						
4-Chlorophenyl phenyl ether	UG/KG	0	0%			0	35						
4-Methylphenol	UG/KG	0	0%	500,000	0	0	16						
4-Nitroaniline	UG/KG	0	0%			0	35						
4-Nitrophenol	UG/KG	0	0%			0	35						
Acenaphthene	UG/KG	0	0%	500,000	0	0	35						
Acenaphthylene	UG/KG	30	9%	500,000	0	3	35						
Anthracene	UG/KG	18	6%	500,000	0	2	35						
Benzo(a)anthracene	UG/KG	50	23%	5,600	0	8	35						
Benzo(a)pyrene	UG/KG	82	23%	1,000	0	8	35						
Benzo(b)fluoranthene	UG/KG	55	26%	5,600	0	9	35						
Benzo(ghi)perylene	UG/KG	66	20%	500,000	0	7	35						
Benzo(k)fluoranthene	UG/KG	58	20%	56,000	0	7	35						

Analytical Data for Surface and e Soil Samples at OD Grounds
Feasibility Stu OD Grounds
Seneca Army Depot

Parameter	Unit	Maximum Value	Frequency of Detection	Criteria Value	Number of Exceedances	Number of Times Detected	Number of Samples Analyzed						
Area								SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45
Loc ID								S45-R1-02	S45-R1-03	S45-R1-04	S45-R1-04D	S45-R15-01	S45-R15-02
Sample ID								S45-R1-02	S45-R1-03	S45-R1-04	S45-R1-04D	S45-R15-01	S45-R15-02
Matrix								SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Depth Interval (FT)								0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6
Sample Date								4/1/2010	4/1/2010	4/1/2010	4/1/2010	3/15/2010	3/16/2010
QC Type								SA	SA	SA	DU	SA	SA
Study ID								OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest
								Value Qual	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual
Bis(2-Chloroethoxy)methane	UG/KG	0	0%			0	35						
Bis(2-Chloroethyl)ether	UG/KG	0	0%			0	35						
Bis(2-Chloroisopropyl)ether	UG/KG	0	0%			0	19						
Bis(2-Ethylhexyl)phthalate	UG/KG	740	26%			9	35						
Butylbenzylphthalate	UG/KG	0	0%			0	35						
Carbazole	UG/KG	0	0%			0	35						
Chrysene	UG/KG	130	34%	56,000	0	12	35						
Dibenz(a,h)anthracene	UG/KG	0	0%	560	0	0	35						
Dibenzofuran	UG/KG	0	0%	350,000	0	0	35						
Diethyl phthalate	UG/KG	35	3%			1	35						
Dimethylphthalate	UG/KG	0	0%			0	35						
Di-n-butylphthalate	UG/KG	6,800	34%			12	35						
Di-n-octylphthalate	UG/KG	0	0%			0	35						
Fluoranthene	UG/KG	68	31%	500,000	0	11	35						
Fluorene	UG/KG	0	0%	500,000	0	0	35						
Hexachlorobenzene	UG/KG	110	31%	6,000	0	11	35						
Hexachlorobutadiene	UG/KG	0	0%			0	35						
Hexachlorocyclopentadiene	UG/KG	0	0%			0	35						
Hexachloroethane	UG/KG	1,100	17%			6	35						
Indeno(1,2,3-cd)pyrene	UG/KG	52	11%	5,600	0	4	35						
Isophorone	UG/KG	0	0%			0	35						
Naphthalene	UG/KG	30	14%	500,000	0	5	35						
Nitrobenzene	UG/KG	0	0%			0	35						
N-Nitrosodiphenylamine	UG/KG	320	6%			2	35						
N-Nitrosodipropylamine	UG/KG	1,600	14%			5	35						
Pentachlorophenol	UG/KG	0	0%	6,700	0	0	35						
Phenanthrene	UG/KG	46	26%	500,000	0	9	35						
Phenol	UG/KG	0	0%	500,000	0	0	35						
Pyrene	UG/KG	110	34%	500,000	0	12	35						
Herbicides													
2,4,5-T	UG/KG	0	0%			0	35						
2,4,5-TP/Silvex	UG/KG	0	0%	500,000	0	0	35						
2,4-D	UG/KG	0	0%			0	35						
2,4-DB	UG/KG	0	0%			0	35						
Dalapon	UG/KG	0	0%			0	35						
Dicamba	UG/KG	0	0%			0	35						
Dichloroprop	UG/KG	0	0%			0	35						
Dinoseb	UG/KG	0	0%			0	35						
MCPA	UG/KG	9,400	6%			2	35						
MCPP	UG/KG	0	0%			0	35						
Explosives													
1,3,5-Trinitrobenzene	UG/KG	190	60%			28	47						
1,3-Dinitrobenzene	UG/KG	0	0%			0	47						
2,4,6-Trinitrotoluene	UG/KG	1,400	81%			38	47						
2,4-Dinitrotoluene	UG/KG	1,100	77%			36	47						
2,6-Dinitrotoluene	UG/KG	0	0%			0	47						
2-amino-4,6-Dinitrotoluene	UG/KG	680	77%			36	47						
2-Nitrotoluene	UG/KG	0	0%			0	31						
3,5-Dinitroaniline	UG/KG	0	0%			0	31						
3-Nitrotoluene	UG/KG	0	0%			0	31						
4-amino-2,6-Dinitrotoluene	UG/KG	500	57%			27	47						
4-Nitrotoluene	UG/KG	0	0%			0	31						
HMX	UG/KG	470	68%			32	47						
Nitrobenzene	UG/KG	0	0%			0	31						
Nitroglycerine	UG/KG	1,500	3%			1	31						
Pentaerythritol Tetranitrate	UG/KG	0	0%			0	31						
RDX	UG/KG	5,800	83%			39	47						
Tetryl	UG/KG	330	9%			4	47						

Table A-1
Analytical Data for Surface and Subsurface Soil Samples at OD Grounds
Feasibility Studies - OD Grounds
Seneca Army Depot

Parameter	Unit	Maximum Value	Frequency of Detection	Criteria Value	Number of Exceedances	Number of Times Detected	Number of Samples Analyzed	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual
Area								SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45
Loc ID								S45-R1-02	S45-R1-03	S45-R1-04	S45-R1-04D	S45-R15-01	S45-R15-02
Sample ID								S45-R1-02	S45-R1-03	S45-R1-04	S45-R1-04D	S45-R15-01	S45-R15-02
Matrix								SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Depth Interval (FT)								0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6
Sample Date								4/1/2010	4/1/2010	4/1/2010	4/1/2010	3/15/2010	3/16/2010
QC Type								SA	SA	SA	DU	SA	SA
Study ID								OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest
Pesticides/PCBs													
Aroclor-1016	UG/KG	0	0%	1,000	0	0	34						
Aroclor-1221	UG/KG	0	0%	1,000	0	0	34						
Aroclor-1232	UG/KG	0	0%	1,000	0	0	34						
Aroclor-1242	UG/KG	0	0%	1,000	0	0	34						
Aroclor-1248	UG/KG	0	0%	1,000	0	0	34						
Aroclor-1254	UG/KG	2,000	6%	1,000	1	2	34						
Aroclor-1260	UG/KG	0	0%	1,000	0	0	34						
4,4'-DDD	UG/KG	2.4	6%	92,000	0	2	34						
4,4'-DDE	UG/KG	4.2	63%	62,000	0	22	35						
4,4'-DDT	UG/KG	3.4	50%	47,000	0	17	34						
Aldrin	UG/KG	0	0%	680	0	0	34						
Alpha-BHC	UG/KG	0	0%	3,400	0	0	34						
Alpha-Chlordane	UG/KG	2	12%	24,000	0	4	34						
Beta-BHC	UG/KG	0	0%	3,000	0	0	34						
Delta-BHC	UG/KG	0	0%	500,000	0	0	34						
Dieldrin	UG/KG	3.2	41%	1,400	0	14	34						
Endosulfan I	UG/KG	55	60%	200,000	0	21	35						
Endosulfan II	UG/KG	0.88	3%	200,000	0	1	34						
Endosulfan sulfate	UG/KG	0	0%	200,000	0	0	34						
Endrin	UG/KG	3.6	3%	89,000	0	1	34						
Endrin aldehyde	UG/KG	0	0%			0	34						
Endrin ketone	UG/KG	0.58	3%			1	34						
Gamma-BHC/Lindane	UG/KG	0	0%	9,200	0	0	34						
Gamma-Chlordane	UG/KG	1.1	9%			3	34						
Heptachlor	UG/KG	0	0%	15,000	0	0	34						
Heptachlor epoxide	UG/KG	0	0%			0	34						
Methoxychlor	UG/KG	45	3%			1	34						
Toxaphene	UG/KG	0	0%			0	34						
Inorganics													
Aluminum	MG/KG	27,900	100%			97	97	16,200	18,200	16,800	20,200	19,900	25,000
Antimony	MG/KG	5.1	33%			32	97	0.64 J	0.65 J	0.81 J	0.37 J	0.25 UJ	0.12 UJ
Arsenic	MG/KG	12.6	100%	16	0	97	97	5.1	5.5	4.9	5.5	7.6	5.4
Barium	MG/KG	365	100%	400	0	97	97	150	168	161	182	287 J	175 J
Beryllium	MG/KG	1.2	98%	590	0	95	97	0.72	0.81	0.89 U	0.85	1 J	1 J
Cadmium	MG/KG	1,100	81%	9.3	11	77	95	7.7	8.2	7.9	8.1	2.6 U	1.2 U
Calcium	MG/KG	193,000	99%			96	97	26,900	21,700	40,600 U	22,000	3,630 J	4,370 J
Chromium	MG/KG	446	100%	1,500	0	97	97	27.4	30.3	27	30.7	24.6 J	30.8 J
Cobalt	MG/KG	26.8	100%			97	97	12.3	12.7	11.4	12.2	26.8 J	10 J
Copper	MG/KG	7,310	100%	270	52	97	97	794	[illegible]	[illegible]	[illegible]	22.8 J	25.6 J
Cyanide	MG/KG	0.7	13%	27	0	2	16						
Iron	MG/KG	118,000	100%			97	97	25,200	25,800	26,700	28,100	35,300 J	26,200 J
Lead	MG/KG	998	100%	1,000	0	97	97	69.2	62.2	63.8	58	22	26.6
Magnesium	MG/KG	15,000	100%			97	97	7,910	6,520	6,890	6,920	4,080 J	4,460 J
Manganese	MG/KG	5,040	100%	10,000	0	97	97	676	664	557	561	5,040 J	552 J
Nickel	MG/KG	59.3	100%	310	0	92	92	39.6	41.8	37	40.5	29.8 J	27.1 J
Potassium	MG/KG	4,880	100%			76	76	2,450	2,690	2,600	3,370	2,780 J	3,850 J
Selenium	MG/KG	0.92	4%	1,500	0	4	97	0.7 U	0.75 U	0.7 U	0.85 U	0.56 U	0.27 U
Silver	MG/KG	205	68%	1,500	0	66	97	3.2	4	3.9	3.2 J	0.17 U	0.08 U
Sodium	MG/KG	213	84%			81	97	89 U	95.6	93.3	86.8 J	130 U	120 U
Thallium	MG/KG	0.27	6%			6	97	0.29 U	0.32 U	0.3 U	0.36 U	0.24 U	0.12 U
Vanadium	MG/KG	41.9	100%			97	97	27.3	29.8	28.3	32.8	30.7 J	41.9 J
Zinc	MG/KG	1,470	100%	10,000	0	92	92	1,350	328	404	347	101 J	104 J
Mercury	MG/KG	9.1	99%	2.8	49	96	97	[illegible]	3.5	[illegible]	4.4	0.21	0.1

Notes.
1) Chemical result qualifiers are assigned by the laboratory and are evaluated and modified (if necessary) by during data validation.
U = non-detect, i.e. not detected equal to or above this value.
J = estimated (detect or non-detect) value.
[blank] = detect, i.e. detected chemical result value.
R = Rejected, data validation rejected the results.
2) Num of Analyses is the number of detected and non-detected results excluding rejected results. Sample duplicate pairs have not been averaged.
3) Chemical results greater than the action level are highlighted, bolded and boxed
4) Criteria action level source document and web address.
- The NYS SCO Commercial Use values were obtained from the NYSDEC Soil Cleanup Objectives.
http://www.dec.ny.gov/regs/15507.html

T:
Analytical Data for Surface and S Soil Samples at OD Grounds
Feasibility Stu. OD Grounds
Seneca Army Depot

Area								SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45
Loc ID								S45-R15-03	S45-R15-04	S45-R15-05	S45-R15-06	S45-R2-01	S45-R2-02
Sample ID								S45-R15-03	S45-R15-04	S45-R15-05	S45-R15-06	S45-R2-01	S45-R2-02
Matrix								SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Depth Interval (FT)								0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6
Sample Date								3/17/2010	3/15/2010	3/15/2010	3/15/2010	4/1/2010	4/1/2010
QC Type								SA	SA	SA	SA	SA	SA
Study ID								OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest
Parameter	Unit	Maximum Value	Frequency of Detection	Criteria Value	Number of Exceedances	Number of Times Detected	Number of Samples Analyzed	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual
Volatile Organic Compounds													
1,1,1-Trichloroethane	UG/KG	0	0%	500,000	0	0	16						
1,1,2,2-Tetrachloroethane	UG/KG	0	0%			0	16						
1,1,2-Trichloroethane	UG/KG	0	0%			0	16						
1,1-Dichloroethane	UG/KG	0	0%	240,000	0	0	16						
1,1-Dichloroethene	UG/KG	0	0%	500,000	0	0	16						
1,2-Dichloroethane	UG/KG	0	0%	30,000	0	0	16						
1,2-Dichloroethene (total)	UG/KG	0	0%	500,000	0	0	16						
1,2-Dichloropropane	UG/KG	0	0%			0	16						
Acetone	UG/KG	0	0%	500,000	0	0	16						
Benzene	UG/KG	0	0%	44,000	0	0	16						
Bromodichloromethane	UG/KG	0	0%			0	16						
Bromoform	UG/KG	0	0%			0	16						
Carbon disulfide	UG/KG	0	0%			0	16						
Carbon tetrachloride	UG/KG	0	0%	22,000	0	0	16						
Chlorobenzene	UG/KG	0	0%	500,000	0	0	16						
Chlorodibromomethane	UG/KG	0	0%			0	16						
Chloroethane	UG/KG	0	0%			0	16						
Chloroform	UG/KG	0	0%	350,000	0	0	16						
Cis-1,3-Dichloropropene	UG/KG	0	0%			0	16						
Ethyl benzene	UG/KG	0	0%	390,000	0	0	16						
Methyl bromide	UG/KG	0	0%			0	16						
Methyl butyl ketone	UG/KG	0	0%			0	16						
Methyl chloride	UG/KG	0	0%			0	16						
Methyl ethyl ketone	UG/KG	0	0%	500,000	0	0	16						
Methyl isobutyl ketone	UG/KG	0	0%			0	16						
Methylene chloride	UG/KG	0	0%	500,000	0	0	16						
Styrene	UG/KG	0	0%			0	16						
Tetrachloroethene	UG/KG	19	38%	150,000	0	6	16						
Toluene	UG/KG	0	0%	500,000	0	0	16						
Total Xylenes	UG/KG	0	0%	500,000	0	0	16						
Trans-1,3-Dichloropropene	UG/KG	0	0%			0	16						
Trichloroethene	UG/KG	0	0%	200,000	0	0	16						
Vinyl chloride	UG/KG	0	0%	13,000	0	0	16						
Semivolatile Organic Compounds													
1,2,4-Trichlorobenzene	UG/KG	0	0%			0	35						
1,2-Dichlorobenzene	UG/KG	0	0%	500,000	0	0	35						
1,3-Dichlorobenzene	UG/KG	0	0%	280,000	0	0	35						
1,4-Dichlorobenzene	UG/KG	0	0%	130,000	0	0	35						
2,2'-oxybis(1-Chloropropane)	UG/KG	0	0%			0	16						
2,4,5-Trichlorophenol	UG/KG	0	0%			0	35						
2,4,6-Trichlorophenol	UG/KG	0	0%			0	35						
2,4-Dichlorophenol	UG/KG	0	0%			0	35						
2,4-Dimethylphenol	UG/KG	0	0%			0	35						
2,4-Dinitrophenol	UG/KG	0	0%			0	35						
2,4-Dinitrotoluene	UG/KG	14,000	37%			13	35						
2,6-Dinitrotoluene	UG/KG	700	6%			2	35						
2-Chloronaphthalene	UG/KG	0	0%			0	35						
2-Chlorophenol	UG/KG	0	0%			0	35						
2-Methylnaphthalene	UG/KG	0	0%			0	35						
2-Methylphenol	UG/KG	0	0%	500,000	0	0	35						
2-Nitroaniline	UG/KG	0	0%			0	35						
2-Nitrophenol	UG/KG	0	0%			0	35						
3 or 4-Methylphenol	UG/KG	0	0%			0	19						
3,3'-Dichlorobenzidine	UG/KG	0	0%			0	35						
3-Nitroaniline	UG/KG	0	0%			0	35						
4,6-Dinitro-2-methylphenol	UG/KG	0	0%			0	35						
4-Bromophenyl phenyl ether	UG/KG	0	0%			0	35						
4-Chloro-3-methylphenol	UG/KG	0	0%			0	35						
4-Chloroaniline	UG/KG	0	0%			0	35						
4-Chlorophenyl phenyl ether	UG/KG	0	0%			0	35						
4-Methylphenol	UG/KG	0	0%	500,000	0	0	16						
4-Nitroaniline	UG/KG	0	0%			0	35						
4-Nitrophenol	UG/KG	0	0%			0	35						
Acenaphthene	UG/KG	0	0%	500,000	0	0	35						
Acenaphthylene	UG/KG	30	9%	500,000	0	3	35						
Anthracene	UG/KG	18	6%	500,000	0	2	35						
Benzo(a)anthracene	UG/KG	50	23%	5,600	0	8	35						
Benzo(a)pyrene	UG/KG	82	23%	1,000	0	8	35						
Benzo(b)fluoranthene	UG/KG	55	26%	5,600	0	9	35						
Benzo(ghi)perylene	UG/KG	66	20%	500,000	0	7	35						
Benzo(k)fluoranthene	UG/KG	58	20%	56,000	0	7	35						

Table A-1
Analytical Data for Surface and Subsurface Soil Samples at OD Grounds
Feasibility Studies - OD Grounds
Seneca Army Depot

Area								SEAD-45		SEAD-45		SEAD-45		SEAD-45		SEAD-45		SEAD-45	
Loc ID								S45-R15-03		S45-R15-04		S45-R15-05		S45-R15-06		S45-R2-01		S45-R2-02	
Sample ID								S45-R15-03		S45-R15-04		S45-R15-05		S45-R15-06		S45-R2-01		S45-R2-02	
Matrix								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
Sample Depth Interval (FT)								0.2-0.6		0.2-0.6		0.2-0.6		0.2-0.6		0.2-0.6		0.2-0.6	
Sample Date								3/17/2010		3/15/2010		3/15/2010		3/15/2010		4/1/2010		4/1/2010	
QC Type								SA		SA		SA		SA		SA		SA	
Study ID								OD Initial Invest		OD Initial Invest		OD Initial Invest		OD Initial Invest		OD Initial Invest		OD Initial Invest	
Parameter	Unit	Maximum Value	Frequency of Detection	Criteria Value	Number of Exceedances	Number of Times Detected	Number of Samples Analyzed	Value	Qual	Value	Qual	Value	Qual	Value	Qual	Value	Qual	Value	Qual
Bis(2-Chloroethoxy)methane	UG/KG	0	0%			0	35												
Bis(2-Chloroethyl)ether	UG/KG	0	0%			0	35												
Bis(2-Chloroisopropyl)ether	UG/KG	0	0%			0	19												
Bis(2-Ethylhexyl)phthalate	UG/KG	740	26%			9	35												
Butylbenzylphthalate	UG/KG	0	0%			0	35												
Carbazole	UG/KG	0	0%			0	35												
Chrysene	UG/KG	130	34%	56,000	0	12	35												
Dibenz(a,h)anthracene	UG/KG	0	0%	560	0	0	35												
Dibenzofuran	UG/KG	0	0%	350,000	0	0	35												
Diethyl phthalate	UG/KG	35	3%			1	35												
Dimethylphthalate	UG/KG	0	0%			0	35												
Di-n-butylphthalate	UG/KG	6,800	34%			12	35												
Di-n-octylphthalate	UG/KG	0	0%			0	35												
Fluoranthene	UG/KG	68	31%	500,000	0	11	35												
Fluorene	UG/KG	0	0%	500,000	0	0	35												
Hexachlorobenzene	UG/KG	110	31%	6,000	0	11	35												
Hexachlorobutadiene	UG/KG	0	0%			0	35												
Hexachlorocyclopentadiene	UG/KG	0	0%			0	35												
Hexachloroethane	UG/KG	1,100	17%			6	35												
Indeno(1,2,3-cd)pyrene	UG/KG	52	11%	5,600	0	4	35												
Isophorone	UG/KG	0	0%			0	35												
Naphthalene	UG/KG	30	14%	500,000	0	5	35												
Nitrobenzene	UG/KG	0	0%			0	35												
N-Nitrosodiphenylamine	UG/KG	320	6%			2	35												
N-Nitrosodipropylamine	UG/KG	1,600	14%			5	35												
Pentachlorophenol	UG/KG	0	0%	6,700	0	0	35												
Phenanthrene	UG/KG	46	26%	500,000	0	9	35												
Phenol	UG/KG	0	0%	500,000	0	0	35												
Pyrene	UG/KG	110	34%	500,000	0	12	35												
Herbicides																			
2,4,5-T	UG/KG	0	0%			0	35												
2,4,5-TP/Silvex	UG/KG	0	0%	500,000	0	0	35												
2,4-D	UG/KG	0	0%			0	35												
2,4-DB	UG/KG	0	0%			0	35												
Dalapon	UG/KG	0	0%			0	35												
Dicamba	UG/KG	0	0%			0	35												
Dichloroprop	UG/KG	0	0%			0	35												
Dinoseb	UG/KG	0	0%			0	35												
MCPA	UG/KG	9,400	6%			2	35												
MCPP	UG/KG	0	0%			0	35												
Explosives																			
1,3,5-Trinitrobenzene	UG/KG	190	60%			28	47												
1,3-Dinitrobenzene	UG/KG	0	0%			0	47												
2,4,6-Trinitrotoluene	UG/KG	1,400	81%			38	47												
2,4-Dinitrotoluene	UG/KG	1,100	77%			36	47												
2,6-Dinitrotoluene	UG/KG	0	0%			0	47												
2-amino-4,6-Dinitrotoluene	UG/KG	680	77%			36	47												
2-Nitrotoluene	UG/KG	0	0%			0	31												
3,5-Dinitroaniline	UG/KG	0	0%			0	31												
3-Nitrotoluene	UG/KG	0	0%			0	31												
4-amino-2,6-Dinitrotoluene	UG/KG	500	57%			27	47												
4-Nitrotoluene	UG/KG	0	0%			0	31												
HMX	UG/KG	470	68%			32	47												
Nitrobenzene	UG/KG	0	0%			0	31												
Nitroglycerine	UG/KG	1,500	3%			1	31												
Pentaerythritol Tetranitrate	UG/KG	0	0%			0	31												
RDX	UG/KG	5,800	83%			39	47												
Tetryl	UG/KG	330	9%			4	47												

Analytical Data for Surface and e Soil Samples at OD Grounds
Feasibility Stu. OD Grounds
Seneca Army Depot

Parameter	Unit	Maximum Value	Frequency of Detection	Criteria Value	Number of Exceedances	Number of Times Detected	Number of Samples Analyzed	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual
Area								SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45
Loc ID								S45-R15-03	S45-R15-04	S45-R15-05	S45-R15-06	S45-R2-01	S45-R2-02
Sample ID								S45-R15-03	S45-R15-04	S45-R15-05	S45-R15-06	S45-R2-01	S45-R2-02
Matrix								SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Depth Interval (FT)								0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6
Sample Date								3/17/2010	3/15/2010	3/15/2010	3/15/2010	4/1/2010	4/1/2010
QC Type								SA	SA	SA	SA	SA	SA
Study ID								OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest
Pesticides/PCBs													
Aroclor-1016	UG/KG	0	0%	1,000	0	0	34						
Aroclor-1221	UG/KG	0	0%	1,000	0	0	34						
Aroclor-1232	UG/KG	0	0%	1,000	0	0	34						
Aroclor-1242	UG/KG	0	0%	1,000	0	0	34						
Aroclor-1248	UG/KG	0	0%	1,000	0	0	34						
Aroclor-1254	UG/KG	2,000	6%	1,000	1	2	34						
Aroclor-1260	UG/KG	0	0%	1,000	0	0	34						
4,4'-DDD	UG/KG	2.4	6%	92,000	0	2	34						
4,4'-DDE	UG/KG	4.2	63%	62,000	0	22	35						
4,4'-DDT	UG/KG	3.4	50%	47,000	0	17	34						
Aldrin	UG/KG	0	0%	680	0	0	34						
Alpha-BHC	UG/KG	0	0%	3,400	0	0	34						
Alpha-Chlordane	UG/KG	2	12%	24,000	0	4	34						
Beta-BHC	UG/KG	0	0%	3,000	0	0	34						
Delta-BHC	UG/KG	0	0%	500,000	0	0	34						
Dieldrin	UG/KG	3.2	41%	1,400	0	14	34						
Endosulfan I	UG/KG	55	60%	200,000	0	21	35						
Endosulfan II	UG/KG	0.88	3%	200,000	0	1	34						
Endosulfan sulfate	UG/KG	0	0%	200,000	0	0	34						
Endrin	UG/KG	3.6	3%	89,000	0	1	34						
Endrin aldehyde	UG/KG	0	0%			0	34						
Endrin ketone	UG/KG	0.58	3%			1	34						
Gamma-BHC/Lindane	UG/KG	0	0%	9,200	0	0	34						
Gamma-Chlordane	UG/KG	1.1	9%			3	34						
Heptachlor	UG/KG	0	0%	15,000	0	0	34						
Heptachlor epoxide	UG/KG	0	0%			0	34						
Methoxychlor	UG/KG	45	3%			1	34						
Toxaphene	UG/KG	0	0%			0	34						
Inorganics													
Aluminum	MG/KG	27,900	100%			97	97	14,200 J	18,700	17,000	20,700	17,800	17,700
Antimony	MG/KG	5.1	33%			32	97	0.41 UJ	0.1 UJ	0.09 UJ	0.12 UJ	0.26 J	0.62 J
Arsenic	MG/KG	12.6	100%	16	0	97	97	4.9 J	4.8	3.9	5.1	6.3	5.4
Barium	MG/KG	365	100%	400	0	97	97	55.4 J	108 J	107 J	135 J	144	164
Beryllium	MG/KG	1.2	98%	590	0	95	97	0.65 J	0.85 J	0.77 J	1 J	0.77	0.86
Cadmium	MG/KG	1,100	81%	9.3	11	77	95	4.1 UJ	0.98 U	0.94 U	1.2 U	4.2	9.1
Calcium	MG/KG	193,000	99%			96	97	9,010 J	2,150 J	3,560 J	2,340 J	28,100	20,800
Chromium	MG/KG	446	100%	1,500	0	97	97	26.6 J	24.2 J	23.3 J	27.5 J	27.2	27.7
Cobalt	MG/KG	26.8	100%			97	97	12.1 J	10.1 J	9.1 J	12.9 J	12	11.8
Copper	MG/KG	7,310	100%	270	52	97	97	43.1 J	20 J	23.4 J	23.3 J	192	**462**
Cyanide	MG/KG	0.7	13%	27	0	2	16						
Iron	MG/KG	118,000	100%			97	97	26,000 J	22,500 J	20,400 J	24,000 J	24,400	27,600
Lead	MG/KG	998	100%	1,000	0	97	97	53.2 J	20.6	22.8	27.9	50	72.3
Magnesium	MG/KG	15,000	100%			97	97	6,180 J	3,770 J	3,800 J	4,210 J	7,290	6,560
Manganese	MG/KG	5,040	100%	10,000	0	97	97	328 J	735 J	466 J	1,080 J	581	618
Nickel	MG/KG	59.3	100%	310	0	92	92	52.1 J	24.8 J	29.4 J	32.7 J	39.9	39.8
Potassium	MG/KG	4,880	100%			76	76	2,140 J	2,740 J	2,780 J	3,410 J	2,540	2,920
Selenium	MG/KG	0.92	4%	1,500	0	4	97	0.9 UJ	0.21 U	0.21 U	0.26 U	0.59 U	0.72 U
Silver	MG/KG	205	68%	1,500	0	66	97	0.27 UJ	0.06 U	0.06 U	0.08 U	1.4 J	3.6
Sodium	MG/KG	213	84%			81	97	82 UJ	98 U	94 U	120 U	99.2	92 U
Thallium	MG/KG	0.27	6%			6	97	0.38 UJ	0.09 U	0.09 U	0.11 U	0.25 U	0.3 U
Vanadium	MG/KG	41.9	100%			97	97	22.5 J	31.3 J	27.1 J	33.8 J	29.7	30.9
Zinc	MG/KG	1,470	100%	10,000	0	92	92	114 J	76 J	80 J	114 J	382	321
Mercury	MG/KG	9.1	99%	2.8	49	96	97	0.1 J	0.06	0.09	0.1	1.2	**3**

Notes
1) Chemical result qualifiers are assigned by the laboratory and are evaluated and modified (if necessary) by during data validation
U = non-detect, i.e. not detected equal to or above this value — J = estimated (detect or non-detect) value
[blank] = detect, i.e. detected chemical result value — R = Rejected, data validation rejected the results
2) Num of Analyses is the number of detected and non-detected results excluding rejected results. Sample duplicate pairs have not been averaged
3) Chemical results greater than the action level are highlighted, bolded and boxed
4) Criteria action level source document and web address
- The NYS SCO Commercial Use values were obtained from the NYSDEC Soil Cleanup Objectives
http://www.dec.ny.gov/regs/15507.html

Table A-1
Analytical Data for Surface and Subsurface Soil Samples at OD Grounds
Feasibility Studies - OD Grounds
Seneca Army Depot

Area								SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45
Loc ID								S45-R2-03	S45-R2-04	S45-R3-01	S45-R3-02	S45-R3-03	S45-R3-04
Sample ID								S45-R2-03	S45-R2-04	S45-R3-01	S45-R3-02	S45-R3-03	S45-R3-04
Matrix								SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Depth Interval (FT)								0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6
Sample Date								4/1/2010	4/1/2010	4/1/2010	4/1/2010	4/1/2010	4/1/2010
QC Type								SA	SA	SA	SA	SA	SA
Study ID								OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest
Parameter	Unit	Maximum Value	Frequency of Detection	Criteria Value	Number of Exceedances	Number of Times Detected	Number of Samples Analyzed	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual
Volatile Organic Compounds													
1,1,1-Trichloroethane	UG/KG	0	0%	500,000	0	0	16						
1,1,2,2-Tetrachloroethane	UG/KG	0	0%			0	16						
1,1,2-Trichloroethane	UG/KG	0	0%			0	16						
1,1-Dichloroethane	UG/KG	0	0%	240,000	0	0	16						
1,1-Dichloroethene	UG/KG	0	0%	500,000	0	0	16						
1,2-Dichloroethane	UG/KG	0	0%	30,000	0	0	16						
1,2-Dichloroethene (total)	UG/KG	0	0%	500,000	0	0	16						
1,2-Dichloropropane	UG/KG	0	0%			0	16						
Acetone	UG/KG	0	0%	500,000	0	0	16						
Benzene	UG/KG	0	0%	44,000	0	0	16						
Bromodichloromethane	UG/KG	0	0%			0	16						
Bromoform	UG/KG	0	0%			0	16						
Carbon disulfide	UG/KG	0	0%			0	16						
Carbon tetrachloride	UG/KG	0	0%	22,000	0	0	16						
Chlorobenzene	UG/KG	0	0%	500,000	0	0	16						
Chlorodibromomethane	UG/KG	0	0%			0	16						
Chloroethane	UG/KG	0	0%			0	16						
Chloroform	UG/KG	0	0%	350,000	0	0	16						
Cis-1,3-Dichloropropene	UG/KG	0	0%			0	16						
Ethyl benzene	UG/KG	0	0%	390,000	0	0	16						
Methyl bromide	UG/KG	0	0%			0	16						
Methyl butyl ketone	UG/KG	0	0%			0	16						
Methyl chloride	UG/KG	0	0%			0	16						
Methyl ethyl ketone	UG/KG	0	0%	500,000	0	0	16						
Methyl isobutyl ketone	UG/KG	0	0%			0	16						
Methylene chloride	UG/KG	0	0%	500,000	0	0	16						
Styrene	UG/KG	0	0%			0	16						
Tetrachloroethene	UG/KG	19	38%	150,000	0	6	16						
Toluene	UG/KG	0	0%	500,000	0	0	16						
Total Xylenes	UG/KG	0	0%	500,000	0	0	16						
Trans-1,3-Dichloropropene	UG/KG	0	0%			0	16						
Trichloroethene	UG/KG	0	0%	200,000	0	0	16						
Vinyl chloride	UG/KG	0	0%	13,000	0	0	16						
Semivolatile Organic Compounds													
1,2,4-Trichlorobenzene	UG/KG	0	0%			0	35						
1,2-Dichlorobenzene	UG/KG	0	0%	500,000	0	0	35						
1,3-Dichlorobenzene	UG/KG	0	0%	280,000	0	0	35						
1,4-Dichlorobenzene	UG/KG	0	0%	130,000	0	0	35						
2,2'-oxybis(1-Chloropropane)	UG/KG	0	0%			0	16						
2,4,5-Trichlorophenol	UG/KG	0	0%			0	35						
2,4,6-Trichlorophenol	UG/KG	0	0%			0	35						
2,4-Dichlorophenol	UG/KG	0	0%			0	35						
2,4-Dimethylphenol	UG/KG	0	0%			0	35						
2,4-Dinitrophenol	UG/KG	0	0%			0	35						
2,4-Dinitrotoluene	UG/KG	14,000	37%			13	35						
2,6-Dinitrotoluene	UG/KG	700	6%			2	35						
2-Chloronaphthalene	UG/KG	0	0%			0	35						
2-Chlorophenol	UG/KG	0	0%			0	35						
2-Methylnaphthalene	UG/KG	0	0%			0	35						
2-Methylphenol	UG/KG	0	0%	500,000	0	0	35						
2-Nitroaniline	UG/KG	0	0%			0	35						
2-Nitrophenol	UG/KG	0	0%			0	35						
3 or 4-Methylphenol	UG/KG	0	0%			0	19						
3,3'-Dichlorobenzidine	UG/KG	0	0%			0	35						
3-Nitroaniline	UG/KG	0	0%			0	35						
4,6-Dinitro-2-methylphenol	UG/KG	0	0%			0	35						
4-Bromophenyl phenyl ether	UG/KG	0	0%			0	35						
4-Chloro-3-methylphenol	UG/KG	0	0%			0	35						
4-Chloroaniline	UG/KG	0	0%			0	35						
4-Chlorophenyl phenyl ether	UG/KG	0	0%			0	35						
4-Methylphenol	UG/KG	0	0%	500,000	0	0	16						
4-Nitroaniline	UG/KG	0	0%			0	35						
4-Nitrophenol	UG/KG	0	0%			0	35						
Acenaphthene	UG/KG	0	0%	500,000	0	0	35						
Acenaphthylene	UG/KG	30	9%	500,000	0	3	35						
Anthracene	UG/KG	18	6%	500,000	0	2	35						
Benzo(a)anthracene	UG/KG	50	23%	5,600	0	8	35						
Benzo(a)pyrene	UG/KG	82	23%	1,000	0	8	35						
Benzo(b)fluoranthene	UG/KG	55	26%	5,600	0	9	35						
Benzo(ghi)perylene	UG/KG	66	20%	500,000	0	7	35						
Benzo(k)fluoranthene	UG/KG	58	20%	56,000	0	7	35						

Analytical Data for Surface and e Soil Samples at OD Grounds
Feasibility Stu. OD Grounds
Seneca Army Depot

Area								SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45
Loc ID								S45-R2-03	S45-R2-04	S45-R3-01	S45-R3-02	S45-R3-03	S45-R3-04
Sample ID								S45-R2-03	S45-R2-04	S45-R3-01	S45-R3-02	S45-R3-03	S45-R3-04
Matrix								SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Depth Interval (FT)								0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6
Sample Date								4/1/2010	4/1/2010	4/1/2010	4/1/2010	4/1/2010	4/1/2010
QC Type								SA	SA	SA	SA	SA	SA
Study ID								OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest
Parameter	Unit	Maximum Value	Frequency of Detection	Criteria Value	Number of Exceedances	Number of Times Detected	Number of Samples Analyzed	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual
Bis(2-Chloroethoxy)methane	UG/KG	0	0%			0	35						
Bis(2-Chloroethyl)ether	UG/KG	0	0%			0	35						
Bis(2-Chloroisopropyl)ether	UG/KG	0	0%			0	19						
Bis(2-Ethylhexyl)phthalate	UG/KG	740	26%			9	35						
Butylbenzylphthalate	UG/KG	0	0%			0	35						
Carbazole	UG/KG	0	0%			0	35						
Chrysene	UG/KG	130	34%	56,000	0	12	35						
Dibenz(a,h)anthracene	UG/KG	0	0%	560	0	0	35						
Dibenzofuran	UG/KG	0	0%	350,000	0	0	35						
Diethyl phthalate	UG/KG	35	3%			1	35						
Dimethylphthalate	UG/KG	0	0%			0	35						
Di-n-butylphthalate	UG/KG	6,800	34%			12	35						
Di-n-octylphthalate	UG/KG	0	0%			0	35						
Fluoranthene	UG/KG	68	31%	500,000	0	11	35						
Fluorene	UG/KG	0	0%	500,000	0	0	35						
Hexachlorobenzene	UG/KG	110	31%	6,000	0	11	35						
Hexachlorobutadiene	UG/KG	0	0%			0	35						
Hexachlorocyclopentadiene	UG/KG	0	0%			0	35						
Hexachloroethane	UG/KG	1,100	17%			6	35						
Indeno(1,2,3-cd)pyrene	UG/KG	52	11%	5,600	0	4	35						
Isophorone	UG/KG	0	0%			0	35						
Naphthalene	UG/KG	30	14%	500,000	0	5	35						
Nitrobenzene	UG/KG	0	0%			0	35						
N-Nitrosodiphenylamine	UG/KG	320	6%			2	35						
N-Nitrosodipropylamine	UG/KG	1,600	14%			5	35						
Pentachlorophenol	UG/KG	0	0%	6,700	0	0	35						
Phenanthrene	UG/KG	46	26%	500,000	0	9	35						
Phenol	UG/KG	0	0%	500,000	0	0	35						
Pyrene	UG/KG	110	34%	500,000	0	12	35						
Herbicides													
2,4,5-T	UG/KG	0	0%			0	35						
2,4,5-TP/Silvex	UG/KG	0	0%	500,000	0	0	35						
2,4-D	UG/KG	0	0%			0	35						
2,4-DB	UG/KG	0	0%			0	35						
Dalapon	UG/KG	0	0%			0	35						
Dicamba	UG/KG	0	0%			0	35						
Dichloroprop	UG/KG	0	0%			0	35						
Dinoseb	UG/KG	0	0%			0	35						
MCPA	UG/KG	9,400	6%			2	35						
MCPP	UG/KG	0	0%			0	35						
Explosives													
1,3,5-Trinitrobenzene	UG/KG	190	60%			28	47						
1,3-Dinitrobenzene	UG/KG	0	0%			0	47						
2,4,6-Trinitrotoluene	UG/KG	1,400	81%			38	47						
2,4-Dinitrotoluene	UG/KG	1,100	77%			36	47						
2,6-Dinitrotoluene	UG/KG	0	0%			0	47						
2-amino-4,6-Dinitrotoluene	UG/KG	680	77%			36	47						
2-Nitrotoluene	UG/KG	0	0%			0	31						
3,5-Dinitroaniline	UG/KG	0	0%			0	31						
3-Nitrotoluene	UG/KG	0	0%			0	31						
4-amino-2,6-Dinitrotoluene	UG/KG	500	57%			27	47						
4-Nitrotoluene	UG/KG	0	0%			0	31						
HMX	UG/KG	470	68%			32	47						
Nitrobenzene	UG/KG	0	0%			0	31						
Nitroglycerine	UG/KG	1,500	3%			1	31						
Pentaerythritol Tetranitrate	UG/KG	0	0%			0	31						
RDX	UG/KG	5,800	83%			39	47						
Tetryl	UG/KG	330	9%			4	47						

Table A-1
Analytical Data for Surface and Subsurface Soil Samples at OD Grounds
Feasibility Studies - OD Grounds
Seneca Army Depot

Parameter	Unit	Maximum Value	Frequency of Detection	Criteria Value	Number of Exceedances	Number of Times Detected	Number of Samples Analyzed	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual
Area								SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45
Loc ID								S45-R2-03	S45-R2-04	S45-R3-01	S45-R3-02	S45-R3-03	S45-R3-04
Sample ID								S45-R2-03	S45-R2-04	S45-R3-01	S45-R3-02	S45-R3-03	S45-R3-04
Matrix								SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Depth Interval (FT)								0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6
Sample Date								4/1/2010	4/1/2010	4/1/2010	4/1/2010	4/1/2010	4/1/2010
QC Type								SA	SA	SA	SA	SA	SA
Study ID								OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest
Pesticides/PCBs													
Aroclor-1016	UG/KG	0	0%	1,000	0	0	34						
Aroclor-1221	UG/KG	0	0%	1,000	0	0	34						
Aroclor-1232	UG/KG	0	0%	1,000	0	0	34						
Aroclor-1242	UG/KG	0	0%	1,000	0	0	34						
Aroclor-1248	UG/KG	0	0%	1,000	0	0	34						
Aroclor-1254	UG/KG	2,000	6%	1,000	1	2	34						
Aroclor-1260	UG/KG	0	0%	1,000	0	0	34						
4,4'-DDD	UG/KG	2.4	6%	92,000	0	2	34						
4,4'-DDE	UG/KG	4.2	63%	62,000	0	22	35						
4,4'-DDT	UG/KG	3.4	50%	47,000	0	17	34						
Aldrin	UG/KG	0	0%	680	0	0	34						
Alpha-BHC	UG/KG	0	0%	3,400	0	0	34						
Alpha-Chlordane	UG/KG	2	12%	24,000	0	4	34						
Beta-BHC	UG/KG	0	0%	3,000	0	0	34						
Delta-BHC	UG/KG	0	0%	500,000	0	0	34						
Dieldrin	UG/KG	3.2	41%	1,400	0	14	34						
Endosulfan I	UG/KG	55	60%	200,000	0	21	35						
Endosulfan II	UG/KG	0.88	3%	200,000	0	1	34						
Endosulfan sulfate	UG/KG	0	0%	200,000	0	0	34						
Endrin	UG/KG	3.6	3%	89,000	0	1	34						
Endrin aldehyde	UG/KG	0	0%			0	34						
Endrin ketone	UG/KG	0.58	3%			1	34						
Gamma-BHC/Lindane	UG/KG	0	0%	9,200	0	0	34						
Gamma-Chlordane	UG/KG	1.1	9%			3	34						
Heptachlor	UG/KG	0	0%	15,000	0	0	34						
Heptachlor epoxide	UG/KG	0	0%			0	34						
Methoxychlor	UG/KG	45	3%			1	34						
Toxaphene	UG/KG	0	0%			0	34						
Inorganics													
Aluminum	MG/KG	27,900	100%			97	97	19,000	17,900	20,800	16,800	24,600	18,500
Antimony	MG/KG	5.1	33%			32	97	0.98 J	0.32 J	0.24 J	0.87 J	0.68 J	0.13 U
Arsenic	MG/KG	12.6	100%	16	0	97	97	5.1	5.2	5.7	5.2	5.1	4.2
Barium	MG/KG	365	100%	400	0	97	97	166	150	140	194	205	122
Beryllium	MG/KG	1.2	98%	590	0	95	97	0.83	0.78	0.78	0.72	1	0.78
Cadmium	MG/KG	1,100	81%	9.3	11	77	95	6.6	6.4	6	8.3	8.2	1.1 U
Calcium	MG/KG	193,000	99%			96	97	16,900	22,300	32,600	36,400	18,400	8,950
Chromium	MG/KG	446	100%	1,500	0	97	97	28.6	29.3	27.9	27.4	35.4	24.7
Cobalt	MG/KG	26.8	100%			97	97	12.3	11.7	12	10.8	12.6	9.8
Copper	MG/KG	7,310	100%	270	52	97	97	217	**364**	[illegible]	233	**425**	41.3
Cyanide	MG/KG	0.7	13%	27	0	2	16						
Iron	MG/KG	118,000	100%			97	97	26,600	26,500	25,300	25,400	29,100	22,900
Lead	MG/KG	998	100%	1,000	0	97	97	51	52.9	48.9	70.3	69.4	28.2
Magnesium	MG/KG	15,000	100%			97	97	6,530	7,100	7,260	9,130	7,340	4,720
Manganese	MG/KG	5,040	100%	10,000	0	97	97	676	518	651	530	470	549
Nickel	MG/KG	59.3	100%	310	0	92	92	40.1	41.4	37.4	38.3	46.6	28.9
Potassium	MG/KG	4,880	100%			76	76	3,240	2,920	2,980	2,550	4,020	2,260
Selenium	MG/KG	0.92	4%	1,500	0	4	97	0.81 U	0.69 U	1.7 U	0.76 U	0.9 U	0.45 U
Silver	MG/KG	205	68%	1,500	0	66	97	2.5 J	3	0.82 J	1.9 J	3 J	0.29 J
Sodium	MG/KG	213	84%			81	97	77 J	90.2	92.2	120	93.7 J	66.2 J
Thallium	MG/KG	0.27	6%			6	97	0.34 U	0.29 U	0.28 U	0.32 U	0.38 U	0.19 U
Vanadium	MG/KG	41.9	100%			97	97	31.7	28.6	30.2	27	38.9	30.8
Zinc	MG/KG	1,470	100%	10,000	0	92	92	274	324	392	588	421	91.2
Mercury	MG/KG	9.1	99%	2.8	49	96	97	**3.1**	[illegible]	1.7	**6.4**	**4.2**	2.2

Notes:
1) Chemical result qualifiers are assigned by the laboratory and are evaluated and modified (if necessary) by during data validation.
U = non-detect, i.e. not detected equal to or above this value. J = estimated (detect or non-detect) value.
[blank] = detect, i.e. detected chemical result value. R = Rejected, data validation rejected the results.
2) Num of Analyses is the number of detected and non-detected results excluding rejected results. Sample duplicate pairs have not been averaged.
3) Chemical results greater than the action level are highlighted, bolded and boxed
4) Criteria action level source document and web address.
- The NYS SCO Commercial Use values were obtained from the NYSDEC Soil Cleanup Objectives.
http://www.dec.ny.gov/regs/15507.html

Analytical Data for Surface and ... e Soil Samples at OD Grounds

Feasibility Stu... OD Grounds

Seneca Army Depot

Parameter	Unit	Maximum Value	Frequency of Detection	Criteria Value	Number of Exceedances	Number of Times Detected	Number of Samples Analyzed						
Area								SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45
Loc ID								S45-R4-01	S45-R4-02	S45-R4-03	S45-R4-04	S45-R5-01	S45-R5-02
Sample ID								S45-R4-01	S45-R4-02	S45-R4-03	S45-R4-04	S45-R5-01	S45-R5-02
Matrix								SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Depth Interval (FT)								0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6
Sample Date								4/1/2010	4/1/2010	4/1/2010	4/1/2010	3/16/2010	3/16/2010
QC Type								SA	SA	SA	SA	SA	SA
Study ID								OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest
								Value Qual	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual
Volatile Organic Compounds													
1,1,1-Trichloroethane	UG/KG	0	0%	500,000	0	0	16						
1,1,2,2-Tetrachloroethane	UG/KG	0	0%			0	16						
1,1,2-Trichloroethane	UG/KG	0	0%			0	16						
1,1-Dichloroethane	UG/KG	0	0%	240,000	0	0	16						
1,1-Dichloroethene	UG/KG	0	0%	500,000	0	0	16						
1,2-Dichloroethane	UG/KG	0	0%	30,000	0	0	16						
1,2-Dichloroethene (total)	UG/KG	0	0%	500,000	0	0	16						
1,2-Dichloropropane	UG/KG	0	0%			0	16						
Acetone	UG/KG	0	0%	500,000	0	0	16						
Benzene	UG/KG	0	0%	44,000	0	0	16						
Bromodichloromethane	UG/KG	0	0%			0	16						
Bromoform	UG/KG	0	0%			0	16						
Carbon disulfide	UG/KG	0	0%			0	16						
Carbon tetrachloride	UG/KG	0	0%	22,000	0	0	16						
Chlorobenzene	UG/KG	0	0%	500,000	0	0	16						
Chlorodibromomethane	UG/KG	0	0%			0	16						
Chloroethane	UG/KG	0	0%			0	16						
Chloroform	UG/KG	0	0%	350,000	0	0	16						
Cis-1,3-Dichloropropene	UG/KG	0	0%			0	16						
Ethyl benzene	UG/KG	0	0%	390,000	0	0	16						
Methyl bromide	UG/KG	0	0%			0	16						
Methyl butyl ketone	UG/KG	0	0%			0	16						
Methyl chloride	UG/KG	0	0%			0	16						
Methyl ethyl ketone	UG/KG	0	0%	500,000	0	0	16						
Methyl isobutyl ketone	UG/KG	0	0%			0	16						
Methylene chloride	UG/KG	0	0%	500,000	0	0	16						
Styrene	UG/KG	0	0%			0	16						
Tetrachloroethene	UG/KG	19	38%	150,000	0	6	16						
Toluene	UG/KG	0	0%	500,000	0	0	16						
Total Xylenes	UG/KG	0	0%	500,000	0	0	16						
Trans-1,3-Dichloropropene	UG/KG	0	0%			0	16						
Trichloroethene	UG/KG	0	0%	200,000	0	0	16						
Vinyl chloride	UG/KG	0	0%	13,000	0	0	16						
Semivolatile Organic Compounds													
1,2,4-Trichlorobenzene	UG/KG	0	0%			0	35					100 U	
1,2-Dichlorobenzene	UG/KG	0	0%	500,000	0	0	35					110 U	
1,3-Dichlorobenzene	UG/KG	0	0%	280,000	0	0	35					98 U	
1,4-Dichlorobenzene	UG/KG	0	0%	130,000	0	0	35					110 U	
2,2'-oxybis(1-Chloropropane)	UG/KG	0	0%			0	16						
2,4,5-Trichlorophenol	UG/KG	0	0%			0	35					200 U	
2,4,6-Trichlorophenol	UG/KG	0	0%			0	35					200 UJ	
2,4-Dichlorophenol	UG/KG	0	0%			0	35					190 UJ	
2,4-Dimethylphenol	UG/KG	0	0%			0	35					210 UJ	
2,4-Dinitrophenol	UG/KG	0	0%			0	35					470 UJ	
2,4-Dinitrotoluene	UG/KG	14,000	37%			13	35					110 U	
2,6-Dinitrotoluene	UG/KG	700	6%			2	35					99 U	
2-Chloronaphthalene	UG/KG	0	0%			0	35					110 UJ	
2-Chlorophenol	UG/KG	0	0%			0	35					210 UJ	
2-Methylnaphthalene	UG/KG	0	0%			0	35					120 U	
2-Methylphenol	UG/KG	0	0%	500,000	0	0	35					250 UJ	
2-Nitroaniline	UG/KG	0	0%			0	35					94 U	
2-Nitrophenol	UG/KG	0	0%			0	35					210 UJ	
3 or 4-Methylphenol	UG/KG	0	0%			0	19					240 UJ	
3,3'-Dichlorobenzidine	UG/KG	0	0%			0	35					140 UJ	
3-Nitroaniline	UG/KG	0	0%			0	35					120 UJ	
4,6-Dinitro-2-methylphenol	UG/KG	0	0%			0	35					420 U	
4-Bromophenyl phenyl ether	UG/KG	0	0%			0	35					110 U	
4-Chloro-3-methylphenol	UG/KG	0	0%			0	35					210 U	
4-Chloroaniline	UG/KG	0	0%			0	35					150 UJ	
4-Chlorophenyl phenyl ether	UG/KG	0	0%			0	35					98 U	
4-Methylphenol	UG/KG	0	0%	500,000	0	0	16						
4-Nitroaniline	UG/KG	0	0%			0	35					170 UJ	
4-Nitrophenol	UG/KG	0	0%			0	35					390 U	
Acenaphthene	UG/KG	0	0%	500,000	0	0	35					82 U	
Acenaphthylene	UG/KG	30	9%	500,000	0	3	35					88 U	
Anthracene	UG/KG	18	6%	500,000	0	2	35					100 U	
Benzo(a)anthracene	UG/KG	50	23%	5,600	0	8	35					110 U	
Benzo(a)pyrene	UG/KG	82	23%	1,000	0	8	35					120 U	
Benzo(b)fluoranthene	UG/KG	55	26%	5,600	0	9	35					170 U	
Benzo(ghi)perylene	UG/KG	66	20%	500,000	0	7	35					130 U	
Benzo(k)fluoranthene	UG/KG	58	20%	56,000	0	7	35					100 U	

Table A-1
Analytical Data for Surface and Subsurface Soil Samples at OD Grounds
Feasibility Studies - OD Grounds
Seneca Army Depot

Area								SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45
Loc ID								S45-R4-01	S45-R4-02	S45-R4-03	S45-R4-04	S45-R5-01	S45-R5-02
Sample ID								S45-R4-01	S45-R4-02	S45-R4-03	S45-R4-04	S45-R5-01	S45-R5-02
Matrix								SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Depth Interval (FT)								0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6
Sample Date								4/1/2010	4/1/2010	4/1/2010	4/1/2010	3/16/2010	3/16/2010
QC Type								SA	SA	SA	SA	SA	SA
Study ID								OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest
Parameter	Unit	Maximum Value	Frequency of Detection	Criteria Value	Number of Exceedances	Number of Times Detected	Number of Samples Analyzed	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual
Bis(2-Chloroethoxy)methane	UG/KG	0	0%			0	35					120 UJ	
Bis(2-Chloroethyl)ether	UG/KG	0	0%			0	35					100 U	
Bis(2-Chloroisopropyl)ether	UG/KG	0	0%			0	19					110 U	
Bis(2-Ethylhexyl)phthalate	UG/KG	740	26%			9	35					120 U	
Butylbenzylphthalate	UG/KG	0	0%			0	35					120 U	
Carbazole	UG/KG	0	0%			0	35					140 U	
Chrysene	UG/KG	130	34%	56,000	0	12	35					120 U	
Dibenz(a,h)anthracene	UG/KG	0	0%	560	0	0	35					160 U	
Dibenzofuran	UG/KG	0	0%	350,000	0	0	35					99 U	
Diethyl phthalate	UG/KG	35	3%			1	35					100 U	
Dimethylphthalate	UG/KG	0	0%			0	35					98 U	
Di-n-butylphthalate	UG/KG	6,800	34%			12	35					130 U	
Di-n-octylphthalate	UG/KG	0	0%			0	35					260 U	
Fluoranthene	UG/KG	68	31%	500,000	0	11	35					130 U	
Fluorene	UG/KG	0	0%	500,000	0	0	35					100 U	
Hexachlorobenzene	UG/KG	110	31%	6,000	0	11	35					100 U	
Hexachlorobutadiene	UG/KG	0	0%			0	35					100 U	
Hexachlorocyclopentadiene	UG/KG	0	0%			0	35					100 UJ	
Hexachloroethane	UG/KG	1,100	17%			6	35					120 U	
Indeno(1,2,3-cd)pyrene	UG/KG	52	11%	5,600	0	4	35					150 U	
Isophorone	UG/KG	0	0%			0	35					94 U	
Naphthalene	UG/KG	30	14%	500,000	0	5	35					110 U	
Nitrobenzene	UG/KG	0	0%			0	35					110 U	
N-Nitrosodiphenylamine	UG/KG	320	6%			2	35					280 UJ	
N-Nitrosodipropylamine	UG/KG	1,600	14%			5	35					100 U	
Pentachlorophenol	UG/KG	0	0%	6,700	0	0	35					300 UJ	
Phenanthrene	UG/KG	46	26%	500,000	0	9	35					100 U	
Phenol	UG/KG	0	0%	500,000	0	0	35					200 U	
Pyrene	UG/KG	110	34%	500,000	0	12	35					130 U	
Herbicides													
2,4,5-T	UG/KG	0	0%			0	35					20 U	
2,4,5-TP/Silvex	UG/KG	0	0%	500,000	0	0	35					16 U	
2,4-D	UG/KG	0	0%			0	35					40 U	
2,4-DB	UG/KG	0	0%			0	35					29 U	
Dalapon	UG/KG	0	0%			0	35					10 U	
Dicamba	UG/KG	0	0%			0	35					14 U	
Dichloroprop	UG/KG	0	0%			0	35					23 U	
Dinoseb	UG/KG	0	0%			0	35					3.2 UJ	
MCPA	UG/KG	9,400	6%			2	35					2,900 U	
MCPP	UG/KG	0	0%			0	35					2,800 U	
Explosives													
1,3,5-Trinitrobenzene	UG/KG	190	60%			28	47					8.5 U	
1,3-Dinitrobenzene	UG/KG	0	0%			0	47					7.9 U	
2,4,6-Trinitrotoluene	UG/KG	1,400	81%			38	47					8.5 U	
2,4-Dinitrotoluene	UG/KG	1,100	77%			36	47					19 U	
2,6-Dinitrotoluene	UG/KG	0	0%			0	47					34 U	
2-amino-4,6-Dinitrotoluene	UG/KG	680	77%			36	47					27 U	
2-Nitrotoluene	UG/KG	0	0%			0	31					15 U	
3,5-Dinitroaniline	UG/KG	0	0%			0	31					4.5 U	
3-Nitrotoluene	UG/KG	0	0%			0	31					10 UJ	
4-amino-2,6-Dinitrotoluene	UG/KG	500	57%			27	47					22 U	
4-Nitrotoluene	UG/KG	0	0%			0	31					34 U	
HMX	UG/KG	470	68%			32	47					11 U	
Nitrobenzene	UG/KG	0	0%			0	31					28 U	
Nitroglycerine	UG/KG	1,500	3%			1	31					160 U	
Pentaerythritol Tetranitrate	UG/KG	0	0%			0	31					300 U	
RDX	UG/KG	5,800	83%			39	47					8.6 U	
Tetryl	UG/KG	330	9%			4	47					6.9 UJ	

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Analytical Data for Surface and . : Soil Samples at OD Grounds
Feasibility Stu. JD Grounds
Seneca Army Depot

Parameter	Unit	Maximum Value	Frequency of Detection	Criteria Value	Number of Exceedances	Number of Times Detected	Number of Samples Analyzed	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual
Area								SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45
Loc ID								S45-R4-01	S45-R4-02	S45-R4-03	S45-R4-04	S45-R5-01	S45-R5-02
Sample ID								S45-R4-01	S45-R4-02	S45-R4-03	S45-R4-04	S45-R5-01	S45-R5-02
Matrix								SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Depth Interval (FT)								0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6
Sample Date								4/1/2010	4/1/2010	4/1/2010	4/1/2010	3/16/2010	3/16/2010
QC Type								SA	SA	SA	SA	SA	SA
Study ID								OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest
Pesticides/PCBs													
Aroclor-1016	UG/KG	0	0%	1,000	0	0	34					7.4 U	
Aroclor-1221	UG/KG	0	0%	1,000	0	0	34					17 U	
Aroclor-1232	UG/KG	0	0%	1,000	0	0	34					11 U	
Aroclor-1242	UG/KG	0	0%	1,000	0	0	34					7.1 U	
Aroclor-1248	UG/KG	0	0%	1,000	0	0	34					7.5 U	
Aroclor-1254	UG/KG	2,000	6%	1,000	1	2	34					5.8 U	
Aroclor-1260	UG/KG	0	0%	1,000	0	0	34					7.4 U	
4,4'-DDD	UG/KG	2.4	6%	92,000	0	2	34					0.24 U	
4,4'-DDE	UG/KG	4.2	63%	62,000	0	22	35					1.6 J	
4,4'-DDT	UG/KG	3.4	50%	47,000	0	17	34					0.38 U	
Aldrin	UG/KG	0	0%	680	0	0	34					0.34 U	
Alpha-BHC	UG/KG	0	0%	3,400	0	0	34					0.42 U	
Alpha-Chlordane	UG/KG	2	12%	24,000	0	4	34					0.26 U	
Beta-BHC	UG/KG	0	0%	3,000	0	0	34					0.4 U	
Delta-BHC	UG/KG	0	0%	500,000	0	0	34					0.39 U	
Dieldrin	UG/KG	3.2	41%	1,400	0	14	34					0.96 J	
Endosulfan I	UG/KG	55	60%	200,000	0	21	35					23 J	
Endosulfan II	UG/KG	0.88	3%	200,000	0	1	34					0.42 UJ	
Endosulfan sulfate	UG/KG	0	0%	200,000	0	0	34					0.71 U	
Endrin	UG/KG	3.6	3%	89,000	0	1	34					1 U	
Endrin aldehyde	UG/KG	0	0%			0	34					0.6 UJ	
Endrin ketone	UG/KG	0.58	3%			1	34					0.49 U	
Gamma-BHC/Lindane	UG/KG	0	0%	9,200	0	0	34					0.33 U	
Gamma-Chlordane	UG/KG	1.1	9%			3	34					0.28 U	
Heptachlor	UG/KG	0	0%	15,000	0	0	34					0.36 U	
Heptachlor epoxide	UG/KG	0	0%			0	34					0.27 U	
Methoxychlor	UG/KG	45	3%			1	34					0.61 U	
Toxaphene	UG/KG	0	0%			0	34					8.6 U	
Inorganics													
Aluminum	MG/KG	27,900	100%			97	97	19,000	21,300	19,400	5,910	17,200	16,700
Antimony	MG/KG	5.1	33%			32	97	0.18 U	0.42 J	0.11 U	2.2	0.14 J	3.1
Arsenic	MG/KG	12.6	100%	16	0	97	97	5.7	5	4.6	4	5	5.1
Barium	MG/KG	365	100%	400	0	97	97	140	299	89.7	27.9	152 J	257 J
Beryllium	MG/KG	1.2	98%	590	0	95	97	0.88	0.81	0.69	0.43 U	0.74 J	0.71 J
Cadmium	MG/KG	1,100	81%	9.3	11	77	95	1.6 U	4.1	1 U	0.86 U	6	3.3
Calcium	MG/KG	193,000	99%			96	97	13,200	40,500	2,900	193,000	31,200 J	17,100 J
Chromium	MG/KG	446	100%	1,500	0	97	97	28.4	29.7	25.1	10.6	26.1 J	25.6 J
Cobalt	MG/KG	26.8	100%			97	97	10.9	11.4	9.4	9.5	11.1 J	10 J
Copper	MG/KG	7,310	100%	270	52	97	97	82.6	263	39.1	38.9	221	**289**
Cyanide	MG/KG	0.7	13%	27	0	2	16						
Iron	MG/KG	118,000	100%			97	97	24,000	26,500	23,100	7,600	26,000 J	24,300 J
Lead	MG/KG	998	100%	1,000	0	97	97	22.5	28.3	21	29.7	86.2	352
Magnesium	MG/KG	15,000	100%			97	97	6,750	7,880	4,460	15,000	7,210 J	6,870 J
Manganese	MG/KG	5,040	100%	10,000	0	97	97	428	606	361	363	583 J	438 J
Nickel	MG/KG	59.3	100%	310	0	92	92	37	42.5	26.2	23.8	38.1 J	32.5 J
Potassium	MG/KG	4,880	100%			76	76	2,970	2,880	2,610	2,620	2,780 J	2,470 J
Selenium	MG/KG	0.92	4%	1,500	0	4	97	0.63 U	0.82 U	0.4 U	0.34 U	0.23 U	0.23 U
Silver	MG/KG	205	68%	1,500	0	66	97	0.42 J	0.47 J	0.23 J	0.04 U	1.6 U	1.6 U
Sodium	MG/KG	213	84%			81	97	81 U	112	59.1 J	179	135	110
Thallium	MG/KG	0.27	6%			6	97	0.27 U	0.35 U	0.17 U	0.14 U	0.1 U	0.1 U
Vanadium	MG/KG	41.9	100%			97	97	33.6	29.5	32.2	16.6	26.7 J	27.5 J
Zinc	MG/KG	1,470	100%	10,000	0	92	92	160	938	99.2	66.8	284 J	335 J
Mercury	MG/KG	9.1	99%	2.8	49	96	97	1.4	0.9	0.48	0.15	**3.7**	1.6

Notes
1) Chemical result qualifiers are assigned by the laboratory and are evaluated and modified (if necessary) by during data validation
U = non-detect, i.e. not detected equal to or above this value
J = estimated (detect or non-detect) value
[blank] = detect, i.e. detected chemical result value
R = Rejected, data validation rejected the results.
2) Num of Analyses is the number of detected and non-detected results excluding rejected results. Sample duplicate pairs have not been averaged
3) Chemical results greater than the action level are highlighted, bolded and boxed
4) Criteria action level source document and web address
- The NYS SCO Commercial Use values were obtained from the NYSDEC Soil Cleanup Objectives
http://www.dec.ny.gov/regs/15507.html

Table A-1
Analytical Data for Surface and Subsurface Soil Samples at OD Grounds
Feasibility Studies - OD Grounds
Seneca Army Depot

Area								SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45
Loc ID								S45-R5-03	S45-R5-04	S45-R5-04	S45-R5-05	S45-R5-06	S45-R5-07
Sample ID								S45-R5-03	S45-R5-04	S45-R5-04D	S45-R5-05	S45-R5-06	S45-R5-07
Matrix								SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Depth Interval (FT)								0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6
Sample Date								3/16/2010	3/16/2010	3/16/2010	3/16/2010	3/16/2010	3/16/2010
QC Type								SA	SA	DU	SA	SA	SA
Study ID								OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest
Parameter	Unit	Maximum Value	Frequency of Detection	Criteria Value	Number of Exceedances	Number of Times Detected	Number of Samples Analyzed	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual
Volatile Organic Compounds													
1,1,1-Trichloroethane	UG/KG	0	0%	500,000	0	0	16						
1,1,2,2-Tetrachloroethane	UG/KG	0	0%			0	16						
1,1,2-Trichloroethane	UG/KG	0	0%			0	16						
1,1-Dichloroethane	UG/KG	0	0%	240,000	0	0	16						
1,1-Dichloroethene	UG/KG	0	0%	500,000	0	0	16						
1,2-Dichloroethane	UG/KG	0	0%	30,000	0	0	16						
1,2-Dichloroethene (total)	UG/KG	0	0%	500,000	0	0	16						
1,2-Dichloropropane	UG/KG	0	0%			0	16						
Acetone	UG/KG	0	0%	500,000	0	0	16						
Benzene	UG/KG	0	0%	44,000	0	0	16						
Bromodichloromethane	UG/KG	0	0%			0	16						
Bromoform	UG/KG	0	0%			0	16						
Carbon disulfide	UG/KG	0	0%			0	16						
Carbon tetrachloride	UG/KG	0	0%	22,000	0	0	16						
Chlorobenzene	UG/KG	0	0%	500,000	0	0	16						
Chlorodibromomethane	UG/KG	0	0%			0	16						
Chloroethane	UG/KG	0	0%			0	16						
Chloroform	UG/KG	0	0%	350,000	0	0	16						
Cis-1,3-Dichloropropene	UG/KG	0	0%			0	16						
Ethyl benzene	UG/KG	0	0%	390,000	0	0	16						
Methyl bromide	UG/KG	0	0%			0	16						
Methyl butyl ketone	UG/KG	0	0%			0	16						
Methyl chloride	UG/KG	0	0%			0	16						
Methyl ethyl ketone	UG/KG	0	0%	500,000	0	0	16						
Methyl isobutyl ketone	UG/KG	0	0%			0	16						
Methylene chloride	UG/KG	0	0%	500,000	0	0	16						
Styrene	UG/KG	0	0%			0	16						
Tetrachloroethene	UG/KG	19	38%	150,000	0	6	16						
Toluene	UG/KG	0	0%	500,000	0	0	16						
Total Xylenes	UG/KG	0	0%	500,000	0	0	16						
Trans-1,3-Dichloropropene	UG/KG	0	0%			0	16						
Trichloroethene	UG/KG	0	0%	200,000	0	0	16						
Vinyl chloride	UG/KG	0	0%	13,000	0	0	16						
Semivolatile Organic Compounds													
1,2,4-Trichlorobenzene	UG/KG	0	0%			0	35	100 U	98 U	100 U	97 U		
1,2-Dichlorobenzene	UG/KG	0	0%	500,000	0	0	35	110 U	110 U	110 U	100 U		
1,3-Dichlorobenzene	UG/KG	0	0%	280,000	0	0	35	100 U	94 U	97 U	93 U		
1,4-Dichlorobenzene	UG/KG	0	0%	130,000	0	0	35	110 U	100 U	110 U	100 U		
2,2'-oxybis(1-Chloropropane)	UG/KG	0	0%			0	16						
2,4,5-Trichlorophenol	UG/KG	0	0%			0	35	200 U	190 U	190 U	180 U		
2,4,6-Trichlorophenol	UG/KG	0	0%			0	35	200 UJ	190 UJ	190 UJ	180 UJ		
2,4-Dichlorophenol	UG/KG	0	0%			0	35	190 UJ	180 UJ	190 UJ	180 UJ		
2,4-Dimethylphenol	UG/KG	0	0%			0	35	210 UJ	200 UJ	200 UJ	200 UJ		
2,4-Dinitrophenol	UG/KG	0	0%			0	35	490 UJ	450 UJ	470 UJ	450 UJ		
2,4-Dinitrotoluene	UG/KG	14,000	37%			13	35	110 U	100 U	110 U	100 U		
2,6-Dinitrotoluene	UG/KG	700	6%			2	35	100 U	95 U	99 U	95 U		
2-Chloronaphthalene	UG/KG	0	0%			0	35	110 UJ	100 UJ	110 UJ	100 UJ		
2-Chlorophenol	UG/KG	0	0%			0	35	210 UJ	200 UJ	200 UJ	200 UJ		
2-Methylnaphthalene	UG/KG	0	0%			0	35	120 U	110 U	110 U	110 U		
2-Methylphenol	UG/KG	0	0%	500,000	0	0	35	260 UJ	240 UJ	250 UJ	240 UJ		
2-Nitroaniline	UG/KG	0	0%			0	35	97 U	90 U	94 U	90 U		
2-Nitrophenol	UG/KG	0	0%			0	35	220 UJ	200 UJ	210 UJ	200 UJ		
3 or 4-Methylphenol	UG/KG	0	0%			0	19	240 UJ	220 UJ	230 UJ	220 UJ		
3,3'-Dichlorobenzidine	UG/KG	0	0%			0	35	150 UJ	140 UJ	140 UJ	140 UJ		
3-Nitroaniline	UG/KG	0	0%			0	35	120 UJ	110 UJ	120 UJ	110 UJ		
4,6-Dinitro-2-methylphenol	UG/KG	0	0%			0	35	440 U	410 U	420 U	400 U		
4-Bromophenyl phenyl ether	UG/KG	0	0%			0	35	110 U	100 U	110 U	100 U		
4-Chloro-3-methylphenol	UG/KG	0	0%			0	35	220 U	200 U	210 U	200 U		
4-Chloroaniline	UG/KG	0	0%			0	35	150 UJ	140 UJ	150 UJ	140 UJ		
4-Chlorophenyl phenyl ether	UG/KG	0	0%			0	35	100 U	94 U	97 U	93 U		
4-Methylphenol	UG/KG	0	0%	500,000	0	0	16						
4-Nitroaniline	UG/KG	0	0%			0	35	170 UJ	160 UJ	170 UJ	160 UJ		
4-Nitrophenol	UG/KG	0	0%			0	35	400 U	370 U	380 U	370 U		
Acenaphthene	UG/KG	0	0%	500,000	0	0	35	84 U	78 U	81 U	78 U		
Acenaphthylene	UG/KG	30	9%	500,000	0	3	35	91 U	84 U	87 U	84 U		
Anthracene	UG/KG	18	6%	500,000	0	2	35	110 U	100 U	100 U	100 U		
Benzo(a)anthracene	UG/KG	50	23%	5,600	0	8	35	110 U	100 U	110 U	100 U		
Benzo(a)pyrene	UG/KG	82	23%	1,000	0	8	35	120 U	110 U	120 U	110 U		
Benzo(b)fluoranthene	UG/KG	55	26%	5,600	0	9	35	170 U	160 U	170 U	160 U		
Benzo(ghi)perylene	UG/KG	66	20%	500,000	0	7	35	130 U	120 U	130 U	120 U		
Benzo(k)fluoranthene	UG/KG	58	20%	56,000	0	7	35	110 U	100 U	100 U	99 U		

Ta
Analytical Data for Surface and S Soil Samples at OD Grounds
Feasibility Stu D Grounds
Seneca Army Depot

Area								SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45
Loc ID								S45-R5-03	S45-R5-04	S45-R5-04	S45-R5-05	S45-R5-06	S45-R5-07
Sample ID								S45-R5-03	S45-R5-04	S45-R5-04D	S45-R5-05	S45-R5-06	S45-R5-07
Matrix								SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Depth Interval (FT)								0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6
Sample Date								3/16/2010	3/16/2010	3/16/2010	3/16/2010	3/16/2010	3/16/2010
QC Type								SA	SA	DU	SA	SA	SA
Study ID								OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest
Parameter	Unit	Maximum Value	Frequency of Detection	Criteria Value	Number of Exceedances	Number of Times Detected	Number of Samples Analyzed	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual
Bis(2-Chloroethoxy)methane	UG/KG	0	0%			0	35	120 UJ	120 UJ	120 UJ	120 UJ		
Bis(2-Chloroethyl)ether	UG/KG	0	0%			0	35	100 U	98 U	100 U	97 U		
Bis(2-Chloroisopropyl)ether	UG/KG	0	0%			0	19	120 U	110 U	110 U	110 U		
Bis(2-Ethylhexyl)phthalate	UG/KG	740	26%			9	35	130 U	120 U	120 U	120 U		
Butylbenzylphthalate	UG/KG	0	0%			0	35	120 U	110 U	120 U	110 U		
Carbazole	UG/KG	0	0%			0	35	140 U	130 U	140 U	130 U		
Chrysene	UG/KG	130	34%	56,000	0	12	35	120 U	110 U	120 U	110 U		
Dibenz(a,h)anthracene	UG/KG	0	0%	560	0	0	35	170 U	150 U	160 U	150 U		
Dibenzofuran	UG/KG	0	0%	350,000	0	0	35	100 U	95 U	99 U	95 U		
Diethyl phthalate	UG/KG	35	3%			1	35	100 U	96 U	100 U	96 U		
Dimethylphthalate	UG/KG	0	0%			0	35	100 U	94 U	97 U	93 U		
Di-n-butylphthalate	UG/KG	6,800	34%			12	35	130 U	120 U	130 U	120 U		
Di-n-octylphthalate	UG/KG	0	0%			0	35	270 U	250 U	260 U	250 U		
Fluoranthene	UG/KG	68	31%	500,000	0	11	35	140 U	130 U	130 U	130 U		
Fluorene	UG/KG	0	0%	500,000	0	0	35	100 U	98 U	100 U	97 U		
Hexachlorobenzene	UG/KG	110	31%	6,000	0	11	35	110 U	99 U	100 U	98 U		
Hexachlorobutadiene	UG/KG	0	0%			0	35	110 U	100 U	100 U	99 U		
Hexachlorocyclopentadiene	UG/KG	0	0%			0	35	110 UJ	99 UJ	100 UJ	98 UJ		
Hexachloroethane	UG/KG	1,100	17%			6	35	120 U	120 U	120 U	120 U		
Indeno(1,2,3-cd)pyrene	UG/KG	52	11%	5,600	0	4	35	160 U	150 U	150 U	150 U		
Isophorone	UG/KG	0	0%			0	35	97 U	90 U	94 U	90 U		
Naphthalene	UG/KG	30	14%	500,000	0	5	35	110 U	100 U	110 U	100 U		
Nitrobenzene	UG/KG	0	0%			0	35	120 U	110 U	110 U	110 U		
N-Nitrosodiphenylamine	UG/KG	320	6%			2	35	280 UJ	260 UJ	270 UJ	260 UJ		
N-Nitrosodipropylamine	UG/KG	1,600	14%			5	35	110 U	100 U	100 U	99 U		
Pentachlorophenol	UG/KG	0	0%	6,700	0	0	35	310 UJ	280 UJ	300 UJ	280 UJ		
Phenanthrene	UG/KG	46	26%	500,000	0	9	35	110 U	100 U	100 U	99 U		
Phenol	UG/KG	0	0%	500,000	0	0	35	200 U	190 U	190 U	190 U		
Pyrene	UG/KG	110	34%	500,000	0	12	35	130 U	120 U	130 U	120 U		
Herbicides													
2,4,5-T	UG/KG	0	0%			0	35	21 U	20 U	19 U	18 U		
2,4,5-TP/Silvex	UG/KG	0	0%	500,000	0	0	35	17 U	16 U	15 U	14 U		
2,4-D	UG/KG	0	0%			0	35	43 U	41 U	38 U	37 U		
2,4-DB	UG/KG	0	0%			0	35	31 U	30 U	28 U	27 U		
Dalapon	UG/KG	0	0%			0	35	11 U	10 U	9.8 U	9.5 U		
Dicamba	UG/KG	0	0%			0	35	15 U	14 U	13 U	13 U		
Dichloroprop	UG/KG	0	0%			0	35	25 U	24 U	22 U	22 U		
Dinoseb	UG/KG	0	0%			0	35	3.4 UJ	3.3 UJ	3 UJ	3 UJ		
MCPA	UG/KG	9,400	6%			2	35	3,100 U	3,000 U	2,800 U	2,700 U		
MCPP	UG/KG	0	0%			0	35	2,900 U	2,800 U	2,600 U	2,500 U		
Explosives													
1,3,5-Trinitrobenzene	UG/KG	190	60%			28	47	8 U	7.4 U	7.5 U	7.3 U		
1,3-Dinitrobenzene	UG/KG	0	0%			0	47	7.4 U	6.8 U	6.9 U	6.7 U		
2,4,6-Trinitrotoluene	UG/KG	1,400	81%			38	47	8 U	7.4 U	7.5 U	470		
2,4-Dinitrotoluene	UG/KG	1,100	77%			36	47	18 U	16 U	17 U	840		
2,6-Dinitrotoluene	UG/KG	0	0%			0	47	32 U	30 U	30 U	29 U		
2-amino-4,6-Dinitrotoluene	UG/KG	680	77%			36	47	25 U	23 U	23 U	23 U		
2-Nitrotoluene	UG/KG	0	0%			0	31	14 U	13 U	13 U	13 U		
3,5-Dinitroaniline	UG/KG	0	0%			0	31	4.2 U	3.9 U	3.9 U	3.8 U		
3-Nitrotoluene	UG/KG	0	0%			0	31	9.5 UJ	8.7 UJ	8.8 UJ	8.6 UJ		
4-amino-2,6-Dinitrotoluene	UG/KG	500	57%			27	47	20 U	19 U	19 U	18 U		
4-Nitrotoluene	UG/KG	0	0%			0	31	32 U	30 U	30 U	29 U		
HMX	UG/KG	470	68%			32	47	10 U	9.5 U	9.6 U	9.3 U		
Nitrobenzene	UG/KG	0	0%			0	31	26 U	24 U	24 U	24 U		
Nitroglycerine	UG/KG	1,500	3%			1	31	150 U	140 U	140 U	130 U		
Pentaerythritol Tetranitrate	UG/KG	0	0%			0	31	290 U	260 U	270 U	260 U		
RDX	UG/KG	5,800	83%			39	47	8.2 U	7.5 U	7.6 U	7.4 U		
Tetryl	UG/KG	330	9%			4	47	6.5 UJ	6 UJ	6 UJ	5.9 UJ		

Table A-1
Analytical Data for Surface and Subsurface Soil Samples at OD Grounds
Feasibility Studies - OD Grounds
Seneca Army Depot

Parameter	Unit	Maximum Value	Frequency of Detection	Criteria Value	Number of Exceedances	Number of Times Detected	Number of Samples Analyzed	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual
Area								SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45
Loc ID								S45-R5-03	S45-R5-04	S45-R5-04	S45-R5-05	S45-R5-06	S45-R5-07
Sample ID								S45-R5-03	S45-R5-04	S45-R5-04D	S45-R5-05	S45-R5-06	S45-R5-07
Matrix								SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Depth Interval (FT)								0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.8	0.2-0.6	0.2-0.6
Sample Date								3/16/2010	3/16/2010	3/16/2010	3/16/2010	3/16/2010	3/16/2010
QC Type								SA	SA	DU	SA	SA	SA
Study ID								OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest
Pesticides/PCBs													
Aroclor-1016	UG/KG	0	0%	1,000	0	0	34	8.3 U	7.1 U	7.7 U	7.2 U		
Aroclor-1221	UG/KG	0	0%	1,000	0	0	34	19 U	17 U	18 U	17 U		
Aroclor-1232	UG/KG	0	0%	1,000	0	0	34	13 U	11 U	12 U	11 U		
Aroclor-1242	UG/KG	0	0%	1,000	0	0	34	8 U	6.9 U	7.4 U	6.9 U		
Aroclor-1248	UG/KG	0	0%	1,000	0	0	34	8.4 U	7.3 U	7.8 U	7.3 U		
Aroclor-1254	UG/KG	2,000	6%	1,000	1	2	34	6.5 U	5.6 U	6 U	5.6 U		
Aroclor-1260	UG/KG	0	0%	1,000	0	0	34	8.3 U	7.1 U	7.7 U	7.2 U		
4,4'-DDD	UG/KG	2.4	6%	92,000	0	2	34	0.28 U	0.24 U	0.26 U	0.24 U		
4,4'-DDE	UG/KG	4.2	63%	62,000	0	22	35	1.7 J	0.23 U	0.24 U	0.85 J		
4,4'-DDT	UG/KG	3.4	50%	47,000	0	17	34	1.2 J	0.37 U	0.4 U	0.37 U		
Aldrin	UG/KG	0	0%	680	0	0	34	0.38 U	0.33 U	0.36 U	0.34 U		
Alpha-BHC	UG/KG	0	0%	3,400	0	0	34	0.47 U	0.4 U	0.44 U	0.41 U		
Alpha-Chlordane	UG/KG	2	12%	24,000	0	4	34	0.29 U	0.25 U	0.27 U	0.25 U		
Beta-BHC	UG/KG	0	0%	3,000	0	0	34	0.45 U	0.39 U	0.42 U	0.4 U		
Delta-BHC	UG/KG	0	0%	500,000	0	0	34	0.44 U	0.38 U	0.41 U	0.38 U		
Dieldrin	UG/KG	3.2	41%	1,400	0	14	34	1.1 J	0.26 U	0.28 U	0.79 J		
Endosulfan I	UG/KG	55	60%	200,000	0	21	35	1.3 JN	0.28 UJ	55 J	0.29 UJ		
Endosulfan II	UG/KG	0.88	3%	200,000	0	1	34	0.47 UJ	0.4 UJ	0.44 UJ	0.41 UJ		
Endosulfan sulfate	UG/KG	0	0%	200,000	0	0	34	0.8 U	0.69 U	0.74 U	0.69 U		
Endrin	UG/KG	3.6	3%	89,000	0	1	34	1.2 U	1 U	1.1 U	1 U		
Endrin aldehyde	UG/KG	0	0%			0	34	0.68 UJ	0.58 UJ	0.63 UJ	0.59 UJ		
Endrin ketone	UG/KG	0.58	3%			1	34	0.55 U	0.48 U	0.51 U	0.48 U		
Gamma-BHC/Lindane	UG/KG	0	0%	9,200	0	0	34	0.37 U	0.32 U	0.35 U	0.32 U		
Gamma-Chlordane	UG/KG	1.1	9%			3	34	0.32 U	0.27 U	0.3 U	0.28 U		
Heptachlor	UG/KG	0	0%	15,000	0	0	34	0.4 U	0.34 U	0.37 U	0.35 U		
Heptachlor epoxide	UG/KG	0	0%			0	34	0.3 U	0.26 U	0.28 U	0.26 U		
Methoxychlor	UG/KG	45	3%			1	34	0.69 U	0.6 U	0.64 U	0.6 U		
Toxaphene	UG/KG	0	0%			0	34	9.6 U	8.3 U	9 U	8.4 U		
Inorganics													
Aluminum	MG/KG	27,900	100%			97	97	18,900	18,100	18,800	18,700	21,600	16,100
Antimony	MG/KG	5.1	33%			32	97	0.15 U	0.09 UJ	0.12 UJ	0.11 U	0.11 U	0.18 J
Arsenic	MG/KG	12.6	100%	16	0	97	97	5.4	5.5	7	5.2	5.2	5.1
Barium	MG/KG	365	100%	400	0	97	97	177 J	106 J	114 J	165 J	148 J	111 J
Beryllium	MG/KG	1.2	98%	590	0	95	97	0.85 J	0.9 J	0.95 J	0.79 J	0.86 J	0.75 J
Cadmium	MG/KG	1,100	81%	9.3	11	77	95	6.4	0.86 U	0.46 J	5.1	0.62 J	8.3
Calcium	MG/KG	193,000	99%			96	97	20,600 J	3,290 J	3,490 J	29,300 J	5,100 J	41,300 J
Chromium	MG/KG	446	100%	1,500	0	97	97	29.7 J	26.4 J	28 J	26.7 J	28.8 J	25.6 J
Cobalt	MG/KG	26.8	100%			97	97	13.4 J	11 J	16.4 J	10 J	9.2 J	11.8 J
Copper	MG/KG	7,310	100%	270	52	97	97	[illegible]	31.5	33.6	219	44.4	210
Cyanide	MG/KG	0.7	13%	27	0	2	16						
Iron	MG/KG	118,000	100%			97	97	25,400 J	25,800 J	30,400 J	25,400 J	25,200 J	26,800 J
Lead	MG/KG	998	100%	1,000	0	97	97	60	11.9 J	15.4 J	42.9	12.9	44.6
Magnesium	MG/KG	15,000	100%			97	97	7,260 J	4,980 J	5,330 J	7,140 J	5,740 J	8,440 J
Manganese	MG/KG	5,040	100%	10,000	0	97	97	662 J	336 J	787 J	489 J	395 J	591 J
Nickel	MG/KG	59.3	100%	310	0	92	92	40.1 J	43 J	56 J	33.4 J	29.8 J	38.9 J
Potassium	MG/KG	4,880	100%			76	76	3,060 J	2,670 J	2,960 J	3,220 J	4,140 J	2,640 J
Selenium	MG/KG	0.92	4%	1,500	0	4	97	0.33 U	0.19 U	0.26 U	0.24 U	0.25 U	0.25 U
Silver	MG/KG	205	68%	1,500	0	66	97	2.6	0.06 U	0.08 U	1.7 U	1.7 U	1.7 U
Sodium	MG/KG	213	84%			81	97	103	86 U	70.2 J	127	110 U	132
Thallium	MG/KG	0.27	6%			6	97	0.14 U	0.08 U	0.11 U	0.1 U	0.11 U	0.1 U
Vanadium	MG/KG	41.9	100%			97	97	31.8 J	29.7 J	31.2 J	30.1 J	37.3 J	25 J
Zinc	MG/KG	1,470	100%	10,000	0	92	92	304 J	80.2 J	83.9 J	360 J	89.5 J	230 J
Mercury	MG/KG	9.1	99%	2.8	49	96	97	[illegible]	0.03 J	0.039 U	1.3	0.23	1

Notes:

1) Chemical result qualifiers are assigned by the laboratory and are evaluated and modified (if necessary) by during data validation.

U = non-detect, i.e. not detected equal to or above this value. J = estimated (detect or non-detect) value.

(blank) = detect, i.e. detected chemical result value. R = Rejected, data validation rejected the results.

2) Num of Analyses is the number of detected and non-detected results excluding rejected results. Sample duplicate pairs have not been averaged.

3) Chemical results greater than the action level are highlighted, bolded and boxed

4) Criteria action level source document and web address.

- The NYS SCO Commercial Use values were obtained from the NYSDEC Soil Cleanup Objectives.

http://www.dec.ny.gov/regs/15507.html

Parameter	Unit	Maximum Value	Frequency of Detection	Criteria Value	Number of Exceedances	Number of Times Detected	Number of Samples Analyzed	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual
Area								SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45
Loc ID								S45-R5-08	S45-TP-1-01	S45-TP-1-02	S45-TP-1-03	S45-TP-1-04	S45-TP-2-01
Sample ID								S45-R5-08	S45-TP-1-01	S45-TP-1-02	S45-TP-1-03	S45-TP-1-04	S45-TP-2-01
Matrix								SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Depth Interval (FT)								0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6
Sample Date								3/16/2010	3/12/2010	3/12/2010	3/12/2010	3/12/2010	3/12/2010
QC Type								SA	SA	SA	SA	SA	SA
Study ID								OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest
Volatile Organic Compounds													
1,1,1-Trichloroethane	UG/KG	0	0%	500,000	0	0	16						
1,1,2,2-Tetrachloroethane	UG/KG	0	0%			0	16						
1,1,2-Trichloroethane	UG/KG	0	0%			0	16						
1,1-Dichloroethane	UG/KG	0	0%	240,000	0	0	16						
1,1-Dichloroethene	UG/KG	0	0%	500,000	0	0	16						
1,2-Dichloroethane	UG/KG	0	0%	30,000	0	0	16						
1,2-Dichloroethene (total)	UG/KG	0	0%	500,000	0	0	16						
1,2-Dichloropropane	UG/KG	0	0%			0	16						
Acetone	UG/KG	0	0%	500,000	0	0	16						
Benzene	UG/KG	0	0%	44,000	0	0	16						
Bromodichloromethane	UG/KG	0	0%			0	16						
Bromoform	UG/KG	0	0%			0	16						
Carbon disulfide	UG/KG	0	0%			0	16						
Carbon tetrachloride	UG/KG	0	0%	22,000	0	0	16						
Chlorobenzene	UG/KG	0	0%	500,000	0	0	16						
Chlorodibromomethane	UG/KG	0	0%			0	16						
Chloroethane	UG/KG	0	0%			0	16						
Chloroform	UG/KG	0	0%	350,000	0	0	16						
Cis-1,3-Dichloropropene	UG/KG	0	0%			0	16						
Ethyl benzene	UG/KG	0	0%	390,000	0	0	16						
Methyl bromide	UG/KG	0	0%			0	16						
Methyl butyl ketone	UG/KG	0	0%			0	16						
Methyl chloride	UG/KG	0	0%			0	16						
Methyl ethyl ketone	UG/KG	0	0%	500,000	0	0	16						
Methyl isobutyl ketone	UG/KG	0	0%			0	16						
Methylene chloride	UG/KG	0	0%	500,000	0	0	16						
Styrene	UG/KG	0	0%			0	16						
Tetrachloroethene	UG/KG	19	38%	150,000	0	6	16						
Toluene	UG/KG	0	0%	500,000	0	0	16						
Total Xylenes	UG/KG	0	0%	500,000	0	0	16						
Trans-1,3-Dichloropropene	UG/KG	0	0%			0	16						
Trichloroethene	UG/KG	0	0%	200,000	0	0	16						
Vinyl chloride	UG/KG	0	0%	13,000	0	0	16						
Semivolatile Organic Compounds													
1,2,4-Trichlorobenzene	UG/KG	0	0%			0	35		92 U				90 U
1,2-Dichlorobenzene	UG/KG	0	0%	500,000	0	0	35		100 U				98 U
1,3-Dichlorobenzene	UG/KG	0	0%	280,000	0	0	35		88 U				87 U
1,4-Dichlorobenzene	UG/KG	0	0%	130,000	0	0	35		97 U				96 U
2,2'-oxybis(1-Chloropropane)	UG/KG	0	0%			0	16						
2,4,5-Trichlorophenol	UG/KG	0	0%			0	35		180 U				170 U
2,4,6-Trichlorophenol	UG/KG	0	0%			0	35		180 U				170 U
2,4-Dichlorophenol	UG/KG	0	0%			0	35		170 U				170 U
2,4-Dimethylphenol	UG/KG	0	0%			0	35		190 U				180 U
2,4-Dinitrophenol	UG/KG	0	0%			0	35		430 U				420 U
2,4-Dinitrotoluene	UG/KG	14,000	37%			13	35		380				94 U
2,6-Dinitrotoluene	UG/KG	700	6%			2	35		90 U				88 U
2-Chloronaphthalene	UG/KG	0	0%			0	35		99 U				97 U
2-Chlorophenol	UG/KG	0	0%			0	35		180 U				180 U
2-Methylnaphthalene	UG/KG	0	0%			0	35		100 U				100 U
2-Methylphenol	UG/KG	0	0%	500,000	0	0	35		230 U				220 U
2-Nitroaniline	UG/KG	0	0%			0	35		85 U				83 U
2-Nitrophenol	UG/KG	0	0%			0	35		190 U				180 U
3 or 4-Methylphenol	UG/KG	0	0%			0	19		210 U				210 U
3,3'-Dichlorobenzidine	UG/KG	0	0%			0	35		130 U				130 U
3-Nitroaniline	UG/KG	0	0%			0	35		110 U				100 U
4,6-Dinitro-2-methylphenol	UG/KG	0	0%			0	35		380 U				370 U
4-Bromophenyl phenyl ether	UG/KG	0	0%			0	35		96 U				94 U
4-Chloro-3-methylphenol	UG/KG	0	0%			0	35		190 U				180 U
4-Chloroaniline	UG/KG	0	0%			0	35		130 U				130 U
4-Chlorophenyl phenyl ether	UG/KG	0	0%			0	35		88 U				87 U
4-Methylphenol	UG/KG	0	0%	500,000	0	0	16						
4-Nitroaniline	UG/KG	0	0%			0	35		150 U				150 U
4-Nitrophenol	UG/KG	0	0%			0	35		350 U				340 U
Acenaphthene	UG/KG	0	0%	500,000	0	0	35		74 U				72 U
Acenaphthylene	UG/KG	30	9%	500,000	0	3	35		79 U				78 U
Anthracene	UG/KG	18	6%	500,000	0	2	35		95 U				93 U
Benzo(a)anthracene	UG/KG	50	23%	5,600	0	8	35		97 U				96 U
Benzo(a)pyrene	UG/KG	82	23%	1,000	0	8	35		100 U				100 U
Benzo(b)fluoranthene	UG/KG	55	26%	5,600	0	9	35		150 U				150 U
Benzo(ghi)perylene	UG/KG	66	20%	500,000	0	7	35		120 UJ				120 UJ
Benzo(k)fluoranthene	UG/KG	58	20%	56,000	0	7	35		94 U				92 U

Table A-1
Analytical Data for Surface and Subsurface Soil Samples at OD Grounds
Feasibility Studies - OD Grounds
Seneca Army Depot

Parameter	Unit	Maximum Value	Frequency of Detection	Criteria Value	Number of Exceedances	Number of Times Detected	Number of Samples Analyzed	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual
Area								SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45
Loc ID								S45-R5-08	S45-TP-1-01	S45-TP-1-02	S45-TP-1-03	S45-TP-1-04	S45-TP-2-01
Sample ID								S45-R5-08	S45-TP-1-01	S45-TP-1-02	S45-TP-1-03	S45-TP-1-04	S45-TP-2-01
Matrix								SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Depth Interval (FT)								0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6
Sample Date								3/16/2010	3/12/2010	3/12/2010	3/12/2010	3/12/2010	3/12/2010
QC Type								SA	SA	SA	SA	SA	SA
Study ID								OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest
Bis(2-Chloroethoxy)methane	UG/KG	0	0%			0	35		110 U				110 U
Bis(2-Chloroethyl)ether	UG/KG	0	0%			0	35		92 U				90 U
Bis(2-Chloroisopropyl)ether	UG/KG	0	0%			0	19		100 U				99 U
Bis(2-Ethylhexyl)phthalate	UG/KG	740	26%			9	35		110 U				110 U
Butylbenzylphthalate	UG/KG	0	0%			0	35		100 U				100 U
Carbazole	UG/KG	0	0%			0	35		120 U				120 U
Chrysene	UG/KG	130	34%	56,000	0	12	35		110 U				100 U
Dibenz(a,h)anthracene	UG/KG	0	0%	560	0	0	35		140 U				140 U
Dibenzofuran	UG/KG	0	0%	350,000	0	0	35		90 U				88 U
Diethyl phthalate	UG/KG	35	3%			1	35		91 U				89 U
Dimethylphthalate	UG/KG	0	0%			0	35		88 U				87 U
Di-n-butylphthalate	UG/KG	6,800	34%			12	35		410				110 U
Di-n-octylphthalate	UG/KG	0	0%			0	35		240 U				230 U
Fluoranthene	UG/KG	68	31%	500,000	0	11	35		120 U				120 U
Fluorene	UG/KG	0	0%	500,000	0	0	35		92 U				90 U
Hexachlorobenzene	UG/KG	110	31%	6,000	0	11	35		93 U				91 U
Hexachlorobutadiene	UG/KG	0	0%			0	35		94 U				92 U
Hexachlorocyclopentadiene	UG/KG	0	0%			0	35		93 U				91 U
Hexachloroethane	UG/KG	1,100	17%			6	35		110 U				110 U
Indeno(1,2,3-cd)pyrene	UG/KG	52	11%	5,600	0	4	35		140 U				140 U
Isophorone	UG/KG	0	0%			0	35		85 U				83 U
Naphthalene	UG/KG	30	14%	500,000	0	5	35		99 U				97 U
Nitrobenzene	UG/KG	0	0%			0	35		100 U				100 U
N-Nitrosodiphenylamine	UG/KG	320	6%			2	35		250 U				240 U
N-Nitrosodipropylamine	UG/KG	1,600	14%			5	35		94 U				92 U
Pentachlorophenol	UG/KG	0	0%	6,700	0	0	35		270 U				260 U
Phenanthrene	UG/KG	46	26%	500,000	0	9	35		94 U				92 U
Phenol	UG/KG	0	0%	500,000	0	0	35		180 U				170 U
Pyrene	UG/KG	110	34%	500,000	0	12	35		110 U				110 U
Herbicides													
2,4,5-T	UG/KG	0	0%			0	35		17 U				17 U
2,4,5-TP/Silvex	UG/KG	0	0%	500,000	0	0	35		14 U				14 U
2,4-D	UG/KG	0	0%			0	35		35 U				35 U
2,4-DB	UG/KG	0	0%			0	35		25 U				26 U
Dalapon	UG/KG	0	0%			0	35		9 U				9.1 U
Dicamba	UG/KG	0	0%			0	35		12 U				12 U
Dichloroprop	UG/KG	0	0%			0	35		20 U				21 U
Dinoseb	UG/KG	0	0%			0	35		2.8 U				2.8 U
MCPA	UG/KG	9,400	6%			2	35		2,500 U				2,600 U
MCPP	UG/KG	0	0%			0	35		2,400 U				2,400 U
Explosives													
1,3,5-Trinitrobenzene	UG/KG	190	60%			28	47		55 NJ				59 J
1,3-Dinitrobenzene	UG/KG	0	0%			0	47		7.1 U				6.6 U
2,4,6-Trinitrotoluene	UG/KG	1,400	81%			38	47		44 J				50 J
2,4-Dinitrotoluene	UG/KG	1,100	77%			36	47		98 J				91 J
2,6-Dinitrotoluene	UG/KG	0	0%			0	47		31 U				29 U
2-amino-4,6-Dinitrotoluene	UG/KG	680	77%			36	47		170 J				190 J
2-Nitrotoluene	UG/KG	0	0%			0	31		14 U				13 U
3,5-Dinitroaniline	UG/KG	0	0%			0	31		4 U				3.8 U
3-Nitrotoluene	UG/KG	0	0%			0	31		9.1 UJ				8.5 UJ
4-amino-2,6-Dinitrotoluene	UG/KG	500	57%			27	47		180				200
4-Nitrotoluene	UG/KG	0	0%			0	31		31 U				29 U
HMX	UG/KG	470	68%			32	47		97 J				160
Nitrobenzene	UG/KG	0	0%			0	31		25 U				24 U
Nitroglycerine	UG/KG	1,500	3%			1	31		140 U				130 U
Pentaerythritol Tetranitrate	UG/KG	0	0%			0	31		280 U				260 U
RDX	UG/KG	5,800	83%			39	47		190				220
Tetryl	UG/KG	330	9%			4	47		6.2 U				5.8 U

Parameter	Unit	Maximum Value	Frequency of Detection	Criteria Value	Number of Exceedances	Number of Times Detected	Number of Samples Analyzed	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual
Area								SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45
Loc ID								S45-R5-08	S45-TP-1-01	S45-TP-1-02	S45-TP-1-03	S45-TP-1-04	S45-TP-2-01
Sample ID								S45-R5-08	S45-TP-1-01	S45-TP-1-02	S45-TP-1-03	S45-TP-1-04	S45-TP-2-01
Matrix								SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Depth Interval (FT)								0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6
Sample Date								3/16/2010	3/12/2010	3/12/2010	3/12/2010	3/12/2010	3/12/2010
QC Type								SA	SA	SA	SA	SA	SA
Study ID								OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest
Pesticides/PCBs													
Aroclor-1016	UG/KG	0	0%	1,000	0	0	34		6.9 U				6.7 U
Aroclor-1221	UG/KG	0	0%	1,000	0	0	34		16 U				16 U
Aroclor-1232	UG/KG	0	0%	1,000	0	0	34		11 U				10 U
Aroclor-1242	UG/KG	0	0%	1,000	0	0	34		6.6 U				6.5 U
Aroclor-1248	UG/KG	0	0%	1,000	0	0	34		7 U				6.8 U
Aroclor-1254	UG/KG	2,000	6%	1,000	1	2	34		5.4 U				5.3 U
Aroclor-1260	UG/KG	0	0%	1,000	0	0	34		6.9 U				6.7 U
4,4'-DDD	UG/KG	2.4	6%	92,000	0	2	34		0.23 U				2.4 JN
4,4'-DDE	UG/KG	4.2	63%	62,000	0	22	35		1.2 J				1.5 J
4,4'-DDT	UG/KG	3.4	50%	47,000	0	17	34		1 J				2.2 JN
Aldrin	UG/KG	0	0%	680	0	0	34		0.32 U				0.31 U
Alpha-BHC	UG/KG	0	0%	3,400	0	0	34		0.39 U				0.38 U
Alpha-Chlordane	UG/KG	2	12%	24,000	0	4	34		0.59 J				0.24 U
Beta-BHC	UG/KG	0	0%	3,000	0	0	34		0.38 U				0.37 U
Delta-BHC	UG/KG	0	0%	500,000	0	0	34		0.37 U				0.36 U
Dieldrin	UG/KG	3.2	41%	1,400	0	14	34		0.25 U				1.2 J
Endosulfan I	UG/KG	55	60%	200,000	0	21	35		0.8 J				1.3 J
Endosulfan II	UG/KG	0.88	3%	200,000	0	1	34		0.39 U				0.38 U
Endosulfan sulfate	UG/KG	0	0%	200,000	0	0	34		0.66 U				0.65 U
Endrin	UG/KG	3.6	3%	89,000	0	1	34		0.97 U				3.6 J
Endrin aldehyde	UG/KG	0	0%			0	34		0.56 U				0.55 U
Endrin ketone	UG/KG	0.58	3%			1	34		0.46 U				0.45 U
Gamma-BHC/Lindane	UG/KG	0	0%	9,200	0	0	34		0.31 U				0.3 U
Gamma-Chlordane	UG/KG	1.1	9%			3	34		0.68 J				1.1 J
Heptachlor	UG/KG	0	0%	15,000	0	0	34		0.33 U				0.32 U
Heptachlor epoxide	UG/KG	0	0%			0	34		0.25 U				0.25 U
Methoxychlor	UG/KG	45	3%			1	34		0.57 U				0.56 U
Toxaphene	UG/KG	0	0%			0	34		8 U				7.8 U
Inorganics													
Aluminum	MG/KG	27,900	100%			97	97	27,900	14,400	14,400	17,800	13,000	16,700
Antimony	MG/KG	5.1	33%			32	97	2.8 J	0.14 UJ	0.63 J	0.2 UJ	0.13 UJ	0.21 UJ
Arsenic	MG/KG	12.6	100%	16	0	97	97	6.4	5.4	8.7	7.9	4.2	5.5
Barium	MG/KG	365	100%	400	0	97	97	229 J	134	101	171	71.2	146
Beryllium	MG/KG	1.2	98%	590	0	95	97	1.2 J	0.67	0.62	0.78	0.63	0.79
Cadmium	MG/KG	1,100	81%	9.3	11	77	95	1.1	9	**13.4**	8.7	0.04 J	6.8
Calcium	MG/KG	193,000	99%			96	97	14,800 J	34,600	62,400	25,700	53,200	25,200
Chromium	MG/KG	446	100%	1,500	0	97	97	33.3 J	25.4	35	39.2	23.5	27.9
Cobalt	MG/KG	26.8	100%			97	97	12.5 J	11.8	12.9	13.6	13.3	12.3
Copper	MG/KG	7,310	100%	270	52	97	97	142	[illegible]	**7,310**	[illegible]	44.4	**365**
Cyanide	MG/KG	0.7	13%	27	0	2	16						
Iron	MG/KG	118,000	100%			97	97	30,600 J	24,800	60,900	37,600	22,100	30,200
Lead	MG/KG	998	100%	1,000	0	97	97	998 J	54.3	22.3	63.8	15.9	54.6
Magnesium	MG/KG	15,000	100%			97	97	8,740 J	8,140	9,200	7,030	10,800	6,780
Manganese	MG/KG	5,040	100%	10,000	0	97	97	506 J	519	574	635	409	572
Nickel	MG/KG	59.3	100%	310	0	92	92	38.6 J	37.7	54	43.5	45.4	40.7
Potassium	MG/KG	4,880	100%			76	76	4,880 J	1,820 J	2,180 J	2,700 J	2,240 J	2,090 J
Selenium	MG/KG	0.92	4%	1,500	0	4	97	0.21 U	0.32 U	0.59 U	0.43 U	0.28 U	0.46 U
Silver	MG/KG	205	68%	1,500	0	66	97	0.06 U	8.7	53.7	7.3	0.14 J	3 J
Sodium	MG/KG	213	84%			81	97	113	113	151	122	120	88.2 J
Thallium	MG/KG	0.27	6%			6	97	0.09 U	0.27 J	0.25 U	0.18 U	0.12 U	0.19 U
Vanadium	MG/KG	41.9	100%			97	97	40 J	23.8	22.3	29.8	21.3	26.9
Zinc	MG/KG	1,470	100%	10,000	0	92	92	153 J	272	150	335	84.4	336
Mercury	MG/KG	9.1	99%	2.8	49	96	97	0.17	[illegible]	[illegible]	[illegible]	0.02 J	2.7

Notes:
1) Chemical result qualifiers are assigned by the laboratory and are evaluated and modified (if necessary) by during data validation.
U = non-detect, i.e. not detected equal to or above this value. J = estimated (detect or non-detect) value.
[blank] = detect, i.e. detected chemical result value. R = Rejected, data validation rejected the results.
2) Num of Analyses is the number of detected and non-detected results excluding rejected results. Sample duplicate pairs have not been averaged.
3) Chemical results greater than the action level are highlighted, bolded and boxed
4) Criteria action level source document and web address.
- The NYS SCO Commercial Use values were obtained from the NYSDEC Soil Cleanup Objectives.
http://www.dec.ny.gov/regs/15507.html

Table A-1
Analytical Data for Surface and Subsurface Soil Samples at OD Grounds
Feasibility Studies - OD Grounds
Seneca Army Depot

Area								SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45
Loc ID								S45-TP-2-02	S45-TP-2-03	S45-TP-2-04	S45-TP-2-05	S45-TP-3-01	S45-TP-3-01
Sample ID								S45-TP-2-02	S45-TP-2-03	S45-TP-2-04	S45-TP-2-05	S45-TP-3-01	S45-TP-3-01D
Matrix								SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Depth Interval (FT)								0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6
Sample Date								3/12/2010	3/12/2010	3/12/2010	3/12/2010	3/12/2010	3/12/2010
QC Type								SA	SA	SA	SA	SA	DU
Study ID								OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest
Parameter	Unit	Maximum Value	Frequency of Detection	Criteria Value	Number of Exceedances	Number of Times Detected	Number of Samples Analyzed	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual
Volatile Organic Compounds													
1,1,1-Trichloroethane	UG/KG	0	0%	500,000	0	0	16						
1,1,2,2-Tetrachloroethane	UG/KG	0	0%			0	16						
1,1,2-Trichloroethane	UG/KG	0	0%			0	16						
1,1-Dichloroethane	UG/KG	0	0%	240,000	0	0	16						
1,1-Dichloroethene	UG/KG	0	0%	500,000	0	0	16						
1,2-Dichloroethane	UG/KG	0	0%	30,000	0	0	16						
1,2-Dichloroethene (total)	UG/KG	0	0%	500,000	0	0	16						
1,2-Dichloropropane	UG/KG	0	0%			0	16						
Acetone	UG/KG	0	0%	500,000	0	0	16						
Benzene	UG/KG	0	0%	44,000	0	0	16						
Bromodichloromethane	UG/KG	0	0%			0	16						
Bromoform	UG/KG	0	0%			0	16						
Carbon disulfide	UG/KG	0	0%			0	16						
Carbon tetrachloride	UG/KG	0	0%	22,000	0	0	16						
Chlorobenzene	UG/KG	0	0%	500,000	0	0	16						
Chlorodibromomethane	UG/KG	0	0%			0	16						
Chloroethane	UG/KG	0	0%			0	16						
Chloroform	UG/KG	0	0%	350,000	0	0	16						
Cis-1,3-Dichloropropene	UG/KG	0	0%			0	16						
Ethyl benzene	UG/KG	0	0%	390,000	0	0	16						
Methyl bromide	UG/KG	0	0%			0	16						
Methyl butyl ketone	UG/KG	0	0%			0	16						
Methyl chloride	UG/KG	0	0%			0	16						
Methyl ethyl ketone	UG/KG	0	0%	500,000	0	0	16						
Methyl isobutyl ketone	UG/KG	0	0%			0	16						
Methylene chloride	UG/KG	0	0%	500,000	0	0	16						
Styrene	UG/KG	0	0%			0	16						
Tetrachloroethene	UG/KG	19	38%	150,000	0	6	16						
Toluene	UG/KG	0	0%	500,000	0	0	16						
Total Xylenes	UG/KG	0	0%	500,000	0	0	16						
Trans-1,3-Dichloropropene	UG/KG	0	0%			0	16						
Trichloroethene	UG/KG	0	0%	200,000	0	0	16						
Vinyl chloride	UG/KG	0	0%	13,000	0	0	16						
Semivolatile Organic Compounds													
1,2,4-Trichlorobenzene	UG/KG	0	0%			0	35					83 U	89 U
1,2-Dichlorobenzene	UG/KG	0	0%	500,000	0	0	35					90 U	97 U
1,3-Dichlorobenzene	UG/KG	0	0%	280,000	0	0	35					80 U	86 U
1,4-Dichlorobenzene	UG/KG	0	0%	130,000	0	0	35					88 U	95 U
2,2'-oxybis(1-Chloropropane)	UG/KG	0	0%			0	16						
2,4,5-Trichlorophenol	UG/KG	0	0%			0	35					160 U	170 U
2,4,6-Trichlorophenol	UG/KG	0	0%			0	35					160 U	170 U
2,4-Dichlorophenol	UG/KG	0	0%			0	35					150 U	160 U
2,4-Dimethylphenol	UG/KG	0	0%			0	35					170 U	180 U
2,4-Dinitrophenol	UG/KG	0	0%			0	35					390 U	410 U
2,4-Dinitrotoluene	UG/KG	14,000	37%			13	35					87 U	94 U
2,6-Dinitrotoluene	UG/KG	700	6%			2	35					81 U	87 U
2-Chloronaphthalene	UG/KG	0	0%			0	35					89 U	96 U
2-Chlorophenol	UG/KG	0	0%			0	35					170 U	180 U
2-Methylnaphthalene	UG/KG	0	0%			0	35					94 U	100 U
2-Methylphenol	UG/KG	0	0%	500,000	0	0	35					200 U	220 U
2-Nitroaniline	UG/KG	0	0%			0	35					77 U	82 U
2-Nitrophenol	UG/KG	0	0%			0	35					170 U	180 U
3 or 4-Methylphenol	UG/KG	0	0%			0	19					190 U	200 U
3,3'-Dichlorobenzidine	UG/KG	0	0%			0	35					120 U	120 U
3-Nitroaniline	UG/KG	0	0%			0	35					96 U	100 U
4,6-Dinitro-2-methylphenol	UG/KG	0	0%			0	35					340 U	370 U
4-Bromophenyl phenyl ether	UG/KG	0	0%			0	35					87 U	94 U
4-Chloro-3-methylphenol	UG/KG	0	0%			0	35					170 U	180 U
4-Chloroaniline	UG/KG	0	0%			0	35					120 U	130 U
4-Chlorophenyl phenyl ether	UG/KG	0	0%			0	35					80 U	86 U
4-Methylphenol	UG/KG	0	0%	500,000	0	0	16						
4-Nitroaniline	UG/KG	0	0%			0	35					140 U	150 U
4-Nitrophenol	UG/KG	0	0%			0	35					320 U	340 U
Acenaphthene	UG/KG	0	0%	500,000	0	0	35					67 U	72 U
Acenaphthylene	UG/KG	30	9%	500,000	0	3	35					72 U	77 U
Anthracene	UG/KG	18	6%	500,000	0	2	35					86 U	92 U
Benzo(a)anthracene	UG/KG	50	23%	5,600	0	8	35					88 U	95 U
Benzo(a)pyrene	UG/KG	82	23%	1,000	0	8	35					95 U	100 U
Benzo(b)fluoranthene	UG/KG	55	26%	5,600	0	9	35					140 U	150 U
Benzo(ghi)perylene	UG/KG	66	20%	500,000	0	7	35					110 UJ	110 UJ
Benzo(k)fluoranthene	UG/KG	58	20%	56,000	0	7	35					85 U	91 U

Parameter	Unit	Maximum Value	Frequency of Detection	Criteria Value	Number of Exceedances	Number of Times Detected	Number of Samples Analyzed	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual
Area								SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45
Loc ID								S45-TP-2-02	S45-TP-2-03	S45-TP-2-04	S45-TP-2-05	S45-TP-3-01	S45-TP-3-01
Sample ID								S45-TP-2-02	S45-TP-2-03	S45-TP-2-04	S45-TP-2-05	S45-TP-3-01	S45-TP-3-01D
Matrix								SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Depth Interval (FT)								0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6
Sample Date								3/12/2010	3/12/2010	3/12/2010	3/12/2010	3/12/2010	3/12/2010
QC Type								SA	SA	SA	SA	SA	DU
Study ID								OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest
Bis(2-Chloroethoxy)methane	UG/KG	0	0%			0	35					98 U	100 U
Bis(2-Chloroethyl)ether	UG/KG	0	0%			0	35					83 U	89 U
Bis(2-Chloroisopropyl)ether	UG/KG	0	0%			0	19					91 U	98 U
Bis(2-Ethylhexyl)phthalate	UG/KG	740	26%			9	35					100 U	110 U
Butylbenzylphthalate	UG/KG	0	0%			0	35					95 U	100 U
Carbazole	UG/KG	0	0%			0	35					110 U	120 U
Chrysene	UG/KG	130	34%	56,000	0	12	35					97 U	100 U
Dibenz(a,h)anthracene	UG/KG	0	0%	560	0	0	35					130 U	140 U
Dibenzofuran	UG/KG	0	0%	350,000	0	0	35					81 U	87 U
Diethyl phthalate	UG/KG	35	3%			1	35					82 U	88 U
Dimethylphthalate	UG/KG	0	0%			0	35					80 U	86 U
Di-n-butylphthalate	UG/KG	6,800	34%			12	35					100 U	110 U
Di-n-octylphthalate	UG/KG	0	0%			0	35					220 U	230 U
Fluoranthene	UG/KG	68	31%	500,000	0	11	35					110 U	120 U
Fluorene	UG/KG	0	0%	500,000	0	0	35					83 U	89 U
Hexachlorobenzene	UG/KG	110	31%	6,000	0	11	35					110 J	90 UJ
Hexachlorobutadiene	UG/KG	0	0%			0	35					85 U	91 U
Hexachlorocyclopentadiene	UG/KG	0	0%			0	35					84 U	90 U
Hexachloroethane	UG/KG	1,100	17%			6	35					98 U	100 U
Indeno(1,2,3-cd)pyrene	UG/KG	52	11%	5,600	0	4	35					120 U	130 U
Isophorone	UG/KG	0	0%			0	35					77 U	82 U
Naphthalene	UG/KG	30	14%	500,000	0	5	35					89 U	96 U
Nitrobenzene	UG/KG	0	0%			0	35					93 U	100 U
N-Nitrosodiphenylamine	UG/KG	320	6%			2	35					220 U	240 U
N-Nitrosodipropylamine	UG/KG	1,600	14%			5	35					85 U	91 U
Pentachlorophenol	UG/KG	0	0%	6,700	0	0	35					240 U	260 U
Phenanthrene	UG/KG	46	26%	500,000	0	9	35					85 U	91 U
Phenol	UG/KG	0	0%	500,000	0	0	35					160 U	170 U
Pyrene	UG/KG	110	34%	500,000	0	12	35					100 U	110 U
Herbicides													
2,4,5-T	UG/KG	0	0%			0	35					16 U	18 U
2,4,5-TP/Silvex	UG/KG	0	0%	500,000	0	0	35					13 U	14 U
2,4-D	UG/KG	0	0%			0	35					33 U	37 U
2,4-DB	UG/KG	0	0%			0	35					24 U	27 U
Dalapon	UG/KG	0	0%			0	35					8.6 U	9.5 U
Dicamba	UG/KG	0	0%			0	35					11 U	13 U
Dichloroprop	UG/KG	0	0%			0	35					19 U	22 U
Dinoseb	UG/KG	0	0%			0	35					2.7 U	3 U
MCPA	UG/KG	9,400	6%			2	35					2,400 U	2,700 U
MCPP	UG/KG	0	0%			0	35					2,300 U	2,500 U
Explosives													
1,3,5-Trinitrobenzene	UG/KG	190	60%			28	47					7.1 UJ	50 NJ
1,3-Dinitrobenzene	UG/KG	0	0%			0	47					6.5 U	6 U
2,4,6-Trinitrotoluene	UG/KG	1,400	81%			38	47					68 J	49 J
2,4-Dinitrotoluene	UG/KG	1,100	77%			36	47					120	57 J
2,6-Dinitrotoluene	UG/KG	0	0%			0	47					28 U	26 U
2-amino-4,6-Dinitrotoluene	UG/KG	680	77%			36	47					330	110 J
2-Nitrotoluene	UG/KG	0	0%			0	31					13 U	12 U
3,5-Dinitroaniline	UG/KG	0	0%			0	31					3.7 U	3.4 U
3-Nitrotoluene	UG/KG	0	0%			0	31					8.3 UJ	7.6 UJ
4-amino-2,6-Dinitrotoluene	UG/KG	500	57%			27	47					500	150
4-Nitrotoluene	UG/KG	0	0%			0	31					28 U	26 U
HMX	UG/KG	470	68%			32	47					9.1 UJ	43 J
Nitrobenzene	UG/KG	0	0%			0	31					23 U	21 U
Nitroglycerine	UG/KG	1,500	3%			1	31					130 U	120 U
Pentaerythritol Tetranitrate	UG/KG	0	0%			0	31					250 U	230 U
RDX	UG/KG	5,800	83%			39	47					230 NJ	75 J
Tetryl	UG/KG	330	9%			4	47					5.7 U	5.2 U

Table A-1
Analytical Data for Surface and Subsurface Soil Samples at OD Grounds
Feasibility Studies - OD Grounds
Seneca Army Depot

Parameter	Unit	Maximum Value	Frequency of Detection	Criteria Value	Number of Exceedances	Number of Times Detected	Number of Samples Analyzed	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual
Area								SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45
Loc ID								S45-TP-2-02	S45-TP-2-03	S45-TP-2-04	S45-TP-2-05	S45-TP-3-01	S45-TP-3-01
Sample ID								S45-TP-2-02	S45-TP-2-03	S45-TP-2-04	S45-TP-2-05	S45-TP-3-01	S45-TP-3-01D
Matrix								SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Depth Interval (FT)								0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6
Sample Date								3/12/2010	3/12/2010	3/12/2010	3/12/2010	3/12/2010	3/12/2010
QC Type								SA	SA	SA	SA	SA	DU
Study ID								OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest
Pesticides/PCBs													
Aroclor-1016	UG/KG	0	0%	1,000	0	0	34					5.9 U	6.9 U
Aroclor-1221	UG/KG	0	0%	1,000	0	0	34					14 U	16 U
Aroclor-1232	UG/KG	0	0%	1,000	0	0	34					9.2 U	11 U
Aroclor-1242	UG/KG	0	0%	1,000	0	0	34					5.7 U	6.7 U
Aroclor-1248	UG/KG	0	0%	1,000	0	0	34					6 U	7 U
Aroclor-1254	UG/KG	2,000	6%	1,000	1	2	34					4.6 U	5.4 U
Aroclor-1260	UG/KG	0	0%	1,000	0	0	34					5.9 U	6.9 U
4,4'-DDD	UG/KG	2.4	6%	92,000	0	2	34					0.2 U	0.23 U
4,4'-DDE	UG/KG	4.2	63%	62,000	0	22	35					1.1 J	0.67 J
4,4'-DDT	UG/KG	3.4	50%	47,000	0	17	34					0.31 U	0.68 J
Aldrin	UG/KG	0	0%	680	0	0	34					0.28 U	0.32 U
Alpha-BHC	UG/KG	0	0%	3,400	0	0	34					0.34 U	0.39 U
Alpha-Chlordane	UG/KG	2	12%	24,000	0	4	34					0.21 U	0.24 U
Beta-BHC	UG/KG	0	0%	3,000	0	0	34					0.33 U	0.38 U
Delta-BHC	UG/KG	0	0%	500,000	0	0	34					0.32 U	0.37 U
Dieldrin	UG/KG	3.2	41%	1,400	0	14	34					0.22 U	0.81 J
Endosulfan I	UG/KG	55	60%	200,000	0	21	35					1.2 J	0.77 J
Endosulfan II	UG/KG	0.88	3%	200,000	0	1	34					0.34 U	0.39 U
Endosulfan sulfate	UG/KG	0	0%	200,000	0	0	34					0.57 U	0.67 U
Endrin	UG/KG	3.6	3%	89,000	0	1	34					0.84 U	0.98 U
Endrin aldehyde	UG/KG	0	0%			0	34					0.48 U	0.56 U
Endrin ketone	UG/KG	0.58	3%			1	34					0.4 U	0.46 U
Gamma-BHC/Lindane	UG/KG	0	0%	9,200	0	0	34					0.27 U	0.31 U
Gamma-Chlordane	UG/KG	1.1	9%			3	34					0.23 U	0.26 U
Heptachlor	UG/KG	0	0%	15,000	0	0	34					0.29 U	0.33 U
Heptachlor epoxide	UG/KG	0	0%			0	34					0.22 U	0.25 U
Methoxychlor	UG/KG	45	3%			1	34					0.5 U	0.58 U
Toxaphene	UG/KG	0	0%			0	34					6.9 U	8 U
Inorganics													
Aluminum	MG/KG	27,900	100%			97	97	16,400	12,500	16,500	12,500	11,900	17,100
Antimony	MG/KG	5.1	33%			32	97	0.2 UJ	1.5 J	0.29 J	0.38 J	0.15 UJ	0.2 UJ
Arsenic	MG/KG	12.6	100%	16	0	97	97	5.5	4.2	4.8	5.8	4.3	5.1
Barium	MG/KG	365	100%	400	0	97	97	126	190	227	191	159	187
Beryllium	MG/KG	1.2	98%	590	0	95	97	0.79	0.55	0.73	0.6	0.53	0.76
Cadmium	MG/KG	1,100	81%	9.3	11	77	95	3.5	4.6	7.6	6.1	5.6	7.7
Calcium	MG/KG	193,000	99%			96	97	28,900	101,000	29,500	30,900	24,400	28,100
Chromium	MG/KG	446	100%	1,500	0	97	97	26.2	21.3	26.7	19.7	20.9	27.3
Cobalt	MG/KG	26.8	100%			97	97	12.5	10	11.3	9.6	9.3	11.4
Copper	MG/KG	7,310	100%	270	52	97	97	132	165	**2,490**	172	143	**330**
Cyanide	MG/KG	0.7	13%	27	0	2	16						
Iron	MG/KG	118,000	100%			97	97	27,800	20,300	25,600	23,000	22,200	25,600
Lead	MG/KG	998	100%	1,000	0	97	97	33.4	62.8	91	83.6	86.3	70.9
Magnesium	MG/KG	15,000	100%			97	97	7,010	7,450	7,380	6,020	6,170	7,980
Manganese	MG/KG	5,040	100%	10,000	0	97	97	616	727	407	389	423	515
Nickel	MG/KG	59.3	100%	310	0	92	92	37.1	31	38.2	30	30.6	37.7
Potassium	MG/KG	4,880	100%			76	76	2,140 J	1,780 J	2,400 J	1,780 J	1,700 J	2,680 J
Selenium	MG/KG	0.92	4%	1,500	0	4	97	0.43 U	0.32 U	0.4 U	0.23 U	0.33 U	0.45 U
Silver	MG/KG	205	68%	1,500	0	66	97	0.72 J	0.31 J	0.63 J	0.78 J	0.56 J	2.2 J
Sodium	MG/KG	213	84%			81	97	199	213	189	199	146	211
Thallium	MG/KG	0.27	6%			6	97	0.18 U	0.14 U	0.17 U	0.25 J	0.14 U	0.19 U
Vanadium	MG/KG	41.9	100%			97	97	26.5	20.8	26.9	20.6	20.8	28.5
Zinc	MG/KG	1,470	100%	10,000	0	92	92	198	463	1,470	535	387	434
Mercury	MG/KG	9.1	99%	2.8	49	96	97	1.1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Notes:
1) Chemical result qualifiers are assigned by the laboratory and are evaluated and modified (if necessary) by during data validation.
U = non-detect, i.e. not detected equal to or above this value.
J = estimated (detect or non-detect) value.
[blank] = detect, i.e. detected chemical result value.
R = Rejected, data validation rejected the results.
2) Num of Analyses is the number of detected and non-detected results excluding rejected results. Sample duplicate pairs have not been averaged.
3) Chemical results greater than the action level are highlighted, bolded and boxed
4) Criteria action level source document and web address.
- The NYS SCO Commercial Use values were obtained from the NYSDEC Soil Cleanup Objectives.
http://www.dec.ny.gov/regs/15507.html

Area								SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45
Loc ID								S45-TP-3-02	S45-TP-3-03	S45-TP-3-04	S45-TP-3-05	S45-TP-4-01	S45-TP-4-02
Sample ID								S45-TP-3-02	S45-TP-3-03	S45-TP-3-04	S45-TP-3-05	S45-TP-4-01	S45-TP-4-02
Matrix								SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Depth Interval (FT)								0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6
Sample Date								3/15/2010	3/15/2010	3/15/2010	3/15/2010	3/12/2010	3/12/2010
QC Type								SA	SA	SA	SA	SA	SA
Study ID								OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest
Parameter	Unit	Maximum Value	Frequency of Detection	Criteria Value	Number of Exceedances	Number of Times Detected	Number of Samples Analyzed	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual
Volatile Organic Compounds													
1,1,1-Trichloroethane	UG/KG	0	0%	500,000	0	0	16						
1,1,2,2-Tetrachloroethane	UG/KG	0	0%			0	16						
1,1,2-Trichloroethane	UG/KG	0	0%			0	16						
1,1-Dichloroethane	UG/KG	0	0%	240,000	0	0	16						
1,1-Dichloroethene	UG/KG	0	0%	500,000	0	0	16						
1,2-Dichloroethane	UG/KG	0	0%	30,000	0	0	16						
1,2-Dichloroethene (total)	UG/KG	0	0%	500,000	0	0	16						
1,2-Dichloropropane	UG/KG	0	0%			0	16						
Acetone	UG/KG	0	0%	500,000	0	0	16						
Benzene	UG/KG	0	0%	44,000	0	0	16						
Bromodichloromethane	UG/KG	0	0%			0	16						
Bromoform	UG/KG	0	0%			0	16						
Carbon disulfide	UG/KG	0	0%			0	16						
Carbon tetrachloride	UG/KG	0	0%	22,000	0	0	16						
Chlorobenzene	UG/KG	0	0%	500,000	0	0	16						
Chlorodibromomethane	UG/KG	0	0%			0	16						
Chloroethane	UG/KG	0	0%			0	16						
Chloroform	UG/KG	0	0%	350,000	0	0	16						
Cis-1,3-Dichloropropene	UG/KG	0	0%			0	16						
Ethyl benzene	UG/KG	0	0%	390,000	0	0	16						
Methyl bromide	UG/KG	0	0%			0	16						
Methyl butyl ketone	UG/KG	0	0%			0	16						
Methyl chloride	UG/KG	0	0%			0	16						
Methyl ethyl ketone	UG/KG	0	0%	500,000	0	0	16						
Methyl isobutyl ketone	UG/KG	0	0%			0	16						
Methylene chloride	UG/KG	0	0%	500,000	0	0	16						
Styrene	UG/KG	0	0%			0	16						
Tetrachloroethene	UG/KG	19	38%	150,000	0	6	16						
Toluene	UG/KG	0	0%	500,000	0	0	16						
Total Xylenes	UG/KG	0	0%	500,000	0	0	16						
Trans-1,3-Dichloropropene	UG/KG	0	0%			0	16						
Trichloroethene	UG/KG	0	0%	200,000	0	0	16						
Vinyl chloride	UG/KG	0	0%	13,000	0	0	16						
Semivolatile Organic Compounds													
1,2,4-Trichlorobenzene	UG/KG	0	0%			0	35					94 U	
1,2-Dichlorobenzene	UG/KG	0	0%	500,000	0	0	35					100 U	
1,3-Dichlorobenzene	UG/KG	0	0%	280,000	0	0	35					90 U	
1,4-Dichlorobenzene	UG/KG	0	0%	130,000	0	0	35					100 U	
2,2'-oxybis(1-Chloropropane)	UG/KG	0	0%			0	16						
2,4,5-Trichlorophenol	UG/KG	0	0%			0	35					180 U	
2,4,6-Trichlorophenol	UG/KG	0	0%			0	35					180 U	
2,4-Dichlorophenol	UG/KG	0	0%			0	35					170 U	
2,4-Dimethylphenol	UG/KG	0	0%			0	35					190 U	
2,4-Dinitrophenol	UG/KG	0	0%			0	35					440 U	
2,4-Dinitrotoluene	UG/KG	14,000	37%			13	35					2,500	
2,6-Dinitrotoluene	UG/KG	700	6%			2	35					92 U	
2-Chloronaphthalene	UG/KG	0	0%			0	35					100 U	
2-Chlorophenol	UG/KG	0	0%			0	35					190 U	
2-Methylnaphthalene	UG/KG	0	0%			0	35					110 U	
2-Methylphenol	UG/KG	0	0%	500,000	0	0	35					230 U	
2-Nitroaniline	UG/KG	0	0%			0	35					87 U	
2-Nitrophenol	UG/KG	0	0%			0	35					190 U	
3 or 4-Methylphenol	UG/KG	0	0%			0	19					220 U	
3,3'-Dichlorobenzidine	UG/KG	0	0%			0	35					130 U	
3-Nitroaniline	UG/KG	0	0%			0	35					110 U	
4,6-Dinitro-2-methylphenol	UG/KG	0	0%			0	35					390 U	
4-Bromophenyl phenyl ether	UG/KG	0	0%			0	35					99 U	
4-Chloro-3-methylphenol	UG/KG	0	0%			0	35					190 U	
4-Chloroaniline	UG/KG	0	0%			0	35					140 U	
4-Chlorophenyl phenyl ether	UG/KG	0	0%			0	35					90 U	
4-Methylphenol	UG/KG	0	0%	500,000	0	0	16						
4-Nitroaniline	UG/KG	0	0%			0	35					160 U	
4-Nitrophenol	UG/KG	0	0%			0	35					360 U	
Acenaphthene	UG/KG	0	0%	500,000	0	0	35					75 U	
Acenaphthylene	UG/KG	30	9%	500,000	0	3	35					81 U	
Anthracene	UG/KG	18	6%	500,000	0	2	35					97 U	
Benzo(a)anthracene	UG/KG	50	23%	5,600	0	8	35					100 U	
Benzo(a)pyrene	UG/KG	82	23%	1,000	0	8	35					110 U	
Benzo(b)fluoranthene	UG/KG	55	26%	5,600	0	9	35					160 U	
Benzo(ghi)perylene	UG/KG	66	20%	500,000	0	7	35					120 UJ	
Benzo(k)fluoranthene	UG/KG	58	20%	56,000	0	7	35					96 U	

Table A-1
Analytical Data for Surface and Subsurface Soil Samples at OD Grounds
Feasibility Studies - OD Grounds
Seneca Army Depot

Area								SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45
Loc ID								S45-TP-3-02	S45-TP-3-03	S45-TP-3-04	S45-TP-3-05	S45-TP-4-01	S45-TP-4-02
Sample ID								S45-TP-3-02	S45-TP-3-03	S45-TP-3-04	S45-TP-3-05	S45-TP-4-01	S45-TP-4-02
Matrix								SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Depth Interval (FT)								0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6
Sample Date								3/15/2010	3/15/2010	3/15/2010	3/15/2010	3/12/2010	3/12/2010
QC Type								SA	SA	SA	SA	SA	SA
Study ID								OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest
Parameter	Unit	Maximum Value	Frequency of Detection	Criteria Value	Number of Exceedances	Number of Times Detected	Number of Samples Analyzed	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual
Bis(2-Chloroethoxy)methane	UG/KG	0	0%			0	35					110 U	
Bis(2-Chloroethyl)ether	UG/KG	0	0%			0	35					94 U	
Bis(2-Chloroisopropyl)ether	UG/KG	0	0%			0	19					100 U	
Bis(2-Ethylhexyl)phthalate	UG/KG	740	26%			9	35					110 U	
Butylbenzylphthalate	UG/KG	0	0%			0	35					110 U	
Carbazole	UG/KG	0	0%			0	35					130 U	
Chrysene	UG/KG	130	34%	56,000	0	12	35					110 U	
Dibenz(a,h)anthracene	UG/KG	0	0%	560	0	0	35					150 U	
Dibenzofuran	UG/KG	0	0%	350,000	0	0	35					92 U	
Diethyl phthalate	UG/KG	35	3%			1	35					93 U	
Dimethylphthalate	UG/KG	0	0%			0	35					90 U	
Di-n-butylphthalate	UG/KG	6,800	34%			12	35					2,600	
Di-n-octylphthalate	UG/KG	0	0%			0	35					240 U	
Fluoranthene	UG/KG	68	31%	500,000	0	11	35					120 U	
Fluorene	UG/KG	0	0%	500,000	0	0	35					94 U	
Hexachlorobenzene	UG/KG	110	31%	6,000	0	11	35					95 U	
Hexachlorobutadiene	UG/KG	0	0%			0	35					96 U	
Hexachlorocyclopentadiene	UG/KG	0	0%			0	35					95 U	
Hexachloroethane	UG/KG	1,100	17%			6	35					110 U	
Indeno(1,2,3-cd)pyrene	UG/KG	52	11%	5,600	0	4	35					140 U	
Isophorone	UG/KG	0	0%			0	35					87 U	
Naphthalene	UG/KG	30	14%	500,000	0	5	35					100 U	
Nitrobenzene	UG/KG	0	0%			0	35					100 U	
N-Nitrosodiphenylamine	UG/KG	320	6%			2	35					320 J	
N-Nitrosodipropylamine	UG/KG	1,600	14%			5	35					96 U	
Pentachlorophenol	UG/KG	0	0%	6,700	0	0	35					280 U	
Phenanthrene	UG/KG	46	26%	500,000	0	9	35					96 U	
Phenol	UG/KG	0	0%	500,000	0	0	35					180 U	
Pyrene	UG/KG	110	34%	500,000	0	12	35					120 U	
Herbicides													
2,4,5-T	UG/KG	0	0%			0	35					18 U	
2,4,5-TP/Silvex	UG/KG	0	0%	500,000	0	0	35					14 U	
2,4-D	UG/KG	0	0%			0	35					36 U	
2,4-DB	UG/KG	0	0%			0	35					26 U	
Dalapon	UG/KG	0	0%			0	35					9.2 U	
Dicamba	UG/KG	0	0%			0	35					12 U	
Dichloroprop	UG/KG	0	0%			0	35					21 U	
Dinoseb	UG/KG	0	0%			0	35					2.9 U	
MCPA	UG/KG	9,400	6%			2	35					2,600 U	
MCPP	UG/KG	0	0%			0	35					2,400 U	
Explosives													
1,3,5-Trinitrobenzene	UG/KG	190	60%			28	47					45 J	
1,3-Dinitrobenzene	UG/KG	0	0%			0	47					6.4 U	
2,4,6-Trinitrotoluene	UG/KG	1,400	81%			38	47					37 J	
2,4-Dinitrotoluene	UG/KG	1,100	77%			36	47					86 J	
2,6-Dinitrotoluene	UG/KG	0	0%			0	47					28 U	
2-amino-4,6-Dinitrotoluene	UG/KG	680	77%			36	47					150 J	
2-Nitrotoluene	UG/KG	0	0%			0	31					12 U	
3,5-Dinitroaniline	UG/KG	0	0%			0	31					3.6 U	
3-Nitrotoluene	UG/KG	0	0%			0	31					8.2 UJ	
4-amino-2,6-Dinitrotoluene	UG/KG	500	57%			27	47					150 J	
4-Nitrotoluene	UG/KG	0	0%			0	31					28 U	
HMX	UG/KG	470	68%			32	47					180	
Nitrobenzene	UG/KG	0	0%			0	31					23 U	
Nitroglycerine	UG/KG	1,500	3%			1	31					130 U	
Pentaerythritol Tetranitrate	UG/KG	0	0%			0	31					250 U	
RDX	UG/KG	5,800	83%			39	47					310	
Tetryl	UG/KG	330	9%			4	47					5.6 U	

Ta[illegible]
Analytical Data for Surface and S[illegible] Soil Samples at OD Grounds
Feasibility Stu[illegible]D Grounds
Seneca Army Depot

Parameter	Unit	Maximum Value	Frequency of Detection	Criteria Value	Number of Exceedances	Number of Times Detected	Number of Samples Analyzed						
Area								SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45
Loc ID								S45-TP-3-02	S45-TP-3-03	S45-TP-3-04	S45-TP-3-05	S45-TP-4-01	S45-TP-4-02
Sample ID								S45-TP-3-02	S45-TP-3-03	S45-TP-3-04	S45-TP-3-05	S45-TP-4-01	S45-TP-4-02
Matrix								SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Depth Interval (FT)								0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6
Sample Date								3/15/2010	3/15/2010	3/15/2010	3/15/2010	3/12/2010	3/12/2010
QC Type								SA	SA	SA	SA	SA	SA
Study ID								OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest	OD Initial Invest
								Value Qual	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual
Pesticides/PCBs													
Aroclor-1016	UG/KG	0	0%	1,000	0	0	34					7.1 U	
Aroclor-1221	UG/KG	0	0%	1,000	0	0	34					16 U	
Aroclor-1232	UG/KG	0	0%	1,000	0	0	34					11 U	
Aroclor-1242	UG/KG	0	0%	1,000	0	0	34					6.8 U	
Aroclor-1248	UG/KG	0	0%	1,000	0	0	34					7.2 U	
Aroclor-1254	UG/KG	2,000	6%	1,000	1	2	34					5.5 U	
Aroclor-1260	UG/KG	0	0%	1,000	0	0	34					7.1 U	
4,4'-DDD	UG/KG	2.4	6%	92,000	0	2	34					0.24 U	
4,4'-DDE	UG/KG	4.2	63%	62,000	0	22	35					0.9 J	
4,4'-DDT	UG/KG	3.4	50%	47,000	0	17	34					0.77 J	
Aldrin	UG/KG	0	0%	680	0	0	34					0.33 U	
Alpha-BHC	UG/KG	0	0%	3,400	0	0	34					0.4 U	
Alpha-Chlordane	UG/KG	2	12%	24,000	0	4	34					0.25 U	
Beta-BHC	UG/KG	0	0%	3,000	0	0	34					0.39 U	
Delta-BHC	UG/KG	0	0%	500,000	0	0	34					0.38 U	
Dieldrin	UG/KG	3.2	41%	1,400	0	14	34					0.79 J	
Endosulfan I	UG/KG	55	60%	200,000	0	21	35					0.74 J	
Endosulfan II	UG/KG	0.88	3%	200,000	0	1	34					0.4 U	
Endosulfan sulfate	UG/KG	0	0%	200,000	0	0	34					0.68 U	
Endrin	UG/KG	3.6	3%	89,000	0	1	34					1 U	
Endrin aldehyde	UG/KG	0	0%			0	34					0.58 U	
Endrin ketone	UG/KG	0.58	3%			1	34					0.47 U	
Gamma-BHC/Lindane	UG/KG	0	0%	9,200	0	0	34					0.32 U	
Gamma-Chlordane	UG/KG	1.1	9%			3	34					0.27 U	
Heptachlor	UG/KG	0	0%	15,000	0	0	34					0.34 U	
Heptachlor epoxide	UG/KG	0	0%			0	34					0.26 U	
Methoxychlor	UG/KG	45	3%			1	34					0.59 U	
Toxaphene	UG/KG	0	0%			0	34					8.2 U	
Inorganics													
Aluminum	MG/KG	27,900	100%			97	97	16,500 J	21,700 J	17,400 J	14,400 J	17,800	15,000
Antimony	MG/KG	5.1	33%			32	97	0.2 UJ	5.1 J	0.38 J	0.69 U	0.12 UJ	0.58 J
Arsenic	MG/KG	12.6	100%	16	0	97	97	4.7 J	4.6 J	4.6 J	3.9 J	5	5.7
Barium	MG/KG	365	100%	400	0	97	97	158 J	173 J	154 J	126 J	170	153
Beryllium	MG/KG	1.2	98%	590	0	95	97	0.75 J	0.7 J	0.74 J	0.62 J	0.79	0.7
Cadmium	MG/KG	1,100	81%	9.3	11	77	95	7.9 J	6.9 J	6.1 J	2.8 J	7.3	8.1
Calcium	MG/KG	193,000	99%			96	97	23,000 J	34,100 J	28,800 J	37,700 J	27,600	30,900
Chromium	MG/KG	446	100%	1,500	0	97	97	28.1 J	26.7 J	26 J	22.8 J	27.4	25
Cobalt	MG/KG	26.8	100%			97	97	12.1 J	9.2 J	9.4 J	10 J	10.8	11.3
Copper	MG/KG	7,310	100%	270	52	97	97	**378 J**	**716 J**	**341 J**	266 J	**343**	**416**
Cyanide	MG/KG	0.7	13%	27	0	2	16						
Iron	MG/KG	118,000	100%			97	97	26,900 J	23,400 J	24,300 J	21,500 J	27,500	24,800
Lead	MG/KG	998	100%	1,000	0	97	97	58.3 J	153 J	45.7 J	42.7 J	64.9	57.4
Magnesium	MG/KG	15,000	100%			97	97	7,310 J	7,810 J	9,350 J	8,470 J	7,170	12,100
Manganese	MG/KG	5,040	100%	10,000	0	97	97	580 J	566 J	502 J	420 J	531	577
Nickel	MG/KG	59.3	100%	310	0	92	92	40.8 J	39 J	33.9 J	34.8 J	37.9	35.8
Potassium	MG/KG	4,880	100%			76	76	2,310 J	3,220 J	3,510 J	2,590 J	2,710 J	2,010 J
Selenium	MG/KG	0.92	4%	1,500	0	4	97	0.44 UJ	0.22 UJ	0.21 UJ	0.19 UJ	0.26 U	0.41 U
Silver	MG/KG	205	68%	1,500	0	66	97	2.5 J	1.5 U	2.9 J	1.3 U	2.4	3.6
Sodium	MG/KG	213	84%			81	97	101 J	149 J	101 J	137 J	198	195
Thallium	MG/KG	0.27	6%			6	97	0.18 UJ	0.09 UJ	0.09 UJ	0.08 UJ	0.11 U	0.17 U
Vanadium	MG/KG	41.9	100%			97	97	27.6 J	29 J	28.3 J	23 J	28.1	25.7
Zinc	MG/KG	1,470	100%	10,000	0	92	92	315 J	585 J	294 J	241 J	317	304
Mercury	MG/KG	9.1	99%	2.8	49	96	97	2.6 J	**5 J**	**3.2 J**	**3.2 J**	2.4	**4.4**

Notes:

1) Chemical result qualifiers are assigned by the laboratory and are evaluated and modified (if necessary) by during data validation.

U = non-detect, i.e. not detected equal to or above this value. J = estimated (detect or non-detect) value.

[blank] = detect, i.e. detected chemical result value. R = Rejected, data validation rejected the results.

2) Num of Analyses is the number of detected and non-detected results excluding rejected results. Sample duplicate pairs have not been averaged.

3) Chemical results greater than the action level are highlighted, bolded and boxed

4) Criteria action level source document and web address.

- The NYS SCO Commercial Use values were obtained from the NYSDEC Soil Cleanup Objectives.

http://www.dec.ny.gov/regs/15507.html

Table A-1
Analytical Data for Surface and Subsurface Soil Samples at OD Grounds
Feasibility Studies - OD Grounds
Seneca Army Depot

Parameter	Unit	Maximum Value	Frequency of Detection	Criteria Value	Number of Exceedances	Number of Times Detected	Number of Samples Analyzed	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual
Area								SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45
Loc ID								S45-TP-4-03	S45-TP-4-04	S45-TP-4-05	SS45-1	SS45-2	SS45-3
Sample ID								S45-TP-4-03	S45-TP-4-04	S45-TP-4-05	SS45-1	SS45-2	SS45-3
Matrix								SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Depth Interval (FT)								0.2-0.6	0.2-0.6	0.2-0.6	0-0.2	0-0.2	0-0.2
Sample Date								3/12/2010	3/12/2010	3/12/2010	10/25/1993	10/25/1993	10/25/1993
QC Type								SA	SA	SA	SA	SA	SA
Study ID								OD Initial Invest	OD Initial Invest	OD Initial Invest	ESI	ESI	ESI
Volatile Organic Compounds													
1,1,1-Trichloroethane	UG/KG	0	0%	500,000	0	0	16				12 U	11 U	12 U
1,1,2,2-Tetrachloroethane	UG/KG	0	0%			0	16				12 U	11 U	12 U
1,1,2-Trichloroethane	UG/KG	0	0%			0	16				12 U	11 U	12 U
1,1-Dichloroethane	UG/KG	0	0%	240,000	0	0	16				12 U	11 U	12 U
1,1-Dichloroethene	UG/KG	0	0%	500,000	0	0	16				12 U	11 U	12 U
1,2-Dichloroethane	UG/KG	0	0%	30,000	0	0	16				12 U	11 U	12 U
1,2-Dichloroethene (total)	UG/KG	0	0%	500,000	0	0	16				12 U	11 U	12 U
1,2-Dichloropropane	UG/KG	0	0%			0	16				12 U	11 U	12 U
Acetone	UG/KG	0	0%	500,000	0	0	16				12 U	11 U	12 U
Benzene	UG/KG	0	0%	44,000	0	0	16				12 U	11 U	12 U
Bromodichloromethane	UG/KG	0	0%			0	16				12 U	11 U	12 U
Bromoform	UG/KG	0	0%			0	16				12 U	11 U	12 U
Carbon disulfide	UG/KG	0	0%			0	16				12 U	11 U	12 U
Carbon tetrachloride	UG/KG	0	0%	22,000	0	0	16				12 U	11 U	12 U
Chlorobenzene	UG/KG	0	0%	500,000	0	0	16				12 U	11 U	12 U
Chlorodibromomethane	UG/KG	0	0%			0	16				12 U	11 U	12 U
Chloroethane	UG/KG	0	0%			0	16				12 U	11 U	12 U
Chloroform	UG/KG	0	0%	350,000	0	0	16				12 U	11 U	12 U
Cis-1,3-Dichloropropene	UG/KG	0	0%			0	16				12 U	11 U	12 U
Ethyl benzene	UG/KG	0	0%	390,000	0	0	16				12 U	11 U	12 U
Methyl bromide	UG/KG	0	0%			0	16				12 U	11 U	12 U
Methyl butyl ketone	UG/KG	0	0%			0	16				12 U	11 U	12 U
Methyl chloride	UG/KG	0	0%			0	16				12 U	11 U	12 U
Methyl ethyl ketone	UG/KG	0	0%	500,000	0	0	16				12 U	11 U	12 U
Methyl isobutyl ketone	UG/KG	0	0%			0	16				12 U	11 U	12 U
Methylene chloride	UG/KG	0	0%	500,000	0	0	16				12 U	11 U	12 U
Styrene	UG/KG	0	0%			0	16				12 U	11 U	12 U
Tetrachloroethene	UG/KG	19	38%	150,000	0	6	16				12 U	11 U	12 U
Toluene	UG/KG	0	0%	500,000	0	0	16				12 U	11 U	12 U
Total Xylenes	UG/KG	0	0%	500,000	0	0	16				12 U	11 U	12 U
Trans-1,3-Dichloropropene	UG/KG	0	0%			0	16				12 U	11 U	12 U
Trichloroethene	UG/KG	0	0%	200,000	0	0	16				12 U	11 U	12 U
Vinyl chloride	UG/KG	0	0%	13,000	0	0	16				12 U	11 U	12 U
Semivolatile Organic Compounds													
1,2,4-Trichlorobenzene	UG/KG	0	0%			0	35				410 U	380 U	400 U
1,2-Dichlorobenzene	UG/KG	0	0%	500,000	0	0	35				410 U	380 U	400 U
1,3-Dichlorobenzene	UG/KG	0	0%	280,000	0	0	35				410 U	380 U	400 U
1,4-Dichlorobenzene	UG/KG	0	0%	130,000	0	0	35				410 U	380 U	400 U
2,2'-oxybis(1-Chloropropane)	UG/KG	0	0%			0	16				410 U	380 U	400 U
2,4,5-Trichlorophenol	UG/KG	0	0%			0	35				1,000 U	930 U	960 U
2,4,6-Trichlorophenol	UG/KG	0	0%			0	35				410 U	380 U	400 U
2,4-Dichlorophenol	UG/KG	0	0%			0	35				410 U	380 U	400 U
2,4-Dimethylphenol	UG/KG	0	0%			0	35				410 U	380 U	400 U
2,4-Dinitrophenol	UG/KG	0	0%			0	35				1,000 U	930 U	960 U
2,4-Dinitrotoluene	UG/KG	14,000	37%			13	35				410 U	380 U	400 U
2,6-Dinitrotoluene	UG/KG	700	6%			2	35				410 U	380 U	400 U
2-Chloronaphthalene	UG/KG	0	0%			0	35				410 U	380 U	400 U
2-Chlorophenol	UG/KG	0	0%			0	35				410 U	380 U	400 U
2-Methylnaphthalene	UG/KG	0	0%			0	35				410 U	380 U	400 U
2-Methylphenol	UG/KG	0	0%	500,000	0	0	35				410 U	380 U	400 U
2-Nitroaniline	UG/KG	0	0%			0	35				1,000 U	930 U	960 U
2-Nitrophenol	UG/KG	0	0%			0	35				410 U	380 U	400 U
3 or 4-Methylphenol	UG/KG	0	0%			0	19						
3,3'-Dichlorobenzidine	UG/KG	0	0%			0	35				410 U	380 U	400 U
3-Nitroaniline	UG/KG	0	0%			0	35				1,000 U	930 U	960 U
4,6-Dinitro-2-methylphenol	UG/KG	0	0%			0	35				1,000 U	930 U	960 U
4-Bromophenyl phenyl ether	UG/KG	0	0%			0	35				410 U	380 U	400 U
4-Chloro-3-methylphenol	UG/KG	0	0%			0	35				410 U	380 U	400 U
4-Chloroaniline	UG/KG	0	0%			0	35				410 U	380 U	400 U
4-Chlorophenyl phenyl ether	UG/KG	0	0%			0	35				410 U	380 U	400 U
4-Methylphenol	UG/KG	0	0%	500,000	0	0	16				410 U	380 U	400 U
4-Nitroaniline	UG/KG	0	0%			0	35				1,000 U	930 U	960 U
4-Nitrophenol	UG/KG	0	0%			0	35				1,000 U	930 U	960 U
Acenaphthene	UG/KG	0	0%	500,000	0	0	35				410 U	380 U	400 U
Acenaphthylene	UG/KG	30	9%	500,000	0	3	35				410 U	380 U	400 U
Anthracene	UG/KG	18	6%	500,000	0	2	35				410 U	380 U	400 U
Benzo(a)anthracene	UG/KG	50	23%	5,600	0	8	35				410 U	380 U	400 U
Benzo(a)pyrene	UG/KG	82	23%	1,000	0	8	35				410 U	380 U	400 U
Benzo(b)fluoranthene	UG/KG	55	26%	5,600	0	9	35				410 U	380 U	400 U
Benzo(ghi)perylene	UG/KG	66	20%	500,000	0	7	35				410 U	380 U	400 U
Benzo(k)fluoranthene	UG/KG	58	20%	56,000	0	7	35				410 U	380 U	400 U

T:
Analytical Data for Surface and S   Soil Samples at OD Grounds
Feasibility Stu.   D Grounds
Seneca Army Depot

Area								SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45
Loc ID								S45-TP-4-03	S45-TP-4-04	S45-TP-4-05	SS45-1	SS45-2	SS45-3
Sample ID								S45-TP-4-03	S45-TP-4-04	S45-TP-4-05	SS45-1	SS45-2	SS45-3
Matrix								SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Depth Interval (FT)								0.2-0.6	0.2-0.6	0.2-0.6	0-0.2	0-0.2	0-0.2
Sample Date								3/12/2010	3/12/2010	3/12/2010	10/25/1993	10/25/1993	10/25/1993
QC Type								SA	SA	SA	SA	SA	SA
Study ID								OD Initial Invest	OD Initial Invest	OD Initial Invest	ESI	ESI	ESI
Parameter	Unit	Maximum Value	Frequency of Detection	Criteria Value	Number of Exceedances	Number of Times Detected	Number of Samples Analyzed	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual
Bis(2-Chloroethoxy)methane	UG/KG	0	0%			0	35				410 U	380 U	400 U
Bis(2-Chloroethyl)ether	UG/KG	0	0%			0	35				410 U	380 U	400 U
Bis(2-Chloroisopropyl)ether	UG/KG	0	0%			0	19						
Bis(2-Ethylhexyl)phthalate	UG/KG	740	26%			9	35				410 U	380 U	700
Butylbenzylphthalate	UG/KG	0	0%			0	35				410 U	380 U	400 U
Carbazole	UG/KG	0	0%			0	35				410 U	380 U	400 U
Chrysene	UG/KG	130	34%	56,000	0	12	35				410 U	380 U	400 U
Dibenz(a,h)anthracene	UG/KG	0	0%	560	0	0	35				410 U	380 U	400 U
Dibenzofuran	UG/KG	0	0%	350,000	0	0	35				410 U	380 U	400 U
Diethyl phthalate	UG/KG	35	3%			1	35				410 U	380 U	400 U
Dimethylphthalate	UG/KG	0	0%			0	35				410 U	380 U	400 U
Di-n-butylphthalate	UG/KG	6,800	34%			12	35				410 U	380 U	400 U
Di-n-octylphthalate	UG/KG	0	0%			0	35				410 U	380 U	400 U
Fluoranthene	UG/KG	68	31%	500,000	0	11	35				410 U	380 U	400 U
Fluorene	UG/KG	0	0%	500,000	0	0	35				410 U	380 U	400 U
Hexachlorobenzene	UG/KG	110	31%	6,000	0	11	35				410 U	380 U	400 U
Hexachlorobutadiene	UG/KG	0	0%			0	35				410 U	380 U	400 U
Hexachlorocyclopentadiene	UG/KG	0	0%			0	35				410 U	380 U	400 U
Hexachloroethane	UG/KG	1,100	17%			6	35				410 U	380 U	400 U
Indeno(1,2,3-cd)pyrene	UG/KG	52	11%	5,600	0	4	35				410 U	380 U	400 U
Isophorone	UG/KG	0	0%			0	35				410 U	380 U	400 U
Naphthalene	UG/KG	30	14%	500,000	0	5	35				410 U	380 U	400 U
Nitrobenzene	UG/KG	0	0%			0	35				410 U	380 U	400 U
N-Nitrosodiphenylamine	UG/KG	320	6%			2	35				410 U	380 U	400 U
N-Nitrosodipropylamine	UG/KG	1,600	14%			5	35				410 U	380 U	400 U
Pentachlorophenol	UG/KG	0	0%	6,700	0	0	35				1,000 U	930 U	960 U
Phenanthrene	UG/KG	46	26%	500,000	0	9	35				410 U	380 U	400 U
Phenol	UG/KG	0	0%	500,000	0	0	35				410 U	380 U	400 U
Pyrene	UG/KG	110	34%	500,000	0	12	35				410 U	380 U	400 U
Herbicides													
2,4,5-T	UG/KG	0	0%			0	35				6.3 U	5.8 U	6 U
2,4,5-TP/Silvex	UG/KG	0	0%	500,000	0	0	35				6.3 U	5.8 U	6 U
2,4-D	UG/KG	0	0%			0	35				63 U	58 U	60 U
2,4-DB	UG/KG	0	0%			0	35				63 U	58 U	60 U
Dalapon	UG/KG	0	0%			0	35				150 U	140 U	150 U
Dicamba	UG/KG	0	0%			0	35				6.3 U	5.8 U	6 U
Dichloroprop	UG/KG	0	0%			0	35				63 U	58 U	60 U
Dinoseb	UG/KG	0	0%			0	35				32 U	29 U	30 U
MCPA	UG/KG	9,400	6%			2	35				9,400	6,300	6,000 U
MCPP	UG/KG	0	0%			0	35				6,300 U	5,800 U	6,000 U
Explosives													
1,3,5-Trinitrobenzene	UG/KG	190	60%			28	47				130 U	130 U	100 J
1,3-Dinitrobenzene	UG/KG	0	0%			0	47				130 U	130 U	130 U
2,4,6-Trinitrotoluene	UG/KG	1,400	81%			38	47				130 U	130 U	96 J
2,4-Dinitrotoluene	UG/KG	1,100	77%			36	47				130 U	130 U	130 U
2,6-Dinitrotoluene	UG/KG	0	0%			0	47				130 U	130 U	130 U
2-amino-4,6-Dinitrotoluene	UG/KG	680	77%			36	47				130 U	130 U	99 J
2-Nitrotoluene	UG/KG	0	0%			0	31						
3,5-Dinitroaniline	UG/KG	0	0%			0	31						
3-Nitrotoluene	UG/KG	0	0%			0	31						
4-amino-2,6-Dinitrotoluene	UG/KG	500	57%			27	47				130 U	130 U	130 U
4-Nitrotoluene	UG/KG	0	0%			0	31						
HMX	UG/KG	470	68%			32	47				130 U	130 U	130 U
Nitrobenzene	UG/KG	0	0%			0	31						
Nitroglycerine	UG/KG	1,500	3%			1	31						
Pentaerythritol Tetranitrate	UG/KG	0	0%			0	31						
RDX	UG/KG	5,800	83%			39	47				130 U	130 U	100 J
Tetryl	UG/KG	330	9%			4	47				130 U	130 U	130 U

Table A-1
Analytical Data for Surface and Subsurface Soil Samples at OD Grounds
Feasibility Studies - OD Grounds
Seneca Army Depot

Parameter	Unit	Maximum Value	Frequency of Detection	Criteria Value	Number of Exceedances	Number of Times Detected	Number of Samples Analyzed	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual
Area								SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45
Loc ID								S45-TP-4-03	S45-TP-4-04	S45-TP-4-05	SS45-1	SS45-2	SS45-3
Sample ID								S45-TP-4-03	S45-TP-4-04	S45-TP-4-05	SS45-1	SS45-2	SS45-3
Matrix								SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Depth Interval (FT)								0.2-0.6	0.2-0.6	0.2-0.6	0-0.2	0-0.2	0-0.2
Sample Date								3/12/2010	3/12/2010	3/12/2010	10/25/1993	10/25/1993	10/25/1993
QC Type								SA	SA	SA	SA	SA	SA
Study ID								OD Initial Invest	OD Initial Invest	OD Initial Invest	ESI	ESI	ESI
Pesticides/PCBs													
Aroclor-1016	UG/KG	0	0%	1,000	0	0	34				41 U	38 U	40 U
Aroclor-1221	UG/KG	0	0%	1,000	0	0	34				84 U	78 U	81 U
Aroclor-1232	UG/KG	0	0%	1,000	0	0	34				41 U	38 U	40 U
Aroclor-1242	UG/KG	0	0%	1,000	0	0	34				41 U	38 U	40 U
Aroclor-1248	UG/KG	0	0%	1,000	0	0	34				41 U	38 U	40 U
Aroclor-1254	UG/KG	2,000	6%	1,000	1	2	34				41 U	38 U	40 U
Aroclor-1260	UG/KG	0	0%	1,000	0	0	34				41 U	38 U	40 U
4,4'-DDD	UG/KG	2.4	6%	92,000	0	2	34				4.1 U	3.8 U	4 U
4,4'-DDE	UG/KG	4.2	63%	62,000	0	22	35				4.1 U	3.8 U	4 U
4,4'-DDT	UG/KG	3.4	50%	47,000	0	17	34				4.1 U	3.8 U	4 U
Aldrin	UG/KG	0	0%	680	0	0	34				2.1 U	2 U	2 U
Alpha-BHC	UG/KG	0	0%	3,400	0	0	34				2.1 U	2 U	2 U
Alpha-Chlordane	UG/KG	2	12%	24,000	0	4	34				2.1 U	2 U	2 U
Beta-BHC	UG/KG	0	0%	3,000	0	0	34				2.1 U	2 U	2 U
Delta-BHC	UG/KG	0	0%	500,000	0	0	34				2.1 U	2 U	2 U
Dieldrin	UG/KG	3.2	41%	1,400	0	14	34				4.1 U	3.8 U	4 U
Endosulfan I	UG/KG	55	60%	200,000	0	21	35				2.1 U	2 U	2 U
Endosulfan II	UG/KG	0.88	3%	200,000	0	1	34				4.1 U	3.8 U	4 U
Endosulfan sulfate	UG/KG	0	0%	200,000	0	0	34				4.1 U	3.8 U	4 U
Endrin	UG/KG	3.6	3%	89,000	0	1	34				4.1 U	3.8 U	4 U
Endrin aldehyde	UG/KG	0	0%			0	34				4.1 U	3.8 U	4 U
Endrin ketone	UG/KG	0.58	3%			1	34				4.1 U	3.8 U	4 U
Gamma-BHC/Lindane	UG/KG	0	0%	9,200	0	0	34				2.1 U	2 U	2 U
Gamma-Chlordane	UG/KG	1.1	9%			3	34				2.1 U	2 U	2 U
Heptachlor	UG/KG	0	0%	15,000	0	0	34				2.1 U	2 U	2 U
Heptachlor epoxide	UG/KG	0	0%			0	34				2.1 U	2 U	2 U
Methoxychlor	UG/KG	45	3%			1	34				21 U	20 U	20 U
Toxaphene	UG/KG	0	0%			0	34				210 U	200 U	200 U
Inorganics													
Aluminum	MG/KG	27,900	100%			97	97	12,700	9,690	10,800	17,300	19,400	18,900
Antimony	MG/KG	5.1	33%			32	97	0.19 UJ	0.16 J	0.14 UJ	10 UJ	11.5 UJ	10.8 UJ
Arsenic	MG/KG	12.6	100%	16	0	97	97	5	3.3	5.4	5	5.5	5.1
Barium	MG/KG	365	100%	400	0	97	97	151	108	76.1	122	194	115
Beryllium	MG/KG	1.2	98%	590	0	95	97	0.58	0.42 J	0.54	0.7 J	0.77 J	0.83 J
Cadmium	MG/KG	1,100	81%	9.3	11	77	95	4.5	1.8	0.01 U	2.8	2.4	1.1
Calcium	MG/KG	193,000	99%			96	97	41,800	40,400	53,900	8,510	10,300	21,800
Chromium	MG/KG	446	100%	1,500	0	97	97	22.8	14.4	18.8	24.1	39.3	27.4
Cobalt	MG/KG	26.8	100%			97	97	10.4	6.4	11	10.8	24.3	14.1
Copper	MG/KG	7,310	100%	270	52	97	97	240	115	24.7	79.4	192	55.8
Cyanide	MG/KG	0.7	13%	27	0	2	16				0.56 U	0.57 U	0.58 U
Iron	MG/KG	118,000	100%			97	97	25,300	15,500	19,000	25,800	75,700	30,500
Lead	MG/KG	998	100%	1,000	0	97	97	50.9	30.3	11.2	20.4	15.7	12
Magnesium	MG/KG	15,000	100%			97	97	10,300	12,500	8,380	5,530	5,950	6,790
Manganese	MG/KG	5,040	100%	10,000	0	97	97	466	380	379	562	1,150	627
Nickel	MG/KG	59.3	100%	310	0	92	92	35.5	20	34.3	29.4 UR	41.3 UR	40.5 UR
Potassium	MG/KG	4,880	100%			76	76	1,890 J	1,870 J	1,790 J	2,310	3,140	2,720
Selenium	MG/KG	0.92	4%	1,500	0	4	97	0.56 J	0.22 U	0.3 U	0.27 U	0.18 U	0.21 U
Silver	MG/KG	205	68%	1,500	0	66	97	1.4 J	0.38 J	0.12 J	1.3 UJ	1.5 UJ	2.1
Sodium	MG/KG	213	84%			81	97	196	166	188	67.1 J	100 J	114 J
Thallium	MG/KG	0.27	6%			6	97	0.18 U	0.09 U	0.15 J	0.29 UJ	0.2 UJ	0.23 UJ
Vanadium	MG/KG	41.9	100%			97	97	21.7	17.5	18.5	28.6	35.4	30.5
Zinc	MG/KG	1,470	100%	10,000	0	92	92	371	336	80.1	148 UR	122 UR	115 UR
Mercury	MG/KG	9.1	99%	2.8	49	96	97	**9.1**	[illegible]	0.04	0.43	0.63	0.17

Notes.
1) Chemical result qualifiers are assigned by the laboratory and are evaluated and modified (if necessary) by during data validation.
U = non-detect, i.e. not detected equal to or above this value. J = estimated (detect or non-detect) value.
[blank] = detect, i.e. detected chemical result value. R = Rejected, data validation rejected the results.
2) Num of Analyses is the number of detected and non-detected results excluding rejected results. Sample duplicate pairs have not been averaged.
3) Chemical results greater than the action level are highlighted, bolded and boxed
4) Criteria action level source document and web address.
- The NYS SCO Commercial Use values were obtained from the NYSDEC Soil Cleanup Objectives.
http://www.dec.ny.gov/regs/15507.html

Analytical Data for Surface and :e Soil Samples at OD Grounds
Feasibility St.. OD Grounds
Seneca Army Depot

Area								SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45
Loc ID								SS45-4	SS45-5	SS45-5	SS45-6	SS45-7	SS45-8
Sample ID								SS45-4	SS45-10	SS45-5	SS45-6	SS45-7	SS45-8
Matrix								SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Depth Interval (FT)								0-0.2	0-0.2	0-0.2	0-0.2	0-0.2	0-0.2
Sample Date								10/25/1993	10/25/1993	10/25/1993	10/25/1993	10/25/1993	10/25/1993
QC Type								SA	DU	SA	SA	SA	SA
Study ID								ESI	ESI	ESI	ESI	ESI	ESI
Parameter	Unit	Maximum Value	Frequency of Detection	Criteria Value	Number of Exceedances	Number of Times Detected	Number of Samples Analyzed	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual
Volatile Organic Compounds													
1,1,1-Trichloroethane	UG/KG	0	0%	500,000	0	0	16	11 UJ	12 U	12 U	11 U	11 U	12 U
1,1,2,2-Tetrachloroethane	UG/KG	0	0%			0	16	11 UJ	12 U	12 U	11 U	11 U	12 U
1,1,2-Trichloroethane	UG/KG	0	0%			0	16	11 UJ	12 U	12 U	11 U	11 U	12 U
1,1-Dichloroethane	UG/KG	0	0%	240,000	0	0	16	11 UJ	12 U	12 U	11 U	11 U	12 U
1,1-Dichloroethene	UG/KG	0	0%	500,000	0	0	16	11 UJ	12 U	12 U	11 U	11 U	12 U
1,2-Dichloroethane	UG/KG	0	0%	30,000	0	0	16	11 UJ	12 U	12 U	11 U	11 U	12 U
1,2-Dichloroethene (total)	UG/KG	0	0%	500,000	0	0	16	11 UJ	12 U	12 U	11 U	11 U	12 U
1,2-Dichloropropane	UG/KG	0	0%			0	16	11 UJ	12 U	12 U	11 U	11 U	12 U
Acetone	UG/KG	0	0%	500,000	0	0	16	11 UJ	12 U	12 U	11 U	11 U	12 U
Benzene	UG/KG	0	0%	44,000	0	0	16	11 UJ	12 U	12 U	11 U	11 U	12 U
Bromodichloromethane	UG/KG	0	0%			0	16	11 UJ	12 U	12 U	11 U	11 U	12 U
Bromoform	UG/KG	0	0%			0	16	11 UJ	12 U	12 U	11 U	11 U	12 U
Carbon disulfide	UG/KG	0	0%			0	16	11 UJ	12 U	12 U	11 U	11 U	12 U
Carbon tetrachloride	UG/KG	0	0%	22,000	0	0	16	11 UJ	12 U	12 U	11 U	11 U	12 U
Chlorobenzene	UG/KG	0	0%	500,000	0	0	16	11 UJ	12 U	12 U	11 U	11 U	12 U
Chlorodibromomethane	UG/KG	0	0%			0	16	11 UJ	12 U	12 U	11 U	11 U	12 U
Chloroethane	UG/KG	0	0%			0	16	11 UJ	12 U	12 U	11 U	11 U	12 U
Chloroform	UG/KG	0	0%	350,000	0	0	16	11 UJ	12 U	12 U	11 U	11 U	12 U
Cis-1,3-Dichloropropene	UG/KG	0	0%			0	16	11 UJ	12 U	12 U	11 U	11 U	12 U
Ethyl benzene	UG/KG	0	0%	390,000	0	0	16	11 UJ	12 U	12 U	11 U	11 U	12 U
Methyl bromide	UG/KG	0	0%			0	16	11 UJ	12 U	12 U	11 U	11 U	12 U
Methyl butyl ketone	UG/KG	0	0%			0	16	11 UJ	12 U	12 U	11 U	11 U	12 U
Methyl chloride	UG/KG	0	0%			0	16	11 UJ	12 U	12 U	11 U	11 U	12 U
Methyl ethyl ketone	UG/KG	0	0%	500,000	0	0	16	11 UJ	12 U	12 U	11 U	11 U	12 U
Methyl isobutyl ketone	UG/KG	0	0%			0	16	11 UJ	12 U	12 U	11 U	11 U	12 U
Methylene chloride	UG/KG	0	0%	500,000	0	0	16	11 UJ	12 U	12 U	11 U	11 U	12 U
Styrene	UG/KG	0	0%			0	16	11 UJ	12 U	12 U	11 U	11 U	12 U
Tetrachloroethene	UG/KG	19	38%	150,000	0	6	16	11 UJ	12 U	12 U	11 U	11 U	12 U
Toluene	UG/KG	0	0%	500,000	0	0	16	11 UJ	12 U	12 U	11 U	11 U	12 U
Total Xylenes	UG/KG	0	0%	500,000	0	0	16	11 UJ	12 U	12 J	11 U	11 U	12 U
Trans-1,3-Dichloropropene	UG/KG	0	0%			0	16	11 UJ	12 U	12 J	11 U	11 U	12 U
Trichloroethene	UG/KG	0	0%	200,000	0	0	16	11 UJ	12 U	12 J	11 U	11 U	12 U
Vinyl chloride	UG/KG	0	0%	13,000	0	0	16	11 UJ	12 U	12 U	11 U	11 U	12 U
Semivolatile Organic Compounds													
1,2,4-Trichlorobenzene	UG/KG	0	0%			0	35	360 U	390 U	390 U	360 U	380 U	420 U
1,2-Dichlorobenzene	UG/KG	0	0%	500,000	0	0	35	360 U	390 U	390 U	360 U	380 U	420 U
1,3-Dichlorobenzene	UG/KG	0	0%	280,000	0	0	35	360 U	390 U	390 U	360 U	380 U	420 U
1,4-Dichlorobenzene	UG/KG	0	0%	130,000	0	0	35	360 U	390 U	390 U	360 U	380 U	420 U
2,2'-oxybis(1-Chloropropane)	UG/KG	0	0%			0	16	360 U	390 U	390 U	360 U	380 U	420 U
2,4,5-Trichlorophenol	UG/KG	0	0%			0	35	870 U	950 U	950 U	870 U	920 U	1,000 U
2,4,6-Trichlorophenol	UG/KG	0	0%			0	35	360 U	390 U	390 U	360 U	380 U	420 U
2,4-Dichlorophenol	UG/KG	0	0%			0	35	360 U	390 U	390 U	360 U	380 U	420 U
2,4-Dimethylphenol	UG/KG	0	0%			0	35	360 U	390 U	390 U	360 U	380 U	420 U
2,4-Dinitrophenol	UG/KG	0	0%			0	35	870 U	950 U	950 U	870 U	920 U	1,000 U
2,4-Dinitrotoluene	UG/KG	14,000	37%			13	35	360 U	75 J	160 J	830	380 U	420 U
2,6-Dinitrotoluene	UG/KG	700	6%			2	35	360 U	390 U	390 U	41 J	380 U	420 U
2-Chloronaphthalene	UG/KG	0	0%			0	35	360 U	390 U	390 U	360 U	380 U	420 U
2-Chlorophenol	UG/KG	0	0%			0	35	360 U	390 U	390 U	360 U	380 U	420 U
2-Methylnaphthalene	UG/KG	0	0%			0	35	360 U	390 U	390 U	360 U	380 U	420 U
2-Methylphenol	UG/KG	0	0%	500,000	0	0	35	360 U	390 U	390 U	360 U	380 U	420 U
2-Nitroaniline	UG/KG	0	0%			0	35	870 U	950 U	950 U	870 U	920 U	1,000 U
2-Nitrophenol	UG/KG	0	0%			0	35	360 U	390 U	390 U	360 U	380 U	420 U
3 or 4-Methylphenol	UG/KG	0	0%			0	19						
3,3'-Dichlorobenzidine	UG/KG	0	0%			0	35	360 U	390 U	390 U	360 U	380 U	420 U
3-Nitroaniline	UG/KG	0	0%			0	35	870 U	950 U	950 U	870 U	920 U	1,000 U
4,6-Dinitro-2-methylphenol	UG/KG	0	0%			0	35	870 U	950 U	950 U	870 U	920 U	1,000 U
4-Bromophenyl phenyl ether	UG/KG	0	0%			0	35	360 U	390 U	390 U	360 U	380 U	420 U
4-Chloro-3-methylphenol	UG/KG	0	0%			0	35	360 U	390 U	390 U	360 U	380 U	420 U
4-Chloroaniline	UG/KG	0	0%			0	35	360 U	390 U	390 U	360 U	380 U	420 U
4-Chlorophenyl phenyl ether	UG/KG	0	0%			0	35	360 U	390 U	390 U	360 U	380 U	420 U
4-Methylphenol	UG/KG	0	0%	500,000	0	0	16	360 U	390 U	390 U	360 U	380 U	420 U
4-Nitroaniline	UG/KG	0	0%			0	35	870 U	950 U	950 U	870 U	920 U	1,000 U
4-Nitrophenol	UG/KG	0	0%			0	35	870 U	950 U	950 U	870 U	920 U	1,000 U
Acenaphthene	UG/KG	0	0%	500,000	0	0	35	360 U	390 U	390 U	360 U	380 U	420 U
Acenaphthylene	UG/KG	30	9%	500,000	0	3	35	360 U	390 U	30 J	360 U	380 U	420 U
Anthracene	UG/KG	18	6%	500,000	0	2	35	360 U	390 U	18 J	360 U	380 U	420 U
Benzo(a)anthracene	UG/KG	50	23%	5,600	0	8	35	360 U	32 J	50 J	31 J	380 U	420 U
Benzo(a)pyrene	UG/KG	82	23%	1,000	0	8	35	360 U	44 J	82 J	45 J	380 U	420 U
Benzo(b)fluoranthene	UG/KG	55	26%	5,600	0	9	35	360 U	33 J	55 J	36 J	380 U	420 U
Benzo(ghi)perylene	UG/KG	66	20%	500,000	0	7	35	360 U	27 J	39 J	360 U	380 U	420 U
Benzo(k)fluoranthene	UG/KG	58	20%	56,000	0	7	35	360 U	18 J	58 J	360 U	380 U	420 U

Table A-1
Analytical Data for Surface and Subsurface Soil Samples at OD Grounds
Feasibility Studies - OD Grounds
Seneca Army Depot

Parameter	Unit	Maximum Value	Frequency of Detection	Criteria Value	Number of Exceedances	Number of Times Detected	Number of Samples Analyzed	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual
Area								SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45
Loc ID								SS45-4	SS45-5	SS45-5	SS45-6	SS45-7	SS45-8
Sample ID								SS45-4	SS45-10	SS45-5	SS45-6	SS45-7	SS45-8
Matrix								SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Depth Interval (FT)								0-0.2	0-0.2	0-0.2	0-0.2	0-0.2	0-0.2
Sample Date								10/25/1993	10/25/1993	10/25/1993	10/25/1993	10/25/1993	10/25/1993
QC Type								SA	DU	SA	SA	SA	SA
Study ID								ESI	ESI	ESI	ESI	ESI	ESI
Bis(2-Chloroethoxy)methane	UG/KG	0	0%			0	35	360 U	390 U	390 U	360 U	380 U	420 U
Bis(2-Chloroethyl)ether	UG/KG	0	0%			0	35	360 U	390 U	390 U	360 U	380 U	420 U
Bis(2-Chloroisopropyl)ether	UG/KG	0	0%			0	19						
Bis(2-Ethylhexyl)phthalate	UG/KG	740	26%			9	35	430	700	740	360 U	210 J	470
Butylbenzylphthalate	UG/KG	0	0%			0	35	360 U	390 U	390 U	360 U	380 U	420 U
Carbazole	UG/KG	0	0%			0	35	360 U	390 U	390 U	360 U	380 U	420 U
Chrysene	UG/KG	130	34%	56,000	0	12	35	19 J	55 J	68 J	52 J	380 U	20 J
Dibenz(a,h)anthracene	UG/KG	0	0%	560	0	0	35	360 U	390 U	390 U	360 U	380 U	420 U
Dibenzofuran	UG/KG	0	0%	350,000	0	0	35	360 U	390 U	390 U	360 U	380 U	420 U
Diethyl phthalate	UG/KG	35	3%			1	35	360 U	390 U	390 U	360 U	380 U	420 U
Dimethylphthalate	UG/KG	0	0%			0	35	360 U	390 U	390 U	360 U	380 U	420 U
Di-n-butylphthalate	UG/KG	6,800	34%			12	35	360 U	31 J	110 J	900	380 U	420 U
Di-n-octylphthalate	UG/KG	0	0%			0	35	360 U	390 U	390 U	360 U	380 U	420 U
Fluoranthene	UG/KG	68	31%	500,000	0	11	35	23 J	44 J	66 J	42 J	380 U	22 J
Fluorene	UG/KG	0	0%	500,000	0	0	35	360 U	390 U	390 U	360 U	380 U	420 U
Hexachlorobenzene	UG/KG	110	31%	6,000	0	11	35	20 J	41 J	43 J	55 J	380 U	420 U
Hexachlorobutadiene	UG/KG	0	0%			0	35	360 U	390 U	390 U	360 U	380 U	420 U
Hexachlorocyclopentadiene	UG/KG	0	0%			0	35	360 U	390 U	390 U	360 U	380 U	420 U
Hexachloroethane	UG/KG	1,100	17%			6	35	360 U	390 U	390 U	21 J	380 U	420 U
Indeno(1,2,3-cd)pyrene	UG/KG	52	11%	5,600	0	4	35	360 U	390 U	52 J	360 U	380 U	420 U
Isophorone	UG/KG	0	0%			0	35	360 U	390 U	390 U	360 U	380 U	420 U
Naphthalene	UG/KG	30	14%	500,000	0	5	35	360 U	390 U	21 J	360 U	380 U	420 U
Nitrobenzene	UG/KG	0	0%			0	35	360 U	390 U	390 U	360 U	380 U	420 U
N-Nitrosodiphenylamine	UG/KG	320	6%			2	35	360 U	390 U	390 U	360 U	380 U	420 U
N-Nitrosodipropylamine	UG/KG	1,600	14%			5	35	360 U	390 U	390 U	110 J	380 U	420 U
Pentachlorophenol	UG/KG	0	0%	6,700	0	0	35	870 U	950 U	950 U	870 U	920 U	1,000 U
Phenanthrene	UG/KG	46	26%	500,000	0	9	35	360 U	31 J	38 J	25 J	380 U	420 U
Phenol	UG/KG	0	0%	500,000	0	0	35	360 U	390 U	390 U	360 U	380 U	420 U
Pyrene	UG/KG	110	34%	500,000	0	12	35	35 J	76 J	100 J	79 J	380 U	30 J
Herbicides													
2,4,5-T	UG/KG	0	0%			0	35	5.4 U	6 U	5.9 U	5.5 U	5.7 U	6.3 U
2,4,5-TP/Silvex	UG/KG	0	0%	500,000	0	0	35	5.4 U	6 U	5.9 UJ	5.5 U	5.7 U	6.3 U
2,4-D	UG/KG	0	0%			0	35	54 U	60 U	59 U	55 U	57 U	63 U
2,4-DB	UG/KG	0	0%			0	35	54 U	60 U	59 U	55 U	57 U	63 U
Dalapon	UG/KG	0	0%			0	35	130 U	150 U	150 U	130 U	140 U	160 U
Dicamba	UG/KG	0	0%			0	35	5.4 U	6 U	5.9 U	5.5 U	5.7 U	6.3 U
Dichloroprop	UG/KG	0	0%			0	35	54 U	60 U	59 U	55 U	57 U	63 U
Dinoseb	UG/KG	0	0%			0	35	27 U	30 U	30 UJ	28 U	29 U	32 U
MCPA	UG/KG	9,400	6%			2	35	5,400 U	6,000 U	5,900 U	5,500 U	5,700 U	6,300 U
MCPP	UG/KG	0	0%			0	35	5,400 U	6,000 U	5,900 U	5,500 U	5,700 U	6,300 U
Explosives													
1,3,5-Trinitrobenzene	UG/KG	190	60%			28	47	100 U	130 UJ	130 UJ	120 J	130 UJ	130 UJ
1,3-Dinitrobenzene	UG/KG	0	0%			0	47	130 U	130 UJ	130 UJ	130 U	130 UJ	130 UJ
2,4,6-Trinitrotoluene	UG/KG	1,400	81%			38	47	130 U	80 J	84 J	190	130 UJ	130 UJ
2,4-Dinitrotoluene	UG/KG	1,100	77%			36	47	110 J	140 J	150 J	160	130 UJ	130 UJ
2,6-Dinitrotoluene	UG/KG	0	0%			0	47	130 U	130 UJ	130 UJ	130 U	130 UJ	130 UJ
2-amino-4,6-Dinitrotoluene	UG/KG	680	77%			36	47	130 U	270 J	280 J	590	130 UJ	130 UJ
2-Nitrotoluene	UG/KG	0	0%			0	31						
3,5-Dinitroaniline	UG/KG	0	0%			0	31						
3-Nitrotoluene	UG/KG	0	0%			0	31						
4-amino-2,6-Dinitrotoluene	UG/KG	500	57%			27	47	130 U	130 UJ	130 UJ	130 U	130 UJ	130 UJ
4-Nitrotoluene	UG/KG	0	0%			0	31						
HMX	UG/KG	470	68%			32	47	130 U	140 J	120 J	130 U	130 UJ	130 UJ
Nitrobenzene	UG/KG	0	0%			0	31						
Nitroglycerine	UG/KG	1,500	3%			1	31						
Pentaerythritol Tetranitrate	UG/KG	0	0%			0	31						
RDX	UG/KG	5,800	83%			39	47	82 J	290 J	280 J	1,800	83 J	130 UJ
Tetryl	UG/KG	330	9%			4	47	90 J	130 J	130 UJ	330	130 UJ	130 UJ

Area								SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45
Loc ID								SS45-4	SS45-5	SS45-5	SS45-6	SS45-7	SS45-8
Sample ID								SS45-4	SS45-10	SS45-5	SS45-6	SS45-7	SS45-8
Matrix								SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Depth Interval (FT)								0-0.2	0-0.2	0-0.2	0-0.2	0-0.2	0-0.2
Sample Date								10/25/1993	10/25/1993	10/25/1993	10/25/1993	10/25/1993	10/25/1993
QC Type								SA	DU	SA	SA	SA	SA
Study ID								ESI	ESI	ESI	ESI	ESI	ESI
Parameter	Unit	Maximum Value	Frequency of Detection	Criteria Value	Number of Exceedances	Number of Times Detected	Number of Samples Analyzed	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual
Pesticides/PCBs													
Aroclor-1016	UG/KG	0	0%	1,000	0	0	34	36 U	38 U	39 U	36 U	38 U	41 U
Aroclor-1221	UG/KG	0	0%	1,000	0	0	34	73 U	78 U	80 U	73 U	77 U	84 U
Aroclor-1232	UG/KG	0	0%	1,000	0	0	34	36 U	38 U	39 U	36 U	38 U	41 U
Aroclor-1242	UG/KG	0	0%	1,000	0	0	34	36 U	38 U	39 U	36 U	38 U	41 U
Aroclor-1248	UG/KG	0	0%	1,000	0	0	34	36 U	38 U	39 U	36 U	38 U	41 U
Aroclor-1254	UG/KG	2,000	6%	1,000	1	2	34	36 U	110 J	39 U	36 U	38 U	41 U
Aroclor-1260	UG/KG	0	0%	1,000	0	0	34	36 U	38 U	39 U	36 U	38 U	41 U
4,4'-DDD	UG/KG	2.4	6%	92,000	0	2	34	3.6 U	3.8 U	3.9 U	3.6 U	3.8 U	4.1 U
4,4'-DDE	UG/KG	4.2	63%	62,000	0	22	35	3.2 J	3.4 J	3.9 U	4.2 J	3.8 U	4.1 U
4,4'-DDT	UG/KG	3.4	50%	47,000	0	17	34	3.6 U	3.4 J	3.9 U	2.8 J	3.8 U	4.1 U
Aldrin	UG/KG	0	0%	680	0	0	34	1.8 U	2 U	2 U	1.8 U	1.9 U	2.1 U
Alpha-BHC	UG/KG	0	0%	3,400	0	0	34	1.8 U	2 U	2 U	1.8 U	1.9 U	2.1 U
Alpha-Chlordane	UG/KG	2	12%	24,000	0	4	34	1.5 J	1.1 J	2 U	2 J	1.9 U	2.1 U
Beta-BHC	UG/KG	0	0%	3,000	0	0	34	1.8 U	2 U	2 U	1.8 U	1.9 U	2.1 U
Delta-BHC	UG/KG	0	0%	500,000	0	0	34	1.8 U	2 U	2 U	1.8 U	1.9 U	2.1 U
Dieldrin	UG/KG	3.2	41%	1,400	0	14	34	2.5 J	3.8 U	3.9 U	3.2 J	3.8 U	4.1 U
Endosulfan I	UG/KG	55	60%	200,000	0	21	35	1.8 U	2 U	1.8 J	1.8 U	1.9 U	2.1 U
Endosulfan II	UG/KG	0.88	3%	200,000	0	1	34	3.6 U	3.8 U	3.9 U	3.6 U	3.8 U	4.1 U
Endosulfan sulfate	UG/KG	0	0%	200,000	0	0	34	3.6 U	3.8 U	3.9 U	3.6 U	3.8 U	4.1 U
Endrin	UG/KG	3.6	3%	89,000	0	1	34	3.6 U	3.8 U	3.9 U	3.6 U	3.8 U	4.1 U
Endrin aldehyde	UG/KG	0	0%			0	34	3.6 U	3.8 U	3.9 U	3.6 U	3.8 U	4.1 U
Endrin ketone	UG/KG	0.58	3%			1	34	3.6 U	3.8 U	3.9 U	3.6 U	3.8 U	4.1 U
Gamma-BHC/Lindane	UG/KG	0	0%	9,200	0	0	34	1.8 U	2 U	2 U	1.8 U	1.9 U	2.1 U
Gamma-Chlordane	UG/KG	1.1	9%			3	34	1.8 U	2 U	2 U	1.8 U	1.9 U	2.1 U
Heptachlor	UG/KG	0	0%	15,000	0	0	34	1.8 U	2 U	2 U	1.8 U	1.9 U	2.1 U
Heptachlor epoxide	UG/KG	0	0%			0	34	1.8 U	2 U	2 U	1.8 U	1.9 U	2.1 U
Methoxychlor	UG/KG	45	3%			1	34	18 U	20 U	20 U	18 U	19 U	21 U
Toxaphene	UG/KG	0	0%			0	34	180 U	200 U	200 U	180 U	190 U	210 U
Inorganics													
Aluminum	MG/KG	27,900	100%			97	97	14,900	15,600	17,600	16,300	18,000	18,600
Antimony	MG/KG	5.1	33%			32	97	7.9 UJ	10.1 UJ	9.3 UJ	8.5 UJ	9.7 UJ	11.4 UJ
Arsenic	MG/KG	12.6	100%	16	0	97	97	5.1	6.4	6.2	5.5	6.8	6.4
Barium	MG/KG	365	100%	400	0	97	97	143	151	161	160	163	365
Beryllium	MG/KG	1.2	98%	590	0	95	97	0.63 J	0.7 J	0.72 J	0.71 J	0.82 J	0.69 J
Cadmium	MG/KG	1,100	81%	9.3	11	77	95	3.9	**9.5 J**	[illegible]	8.8	1.6 J	4.8 J
Calcium	MG/KG	193,000	99%			96	97	47,000	47,000	26,000	23,400	6,930	16,800
Chromium	MG/KG	446	100%	1,500	0	97	97	22.9	23.8	26.9	24.2	24.8	27.2
Cobalt	MG/KG	26.8	100%			97	97	12.4	12.2	12.9	11.7	13.1	12.1
Copper	MG/KG	7,310	100%	270	52	97	97	155	**405**	**538**	**491**	69.8	[illegible]
Cyanide	MG/KG	0.7	13%	27	0	2	16	0.54 U	0.67 U	0.72 U	0.52 U	0.66 U	0.72 U
Iron	MG/KG	118,000	100%			97	97	26,700	30,400	31,400	28,100	29,900	29,400
Lead	MG/KG	998	100%	1,000	0	97	97	34.9	54.9	63.6	63.2	21.9	66.9
Magnesium	MG/KG	15,000	100%			97	97	8,420	7,000	7,320	6,440	5,170	6,740
Manganese	MG/KG	5,040	100%	10,000	0	97	97	530	599	575	555	1,050	489
Nickel	MG/KG	59.3	100%	310	0	92	92	35.2 UR	36.4	40.5	34.2 UR	35.1	39.4
Potassium	MG/KG	4,880	100%			76	76	2,100	1,980	2,140	2,060	2,080	2,530
Selenium	MG/KG	0.92	4%	1,500	0	4	97	0.23 U	0.22 UJ	0.18 UJ	0.18 U	0.22 UJ	0.24 UJ
Silver	MG/KG	205	68%	1,500	0	66	97	1 UJ	2.7 J	3.5 J	4.3	1.2 UJ	2.3 J
Sodium	MG/KG	213	84%			81	97	142 J	104 J	110 J	112 J	136 J	93.5 J
Thallium	MG/KG	0.27	6%			6	97	0.25 UJ	0.24 U	0.19 U	0.2 UJ	0.24 U	0.26 U
Vanadium	MG/KG	41.9	100%			97	97	23.7	25.8	27.9	27.3	32.5	30
Zinc	MG/KG	1,470	100%	10,000	0	92	92	208 UR	361	427	347 UR	126	306
Mercury	MG/KG	9.1	99%	2.8	49	96	97	0.43	2.1 J	1.5 J	2.4	0.41 J	1.9 J

Notes:
1) Chemical result qualifiers are assigned by the laboratory and are evaluated and modified (if necessary) by during data validation.
U = non-detect, i.e. not detected equal to or above this value. J = estimated (detect or non-detect) value.
[blank] = detect, i.e. detected chemical result value. R = Rejected, data validation rejected the results.
2) Num of Analyses is the number of detected and non-detected results excluding rejected results. Sample duplicate pairs have not been averaged.
3) Chemical results greater than the action level are highlighted, bolded and boxed
4) Criteria action level source document and web address.
- The NYS SCO Commercial Use values were obtained from the NYSDEC Soil Cleanup Objectives.
http://www.dec.ny.gov/regs/15507.html

Table A-1
Analytical Data for Surface and Subsurface Soil Samples at OD Grounds
Feasibility Studies - OD Grounds
Seneca Army Depot

Parameter	Unit	Maximum Value	Frequency of Detection	Criteria Value	Number of Exceedances	Number of Times Detected	Number of Samples Analyzed	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual
Area								SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45
Loc ID								SS45-9	TP45-1	TP45-1	TP45-2	TP45-3	TP45-4	TP45-5
Sample ID								SS45-9	TP45-1	TP45-11	TP45-2	TP45-3	TP45-4	TP45-5
Matrix								SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Depth Interval (FT)								0-0.2	3-3	3-3	3-3	3-3	3-3	3-3
Sample Date								10/25/1993	11/11/1993	11/11/1993	11/11/1993	11/11/1993	11/9/1993	11/9/1993
QC Type								SA	SA	DU	SA	SA	SA	SA
Study ID								ESI	ESI	ESI	ESI	ESI	ESI	ESI
Volatile Organic Compounds														
1,1,1-Trichloroethane	UG/KG	0	0%	500,000	0	0	16	12 U	11 U	11 U	12 U	11 U	11 U	11 U
1,1,2,2-Tetrachloroethane	UG/KG	0	0%			0	16	12 U	11 U	11 U	12 U	11 U	11 U	11 U
1,1,2-Trichloroethane	UG/KG	0	0%			0	16	12 U	11 U	11 U	12 U	11 U	11 U	11 U
1,1-Dichloroethane	UG/KG	0	0%	240,000	0	0	16	12 U	11 U	11 U	12 U	11 U	11 U	11 U
1,1-Dichloroethene	UG/KG	0	0%	500,000	0	0	16	12 U	11 U	11 U	12 U	11 U	11 U	11 U
1,2-Dichloroethane	UG/KG	0	0%	30,000	0	0	16	12 U	11 U	11 U	12 U	11 U	11 U	11 U
1,2-Dichloroethene (total)	UG/KG	0	0%	500,000	0	0	16	12 U	11 U	11 U	12 U	11 U	11 U	11 U
1,2-Dichloropropane	UG/KG	0	0%			0	16	12 U	11 U	11 U	12 U	11 U	11 U	11 U
Acetone	UG/KG	0	0%	500,000	0	0	16	12 U	11 U	11 U	12 U	31 U	11 U	11 U
Benzene	UG/KG	0	0%	44,000	0	0	16	12 U	11 U	11 U	12 U	11 U	11 U	11 U
Bromodichloromethane	UG/KG	0	0%			0	16	12 U	11 U	11 U	12 U	11 U	11 U	11 U
Bromoform	UG/KG	0	0%			0	16	12 U	11 U	11 U	12 U	11 U	11 U	11 U
Carbon disulfide	UG/KG	0	0%			0	16	12 U	11 U	11 U	12 U	11 U	11 U	11 U
Carbon tetrachloride	UG/KG	0	0%	22,000	0	0	16	12 U	11 U	11 U	12 U	11 U	11 U	11 U
Chlorobenzene	UG/KG	0	0%	500,000	0	0	16	12 U	11 U	11 U	12 U	11 U	11 U	11 U
Chlorodibromomethane	UG/KG	0	0%			0	16	12 U	11 U	11 U	12 U	11 U	11 U	11 U
Chloroethane	UG/KG	0	0%			0	16	12 U	11 U	11 U	12 U	11 U	11 U	11 U
Chloroform	UG/KG	0	0%	350,000	0	0	16	12 U	11 U	11 U	12 U	11 U	11 U	11 U
Cis-1,3-Dichloropropene	UG/KG	0	0%			0	16	12 U	11 U	11 U	12 U	11 U	11 U	11 U
Ethyl benzene	UG/KG	0	0%	390,000	0	0	16	12 U	11 U	11 U	12 U	11 U	11 U	11 U
Methyl bromide	UG/KG	0	0%			0	16	12 U	11 U	11 U	12 U	11 U	11 U	11 U
Methyl butyl ketone	UG/KG	0	0%			0	16	12 U	11 U	11 U	12 U	11 U	11 U	11 U
Methyl chloride	UG/KG	0	0%			0	16	12 U	11 U	11 U	12 U	11 U	11 U	11 U
Methyl ethyl ketone	UG/KG	0	0%	500,000	0	0	16	12 U	11 U	11 U	12 U	11 U	11 U	11 U
Methyl isobutyl ketone	UG/KG	0	0%			0	16	12 U	11 U	11 U	12 U	11 U	11 U	11 U
Methylene chloride	UG/KG	0	0%	500,000	0	0	16	12 U	11 U	11 U	12 U	11 U	11 U	11 U
Styrene	UG/KG	0	0%			0	16	12 U	11 U	11 U	12 U	11 U	11 U	11 U
Tetrachloroethene	UG/KG	19	38%	150,000	0	6	16	12 U	4 J	6 J	8 J	19	2 J	3 J
Toluene	UG/KG	0	0%	500,000	0	0	16	12 U	11 U	11 U	12 U	11 U	11 U	11 U
Total Xylenes	UG/KG	0	0%	500,000	0	0	16	12 U	11 U	11 U	12 U	11 U	11 U	11 U
Trans-1,3-Dichloropropene	UG/KG	0	0%			0	16	12 U	11 U	11 U	12 U	11 U	11 U	11 U
Trichloroethene	UG/KG	0	0%	200,000	0	0	16	12 U	11 U	11 U	12 U	11 U	11 U	11 U
Vinyl chloride	UG/KG	0	0%	13,000	0	0	16	12 U	11 U	11 U	12 U	11 U	11 U	11 U
Semivolatile Organic Compounds														
1,2,4-Trichlorobenzene	UG/KG	0	0%			0	35	390 U	370 U	360 U	1,900 U	400 U	460 U	370 U
1,2-Dichlorobenzene	UG/KG	0	0%	500,000	0	0	35	390 U	370 U	360 U	1,900 U	400 U	460 U	370 U
1,3-Dichlorobenzene	UG/KG	0	0%	280,000	0	0	35	390 U	370 U	360 U	1,900 U	400 U	460 U	370 U
1,4-Dichlorobenzene	UG/KG	0	0%	130,000	0	0	35	390 U	370 U	360 U	1,900 U	400 U	460 U	370 U
2,2'-oxybis(1-Chloropropane)	UG/KG	0	0%			0	16	390 U	370 U	360 U	1,900 U	400 U	460 U	370 U
2,4,5-Trichlorophenol	UG/KG	0	0%			0	35	940 U	890 U	880 U	4,600 U	960 U	1,100 U	900 U
2,4,6-Trichlorophenol	UG/KG	0	0%			0	35	390 U	370 U	360 U	1,900 U	400 U	460 U	370 U
2,4-Dichlorophenol	UG/KG	0	0%			0	35	390 U	370 U	360 U	1,900 U	400 U	460 U	370 U
2,4-Dimethylphenol	UG/KG	0	0%			0	35	390 U	370 U	360 U	1,900 U	400 U	460 U	370 U
2,4-Dinitrophenol	UG/KG	0	0%			0	35	940 U	890 U	880 U	4,600 U	960 U	1,100 U	900 U
2,4-Dinitrotoluene	UG/KG	14,000	37%			13	35	390 U	100 J	190 J	14,000	84 J	59 J	230 J
2,6-Dinitrotoluene	UG/KG	700	6%			2	35	390 U	370 U	360 U	700 J	400 U	460 U	370 U
2-Chloronaphthalene	UG/KG	0	0%			0	35	390 U	370 U	360 U	1,900 U	400 U	460 U	370 U
2-Chlorophenol	UG/KG	0	0%			0	35	390 U	370 U	360 U	1,900 U	400 U	460 U	370 U
2-Methylnaphthalene	UG/KG	0	0%			0	35	390 U	370 U	360 U	1,900 U	400 U	460 U	370 U
2-Methylphenol	UG/KG	0	0%	500,000	0	0	35	390 U	370 U	360 U	1,900 U	400 U	460 U	370 U
2-Nitroaniline	UG/KG	0	0%			0	35	940 U	890 U	880 U	4,600 U	960 U	1,100 U	900 U
2-Nitrophenol	UG/KG	0	0%			0	35	390 U	370 U	360 U	1,900 U	400 U	460 U	370 U
3 or 4-Methylphenol	UG/KG	0	0%			0	19							
3,3'-Dichlorobenzidine	UG/KG	0	0%			0	35	390 U	370 U	360 U	1,900 U	400 U	460 U	370 U
3-Nitroaniline	UG/KG	0	0%			0	35	940 U	890 U	880 U	4,600 U	960 U	1,100 U	900 U
4,6-Dinitro-2-methylphenol	UG/KG	0	0%			0	35	940 U	890 U	880 U	4,600 U	960 U	1,100 U	900 U
4-Bromophenyl phenyl ether	UG/KG	0	0%			0	35	390 U	370 U	360 U	1,900 U	400 U	460 U	370 U
4-Chloro-3-methylphenol	UG/KG	0	0%			0	35	390 U	370 U	360 U	1,900 U	400 U	460 U	370 U
4-Chloroaniline	UG/KG	0	0%			0	35	390 U	370 U	360 U	1,900 U	400 U	460 U	370 U
4-Chlorophenyl phenyl ether	UG/KG	0	0%			0	35	390 U	370 U	360 U	1,900 U	400 U	460 U	370 U
4-Methylphenol	UG/KG	0	0%	500,000	0	0	16	390 U	370 U	360 U	1,900 U	400 U	460 U	370 U
4-Nitroaniline	UG/KG	0	0%			0	35	940 U	890 U	880 U	4,600 U	960 U	1,100 U	900 U
4-Nitrophenol	UG/KG	0	0%			0	35	940 U	890 U	880 U	4,600 U	960 U	1,100 U	900 U
Acenaphthene	UG/KG	0	0%	500,000	0	0	35	390 U	370 U	360 U	1,900 U	400 U	460 U	370 U
Acenaphthylene	UG/KG	30	9%	500,000	0	3	35	390 U	19 J	17 J	1,900 U	400 U	460 U	370 U
Anthracene	UG/KG	18	6%	500,000	0	2	35	390 U	17 J	360 U	1,900 U	400 U	460 U	370 U
Benzo(a)anthracene	UG/KG	50	23%	5,600	0	8	35	390 U	32 J	30 J	1,900 U	22 J	36 J	32 J
Benzo(a)pyrene	UG/KG	82	23%	1,000	0	8	35	390 U	46 J	41 J	1,900 U	28 J	45 J	42 J
Benzo(b)fluoranthene	UG/KG	55	26%	5,600	0	9	35	20 J	38 J	36 J	1,900 U	24 J	39 J	42 J
Benzo(ghi)perylene	UG/KG	66	20%	500,000	0	7	35	390 U	66 J	58 J	1,900 U	34 J	53 J	45 J
Benzo(k)fluoranthene	UG/KG	58	20%	56,000	0	7	35	390 U	28 J	26 J	1,900 U	21 J	34 J	23 J

Analytical Data for Surface and .e Soil Samples at OD Grounds
Feasibility St. OD Grounds
Seneca Army Depot

Parameter	Unit	Maximum Value	Frequency of Detection	Criteria Value	Number of Exceedances	Number of Times Detected	Number of Samples Analyzed	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual
Area								SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45
Loc ID								SS45-9	TP45-1	TP45-1	TP45-2	TP45-3	TP45-4	TP45-5
Sample ID								SS45-9	TP45-1	TP45-11	TP45-2	TP45-3	TP45-4	TP45-5
Matrix								SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Depth Interval (FT)								0-0.2	3-3	3-3	3-3	3-3	3-3	3-3
Sample Date								10/25/1993	11/11/1993	11/11/1993	11/11/1993	11/11/1993	11/9/1993	11/9/1993
QC Type								SA	SA	DU	SA	SA	SA	SA
Study ID								ESI	ESI	ESI	ESI	ESI	ESI	ESI
Bis(2-Chloroethoxy)methane	UG/KG	0	0%			0	35	390 U	370 U	360 U	1,900 U	400 U	460 U	370 U
Bis(2-Chloroethyl)ether	UG/KG	0	0%			0	35	390 U	370 U	360 U	1,900 U	400 U	460 U	370 U
Bis(2-Chloroisopropyl)ether	UG/KG	0	0%			0	19							
Bis(2-Ethylhexyl)phthalate	UG/KG	740	26%			9	35	350 J	65 J	50 J	1,900 U	400 U	460 U	370 U
Butylbenzylphthalate	UG/KG	0	0%			0	35	390 U	370 U	360 U	1,900 U	400 U	460 U	370 U
Carbazole	UG/KG	0	0%			0	35	390 U	370 U	360 U	1,900 U	400 U	460 U	370 U
Chrysene	UG/KG	130	34%	56,000	0	12	35	27 J	46 J	44 J	1,900 U	37 J	51 J	47 J
Dibenz(a,h)anthracene	UG/KG	0	0%	560	0	0	35	390 U	370 U	360 U	1,900 U	400 U	460 U	370 U
Dibenzofuran	UG/KG	0	0%	350,000	0	0	35	390 U	370 U	360 U	1,900 U	400 U	460 U	370 U
Diethyl phthalate	UG/KG	35	3%			1	35	390 U	370 U	360 U	1,900 U	400 U	35 J	370 U
Dimethylphthalate	UG/KG	0	0%			0	35	390 U	370 U	360 U	1,900 U	400 U	460 U	370 U
Di-n-butylphthalate	UG/KG	6,800	34%			12	35	390 U	35 J	170 J	6,800	27 J	75 J	230 J
Di-n-octylphthalate	UG/KG	0	0%			0	35	390 U	370 U	360 U	1,900 U	400 U	460 U	370 U
Fluoranthene	UG/KG	68	31%	500,000	0	11	35	30 J	59 J	50 J	1,900 U	52 J	68 J	58 J
Fluorene	UG/KG	0	0%	500,000	0	0	35	390 U	370 U	360 U	1,900 U	400 U	460 U	370 U
Hexachlorobenzene	UG/KG	110	31%	6,000	0	11	35	30 J	62 J	54 J	1,900 U	52 J	48 J	42 J
Hexachlorobutadiene	UG/KG	0	0%			0	35	390 U	370 U	360 U	1,900 U	400 U	460 U	370 U
Hexachlorocyclopentadiene	UG/KG	0	0%			0	35	390 U	370 U	360 U	1,900 U	400 U	460 U	370 U
Hexachloroethane	UG/KG	1,100	17%			6	35	390 U	72 J	68 J	1,900 U	1,100	41 J	36 J
Indeno(1,2,3-cd)pyrene	UG/KG	52	11%	5,600	0	4	35	390 U	37 J	360 U	1,900 U	400 U	29 J	26 J
Isophorone	UG/KG	0	0%			0	35	390 U	370 U	360 U	1,900 U	400 U	460 U	370 U
Naphthalene	UG/KG	30	14%	500,000	0	5	35	390 U	30 J	27 J	1,900 U	24 J	30 J	370 U
Nitrobenzene	UG/KG	0	0%			0	35	390 U	370 U	360 U	1,900 U	400 U	460 U	370 U
N-Nitrosodiphenylamine	UG/KG	320	6%			2	35	390 U	370 U	360 U	1,900 U	400 U	460 U	370 U
N-Nitrosodipropylamine	UG/KG	1,600	14%			5	35	390 U	370 U	30 J	1,600 J	20 J	460 U	25 J
Pentachlorophenol	UG/KG	0	0%	6,700	0	0	35	940 U	890 U	880 U	4,600 U	960 U	1,100 U	900 U
Phenanthrene	UG/KG	46	26%	500,000	0	9	35	18 J	46 J	38 J	1,900 U	38 J	44 J	34 J
Phenol	UG/KG	0	0%	500,000	0	0	35	390 U	370 U	360 U	1,900 U	400 U	460 U	370 U
Pyrene	UG/KG	110	34%	500,000	0	12	35	36 J	110 J	98 J	100 J	90 J	110 J	97 J
Herbicides														
2,4,5-T	UG/KG	0	0%			0	35	5.9 U	5.6 U	5.5 U	5.8 U	6 U	6.9 U	5.6 U
2,4,5-TP/Silvex	UG/KG	0	0%	500,000	0	0	35	5.9 U	5.6 U	5.5 U	5.8 U	6 U	6.9 U	5.6 U
2,4-D	UG/KG	0	0%			0	35	59 U	56 U	55 U	58 U	60 U	69 U	56 U
2,4-DB	UG/KG	0	0%			0	35	59 U	56 U	55 U	58 U	60 U	69 U	56 U
Dalapon	UG/KG	0	0%			0	35	150 U	140 U	140 U	140 U	150 U	170 U	140 U
Dicamba	UG/KG	0	0%			0	35	5.9 U	5.6 U	5.5 U	5.8 U	6 U	6.9 U	5.6 U
Dichloroprop	UG/KG	0	0%			0	35	59 U	56 U	55 U	58 U	60 U	69 U	56 U
Dinoseb	UG/KG	0	0%			0	35	30 U	28 U	28 U	29 U	30 U	35 U	28 U
MCPA	UG/KG	9,400	6%			2	35	5,900 U	5,600 U	5,500 U	5,800 U	6,000 U	6,900 U	5,600 U
MCPP	UG/KG	0	0%			0	35	5,900 U	5,600 U	5,500 U	5,800 U	6,000 U	6,900 U	5,600 U
Explosives														
1,3,5-Trinitrobenzene	UG/KG	190	60%			28	47	130 UJ	150 J	170 J	190 J	130 UJ	180	140
1,3-Dinitrobenzene	UG/KG	0	0%			0	47	130 UJ	130 UJ	130 UJ	130 UJ	130 UJ	130 U	130 U
2,4,6-Trinitrotoluene	UG/KG	1,400	81%			38	47	1,400 J	330 J	340 J	600 J	400 J	330	280
2,4-Dinitrotoluene	UG/KG	1,100	77%			36	47	130 UJ	130 UJ	140 J	190 J	120 J	110 J	90 J
2,6-Dinitrotoluene	UG/KG	0	0%			0	47	130 UJ	130 UJ	130 UJ	130 UJ	130 UJ	130 U	130 U
2-amino-4,6-Dinitrotoluene	UG/KG	680	77%			36	47	130 UJ	430 J	430 J	680 J	530 J	480	350
2-Nitrotoluene	UG/KG	0	0%			0	31							
3,5-Dinitroaniline	UG/KG	0	0%			0	31							
3-Nitrotoluene	UG/KG	0	0%			0	31							
4-amino-2,6-Dinitrotoluene	UG/KG	500	57%			27	47	270 J	130 UJ	130 UJ	130 UJ	130 UJ	130 U	130 U
4-Nitrotoluene	UG/KG	0	0%			0	31							
HMX	UG/KG	470	68%			32	47	130 UJ	250 J	430 J	470 J	240 J	350	200
Nitrobenzene	UG/KG	0	0%			0	31							
Nitroglycerine	UG/KG	1,500	3%			1	31							
Pentaerythritol Tetranitrate	UG/KG	0	0%			0	31							
RDX	UG/KG	5,800	83%			39	47	5,800 J	2,500 J	1,600 J	2,700 J	2,500 J	4,300	1,300
Tetryl	UG/KG	330	9%			4	47	130 UJ	130 UJ	130 UJ	130 UJ	130 UJ	130 U	180 J

Table A-1
Analytical Data for Surface and Subsurface Soil Samples at OD Grounds
Feasibility Studies - OD Grounds
Seneca Army Depot

Parameter	Unit	Maximum Value	Frequency of Detection	Criteria Value	Number of Exceedances	Number of Times Detected	Number of Samples Analyzed	SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45
Area								SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45
Loc ID								SS45-9	TP45-1	TP45-1	TP45-2	TP45-3	TP45-4	TP45-5
Sample ID								SS45-9	TP45-1	TP45-11	TP45-2	TP45-3	TP45-4	TP45-5
Matrix								SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Depth Interval (FT)								0-0.2	3-3	3-3	3-3	3-3	3-3	3-3
Sample Date								10/25/1993	11/11/1993	11/11/1993	11/11/1993	11/11/1993	11/9/1993	11/9/1993
QC Type								SA	SA	DU	SA	SA	SA	SA
Study ID								ESI	ESI	ESI	ESI	ESI	ESI	ESI
								Value Qual	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual
Pesticides/PCBs														
Aroclor-1016	UG/KG	0	0%	1,000	0	0	34	38 UR	37 U	36 U	38 U	40 U	46 U	37 U
Aroclor-1221	UG/KG	0	0%	1,000	0	0	34	78 UR	74 U	74 U	77 U	81 U	93 U	75 U
Aroclor-1232	UG/KG	0	0%	1,000	0	0	34	38 UR	37 U	36 U	38 U	40 U	46 U	37 U
Aroclor-1242	UG/KG	0	0%	1,000	0	0	34	38 UR	37 U	36 U	38 U	40 U	46 U	37 U
Aroclor-1248	UG/KG	0	0%	1,000	0	0	34	38 UR	37 U	36 U	38 U	40 U	46 U	37 U
Aroclor-1254	UG/KG	2,000	6%	1,000	1	2	34	38 UR	37 U	36 U	38 U	40 U	46 U	37 U
Aroclor-1260	UG/KG	0	0%	1,000	0	0	34	38 UR	37 U	36 U	38 U	40 U	46 U	37 U
4,4'-DDD	UG/KG	2.4	6%	92,000	0	2	34	3.8 UR	3.7 U	3.6 U	3.8 U	4 U	4.6 U	3.7 U
4,4'-DDE	UG/KG	4.2	63%	62,000	0	22	35	3.3 J	3.7 U	3.6 U	3.8 U	4 U	3.2 J	1.9 J
4,4'-DDT	UG/KG	3.4	50%	47,000	0	17	34	3.8 UR	3.7 U	2.3 J	3.8 U	2.9 J	4.6 U	3.7 U
Aldrin	UG/KG	0	0%	680	0	0	34	2 UR	1.9 U	1.9 U	2 U	2 U	2.4 U	1.9 U
Alpha-BHC	UG/KG	0	0%	3,400	0	0	34	2 UR	1.9 U	1.9 U	2 U	2 U	2.4 U	1.9 U
Alpha-Chlordane	UG/KG	2	12%	24,000	0	4	34	2 UR	1.9 U	1.9 U	2 U	2 U	2.4 U	1.9 U
Beta-BHC	UG/KG	0	0%	3,000	0	0	34	2 UR	1.9 U	1.9 U	2 U	2 U	2.4 U	1.9 U
Delta-BHC	UG/KG	0	0%	500,000	0	0	34	2 UR	1.9 U	1.9 U	2 U	2 U	2.4 U	1.9 U
Dieldrin	UG/KG	3.2	41%	1,400	0	14	34	3.8 UR	3.7 U	3.6 U	3.8 U	4 U	2.4 J	3.7 U
Endosulfan I	UG/KG	55	60%	200,000	0	21	35	1 J	1.9 J	2.2 J	1.9 J	1.6 J	2.4 U	1.9 U
Endosulfan II	UG/KG	0.88	3%	200,000	0	1	34	3.8 UR	3.7 U	3.6 U	3.8 U	4 U	4.6 U	3.7 U
Endosulfan sulfate	UG/KG	0	0%	200,000	0	0	34	3.8 UR	3.7 U	3.6 U	3.8 U	4 U	4.6 U	3.7 U
Endrin	UG/KG	3.6	3%	89,000	0	1	34	3.8 UR	3.7 U	3.6 U	3.8 U	4 U	4.6 U	3.7 U
Endrin aldehyde	UG/KG	0	0%			0	34	3.8 UR	3.7 U	3.6 U	3.8 U	4 U	4.6 U	3.7 U
Endrin ketone	UG/KG	0.58	3%			1	34	3.8 UR	3.7 U	3.6 U	3.8 U	4 U	4.6 U	3.7 U
Gamma-BHC/Lindane	UG/KG	0	0%	9,200	0	0	34	2 UR	1.9 U	1.9 U	2 U	2 U	2.4 U	1.9 U
Gamma-Chlordane	UG/KG	1.1	9%			3	34	2 UR	1.9 U	1.9 U	2 U	2 U	2.4 U	1.9 U
Heptachlor	UG/KG	0	0%	15,000	0	0	34	2 UR	1.9 U	1.9 U	2 U	2 U	2.4 U	1.9 U
Heptachlor epoxide	UG/KG	0	0%			0	34	2 UR	1.9 U	1.9 U	2 U	2 U	2.4 U	1.9 U
Methoxychlor	UG/KG	45	3%			1	34	20 UR	19 U	19 U	20 U	20 U	24 U	19 U
Toxaphene	UG/KG	0	0%			0	34	200 UR	190 U	190 U	200 U	200 U	240 U	190 U
Inorganics														
Aluminum	MG/KG	27,900	100%			97	97	17,800	20,100	16,500	20,800	22,800	20,600	17,300
Antimony	MG/KG	5.1	33%			32	97	9.4 UJ	9.7 UJ	7.6 UJ	12.1 UJ	12.4 UJ	10.2 U	9.2 U
Arsenic	MG/KG	12.6	100%	16	0	97	97	6.1	6.8	6.3	7.1	8.2	6 J	5.1 J
Barium	MG/KG	365	100%	400	0	97	97	202	208	177	201	248	216	174
Beryllium	MG/KG	1.2	98%	590	0	95	97	0.79 J	0.9 J	0.8	0.91 J	1.1 J	0.94 J	0.8 J
Cadmium	MG/KG	1,100	81%	9.3	11	77	95	5.5 J	[illegible]	[illegible]	[illegible]	[illegible]	10.9 UR	7.4 UR
Calcium	MG/KG	193,000	99%			96	97	22,600	42,700	31,500	26,400	32,500	36,400	32,100
Chromium	MG/KG	446	100%	1,500	0	97	97	27.4	31.3	25.7	30.1	35.5	32.1	27.6
Cobalt	MG/KG	26.8	100%			97	97	15	13.2	13.2	12.8	16.9	15.3	12.1
Copper	MG/KG	7,310	100%	270	52	97	97	267	**722**	**556**	**561**	**791**	**1,240 J**	**449 J**
Cyanide	MG/KG	0.7	13%	27	0	2	16	0.7 U	0.7	0.54 U	0.55 U	0.55 U	0.62	0.51 U
Iron	MG/KG	118,000	100%			97	97	32,500	35,700	31,900	31,500	41,300	37,600	31,600
Lead	MG/KG	998	100%	1,000	0	97	97	77.7	54.1	73.3	69.4	87.8	74.7	61.9
Magnesium	MG/KG	15,000	100%			97	97	7,110	7,910	7,780	7,800	9,270	8,940	7,570
Manganese	MG/KG	5,040	100%	10,000	0	97	97	912	1,380	613	605	827	726	600
Nickel	MG/KG	59.3	100%	310	0	92	92	42.5	41.8	39.1	40.5	51	48.3	39.2
Potassium	MG/KG	4,880	100%			76	76	2,260	3,040	1,960	3,280	3,010	2,400	1,960
Selenium	MG/KG	0.92	4%	1,500	0	4	97	0.24 UJ	0.23 UJ	0.15 UJ	0.16 UJ	0.23 UJ	0.27 UJ	0.2 UJ
Silver	MG/KG	205	68%	1,500	0	66	97	1.3 J	3.2 J	4.7 J	5 J	6.6 J	26.2 J	3.9 J
Sodium	MG/KG	213	84%			81	97	93.4 J	141 J	105 J	118 J	135 J	136 J	122 J
Thallium	MG/KG	0.27	6%			6	97	0.26 U	0.25 U	0.16 U	0.17 U	0.25 U	0.29 UJ	0.22 UJ
Vanadium	MG/KG	41.9	100%			97	97	28.9	32.4	26.7	34.4	38	32.6	27.3
Zinc	MG/KG	1,470	100%	10,000	0	92	92	383	345	360	390	538	557 J	333 J
Mercury	MG/KG	9.1	99%	2.8	49	96	97	1.9 J	**3.1 J**	1.4 J	**[illegible]**	**4 J**	**[illegible]**	**4.3**

Notes:
1) Chemical result qualifiers are assigned by the laboratory and are evaluated and modified (if necessary) by during data validation.
U = non-detect, i.e. not detected equal to or above this value. J = estimated (detect or non-detect) value.
[blank] = detect, i.e. detected chemical result value. R = Rejected, data validation rejected the results.
2) Num of Analyses is the number of detected and non-detected results excluding rejected results. Sample duplicate pairs have not been averaged.
3) Chemical results greater than the action level are highlighted, bolded and boxed
4) Criteria action level source document and web address.
- The NYS SCO Commercial Use values were obtained from the NYSDEC Soil Cleanup Objectives.
http://www.dec.ny.gov/regs/15507.html

Parameter	Unit	Maximum Value	Frequency of Detection	Criteria Source	Criteria Value	Number of Exceedances	Number of Times Detected	Number of Samples Analyzed						
Area									SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45
Loc ID									MW1	MW2	MW3	MW4	MW45-2	MW45-3
Sample ID									MW1	MW2	MW3	MW4	MW45-2	MW45-3
Matrix									GW	GW	GW	GW	GW	GW
Sample Date									2/1/1994	2/2/1994	2/1/1994	2/2/1994	2/3/1994	2/3/1994
QC Type									SA	SA	SA	SA	SA	SA
Study ID									ESI	ESI	ESI	ESI	ESI	ESI
									N	N	N	N	N	N
									Value Qual	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual
Volatile Organic Compounds														
1,1,1-Trichloroethane	µG/L	0	0%	GA	5	0	0	8	10 U	10 U	10 U	10 U	10 U	10 U
1,1,2,2-Tetrachloroethane	µG/L	0	0%	GA	5	0	0	8	10 U	10 U	10 U	10 U	10 U	10 U
1,1,2-Trichloroethane	µG/L	0	0%	GA	1	0	0	8	10 U	10 U	10 U	10 U	10 U	10 U
1,1-Dichloroethane	µG/L	0	0%	GA	5	0	0	8	10 U	10 U	10 U	10 U	10 U	10 U
1,1-Dichloroethene	µG/L	0	0%	GA	5	0	0	8	10 U	10 U	10 U	10 U	10 U	10 U
1,2-Dichloroethane	µG/L	0	0%	GA	0.6	0	0	8	10 U	10 U	10 U	10 U	10 U	10 U
1,2-Dichloroethene (total)	µG/L	0	0%	GA	5	0	0	8	10 U	10 U	10 U	10 U	10 U	10 U
1,2-Dichloropropane	µG/L	0	0%	GA	1	0	0	8	10 U	10 U	10 U	10 U	10 U	10 U
Acetone	µG/L	0	0%				0	8	10 U	10 U	10 U	10 U	10 U	10 U
Benzene	µG/L	0	0%	GA	1	0	0	8	10 U	10 U	10 U	10 U	10 U	10 U
Bromodichloromethane	µG/L	0	0%	MCL	80	0	0	8	10 U	10 U	10 U	10 U	10 U	10 U
Bromoform	µG/L	0	0%	MCL	80	0	0	8	10 U	10 U	10 U	10 U	10 U	10 U
Carbon disulfide	µG/L	0	0%				0	8	10 U	10 U	10 U	10 U	10 U	10 U
Carbon tetrachloride	µG/L	0	0%	GA	5	0	0	8	10 U	10 U	10 U	10 U	10 U	10 U
Chlorobenzene	µG/L	0	0%	GA	5	0	0	8	10 U	10 U	10 U	10 U	10 U	10 U
Chlorodibromomethane	µG/L	0	0%	MCL	80	0	0	8	10 U	10 U	10 U	10 U	10 U	10 U
Chloroethane	µG/L	0	0%	GA	5	0	0	8	10 U	10 U	10 U	10 U	10 U	10 U
Chloroform	µG/L	0	0%	GA	7	0	0	8	10 U	10 U	10 U	10 U	10 U	10 U
Cis-1,3-Dichloropropene	µG/L	0	0%	GA	0.4	0	0	8	10 U	10 U	10 U	10 U	10 U	10 U
Ethyl benzene	µG/L	0	0%	GA	5	0	0	8	10 U	10 U	10 U	10 U	10 U	10 U
Methyl bromide	µG/L	0	0%	GA	5	0	0	8	10 U	10 U	10 U	10 U	10 U	10 U
Methyl butyl ketone	µG/L	0	0%				0	8	10 U	10 U	10 U	10 U	10 U	10 U
Methyl chloride	µG/L	0	0%	GA	5	0	0	8	10 U	10 U	10 U	10 U	10 U	10 U
Methyl ethyl ketone	µG/L	0	0%				0	8	10 U	10 U	10 U	10 U	10 U	10 U
Methyl isobutyl ketone	µG/L	0	0%				0	8	10 U	10 U	10 U	10 U	10 U	10 U
Methylene chloride	µG/L	0	0%	GA	5	0	0	8	10 U	10 U	10 U	10 U	10 U	10 U
Styrene	µG/L	0	0%	GA	5	0	0	8	10 U	10 U	10 U	10 U	10 U	10 U
Tetrachloroethene	µG/L	1	13%	GA	5	0	1	8	1 J	10 U	10 U	10 U	10 U	10 U
Toluene	µG/L	0	0%	GA	5	0	0	8	10 U	10 U	10 U	10 U	10 U	10 U
Total Xylenes	µG/L	0	0%	GA	5	0	0	8	10 U	10 U	10 U	10 U	10 U	10 U
Trans-1,3-Dichloropropene	µG/L	0	0%	GA	0.4	0	0	8	10 U	10 U	10 U	10 U	10 U	10 U
Trichloroethene	µG/L	0	0%	GA	5	0	0	8	10 U	10 U	10 U	10 U	10 U	10 U
Vinyl chloride	µG/L	0	0%	GA	2	0	0	8	10 U	10 U	10 U	10 U	10 U	10 U
Semivolatile Organic Compounds														
1,2,4-Trichlorobenzene	µG/L	0	0%	GA	5	0	0	8	10 U	11 U	10 U	10 U	11 U	11 U
1,2-Dichlorobenzene	µG/L	0	0%	GA	3	0	0	8	10 U	11 U	10 U	10 U	11 U	11 U
1,3-Dichlorobenzene	µG/L	0	0%	GA	3	0	0	8	10 U	11 U	10 U	10 U	11 U	11 U
1,4-Dichlorobenzene	µG/L	0	0%	GA	3	0	0	8	10 U	11 U	10 U	10 U	11 U	11 U
2,2'-oxybis(1-Chloropropane)	µG/L	0	0%				0	8	10 U	11 U	10 U	10 U	11 U	11 U
2,4,5-Trichlorophenol	µG/L	0	0%	GA	1	0	0	8	25 U	28 U	25 U	26 U	27 U	27 U
2,4,6-Trichlorophenol	µG/L	0	0%	GA	1	0	0	8	10 U	11 U	10 U	10 U	11 U	11 U
2,4-Dichlorophenol	µG/L	0	0%	GA	5	0	0	8	10 U	11 U	10 U	10 U	11 U	11 U
2,4-Dimethylphenol	µG/L	0	0%				0	8	10 U	11 U	10 U	10 U	11 U	11 U
2,4-Dinitrophenol	µG/L	0	0%				0	8	25 U	28 U	25 U	26 U	27 U	27 U
2,4-Dinitrotoluene	µG/L	0	0%	GA	5	0	0	8	10 U	11 U	10 U	10 U	11 U	11 U
2,6-Dinitrotoluene	µG/L	0	0%	GA	5	0	0	8	10 U	11 U	10 U	10 U	11 U	11 U
2-Chloronaphthalene	µG/L	0	0%				0	8	10 U	11 U	10 U	10 U	11 U	11 U
2-Chlorophenol	µG/L	0	0%				0	8	10 U	11 U	10 U	10 U	11 U	11 U
2-Methylnaphthalene	µG/L	0	0%				0	8	10 U	11 U	10 U	10 U	11 U	11 U
2-Methylphenol	µG/L	0	0%				0	8	10 U	11 U	10 U	10 U	11 U	11 U

Table A-2
Analytical Results of Groundwater Samples
Feasibility Study - OD Grounds
Seneca Army Depot

								Area	SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45
								Loc ID	MW1	MW2	MW3	MW4	MW45-2	MW45-3
								Sample ID	MW1	MW2	MW3	MW4	MW45-2	MW45-3
								Matrix	GW	GW	GW	GW	GW	GW
								Sample Date	2/1/1994	2/2/1994	2/1/1994	2/2/1994	2/3/1994	2/3/1994
								QC Type	SA	SA	SA	SA	SA	SA
								Study ID	ESI	ESI	ESI	ESI	ESI	ESI
									N	N	N	N	N	N
Parameter	Unit	Maximum Value	Frequency of Detection	Criteria Source	Criteria Value	Number of Exceedances	Number of Times Detected	Number of Samples Analyzed	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual
2-Nitroaniline	µG/L	0	0%	GA	5	0	0	8	25 U	28 U	25 U	26 U	27 U	27 U
2-Nitrophenol	µG/L	0	0%	GA	1	0	0	8	10 U	11 U	10 U	10 U	11 U	11 U
3,3'-Dichlorobenzidine	µG/L	0	0%	GA	5	0	0	8	10 U	11 U	10 U	10 U	11 U	11 U
3-Nitroaniline	µG/L	0	0%	GA	5	0	0	8	25 U	28 U	25 U	26 U	27 U	27 U
4,6-Dinitro-2-methylphenol	µG/L	0	0%	GA	1	0	0	8	25 U	28 U	25 U	26 U	27 U	27 U
4-Bromophenyl phenyl ether	µG/L	0	0%				0	8	10 U	11 U	10 U	10 U	11 U	11 U
4-Chloro-3-methylphenol	µG/L	0	0%	GA	1	0	0	8	10 U	11 U	10 U	10 U	11 U	11 U
4-Chloroaniline	µG/L	0	0%	GA	5	0	0	8	10 U	11 U	10 U	10 U	11 U	11 U
4-Chlorophenyl phenyl ether	µG/L	0	0%				0	8	10 U	11 U	10 U	10 U	11 U	11 U
4-Methylphenol	µG/L	0	0%				0	8	10 U	11 U	10 U	10 U	11 U	11 U
4-Nitroaniline	µG/L	0	0%	GA	5	0	0	8	25 U	28 U	25 U	26 U	27 U	27 U
4-Nitrophenol	µG/L	0	0%	GA	1	0	0	8	25 U	28 U	25 U	26 U	27 U	27 U
Acenaphthene	µG/L	0	0%				0	8	10 U	11 U	10 U	10 U	11 U	11 U
Acenaphthylene	µG/L	0	0%				0	8	10 U	11 U	10 U	10 U	11 U	11 U
Anthracene	µG/L	0	0%				0	8	10 U	11 U	10 U	10 U	11 U	11 U
Benzo(a)anthracene	µG/L	0	0%				0	8	10 U	11 U	10 U	10 U	11 U	11 U
Benzo(a)pyrene	µG/L	0	0%	GA	0		0	8	10 U	11 U	10 U	10 U	11 U	11 U
Benzo(b)fluoranthene	µG/L	0	0%				0	8	10 U	11 U	10 U	10 U	11 U	11 U
Benzo(ghi)perylene	µG/L	0	0%				0	8	10 U	11 U	10 U	10 U	11 U	11 U
Benzo(k)fluoranthene	µG/L	0	0%				0	8	10 U	11 U	10 U	10 U	11 U	11 U
Bis(2-Chloroethoxy)methane	µG/L	0	0%	GA	5	0	0	8	10 U	11 U	10 U	10 U	11 U	11 U
Bis(2-Chloroethyl)ether	µG/L	0	0%	GA	1	0	0	8	10 U	11 U	10 U	10 U	11 U	11 U
Bis(2-Ethylhexyl)phthalate	µG/L	33	50%	GA	5	4	4	8	33	11 U	12	11	23	11 U
Butylbenzylphthalate	µG/L	0	0%				0	8	10 U	11 U	10 U	10 U	11 U	11 U
Carbazole	µG/L	0	0%				0	8	10 U	11 U	10 U	10 U	11 U	11 U
Chrysene	µG/L	0	0%				0	8	10 U	11 U	10 U	10 U	11 U	11 U
Dibenz(a,h)anthracene	µG/L	0	0%				0	8	10 U	11 U	10 U	10 U	11 U	11 U
Dibenzofuran	µG/L	0	0%				0	8	10 U	11 U	10 U	10 U	11 U	11 U
Diethyl phthalate	µG/L	0	0%				0	8	10 U	11 U	10 U	10 U	11 U	11 U
Dimethylphthalate	µG/L	0	0%				0	8	10 U	11 U	10 U	10 U	11 U	11 U
Di-n-butylphthalate	µG/L	0	0%	GA	50	0	0	8	10 U	11 U	10 U	10 U	11 U	11 U
Di-n-octylphthalate	µG/L	0	0%				0	8	10 U	11 U	10 U	10 U	11 U	11 U
Fluoranthene	µG/L	0	0%				0	8	10 U	11 U	10 U	10 U	11 U	11 U
Fluorene	µG/L	0	0%				0	8	10 U	11 U	10 U	10 U	11 U	11 U
Hexachlorobenzene	µG/L	0	0%	GA	0.04	0	0	8	10 U	11 U	10 U	10 U	11 U	11 U
Hexachlorobutadiene	µG/L	0	0%	GA	0.5	0	0	8	10 U	11 U	10 U	10 U	11 U	11 U
Hexachlorocyclopentadiene	µG/L	0	0%	GA	5	0	0	8	10 U	11 U	10 U	10 U	11 U	11 U
Hexachloroethane	µG/L	0	0%	GA	5	0	0	8	10 U	11 U	10 U	10 U	11 U	11 U
Indeno(1,2,3-cd)pyrene	µG/L	0	0%				0	8	10 U	11 U	10 U	10 U	11 U	11 U
Isophorone	µG/L	0	0%				0	8	10 U	11 U	10 U	10 U	11 U	11 U
Naphthalene	µG/L	0	0%				0	8	10 U	11 U	10 U	10 U	11 U	11 U
Nitrobenzene	µG/L	0	0%	GA	0.4	0	0	8	10 U	11 U	10 U	10 U	11 U	11 U
N-Nitroso-di-n-propylamine	µG/L	0	0%				0	8	10 U	11 U	10 U	10 U	11 U	11 U
N-Nitrosodiphenylamine	µG/L	0	0%				0	8	10 U	11 U	10 U	10 U	11 U	11 U
Pentachlorophenol	µG/L	0	0%	GA	1	0	0	8	25 U	28 U	25 U	26 U	27 U	27 U
Phenanthrene	µG/L	0	0%				0	8	10 U	11 U	10 U	10 U	11 U	11 U
Phenol	µG/L	0	0%	GA	1	0	0	8	10 U	11 U	10 U	10 U	11 U	11 U
Pyrene	µG/L	0	0%				0	8	10 U	11 U	10 U	10 U	11 U	11 U

Parameter	Unit	Maximum Value	Frequency of Detection	Criteria Source	Criteria Value	Number of Exceedances	Number of Times Detected	Number of Samples Analyzed						
Area									SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45
Loc ID									MW1	MW2	MW3	MW4	MW45-2	MW45-3
Sample ID									MW1	MW2	MW3	MW4	MW45-2	MW45-3
Matrix									GW	GW	GW	GW	GW	GW
Sample Date									2/1/1994	2/2/1994	2/1/1994	2/2/1994	2/3/1994	2/3/1994
QC Type									SA	SA	SA	SA	SA	SA
Study ID									ESI	ESI	ESI	ESI	ESI	ESI
									N	N	N	N	N	N
									Value Qual	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual
Herbicides														
2,4,5-T	µG/L	0	0%	GA	35	0	0	8	0.11 U	0.12 U	0.11 U	0.12 U	0.11 U	0.11 U
2,4,5-TP/Silvex	µG/L	0	0%	GA	0.26	0	0	8	0.11 U	0.12 U	0.11 U	0.12 U	0.11 U	0.11 U
2,4-D	µG/L	0	0%	GA	50	0	0	8	1.1 U	1.2 U	1.1 U	1.2 U	1.1 U	1.1 U
2,4-DB	µG/L	0	0%				0	8	1.1 U	1.2 U	1.1 U	1.2 U	1.1 U	1.1 U
Dalapon	µG/L	0	0%	GA	50	0	0	8	2.5 U	2.7 U	2.4 U	2.7 U	2.5 U	2.5 U
Dicamba	µG/L	0	0%	GA	0.44	0	0	8	0.11 U	0.12 U	0.11 U	0.12 U	0.11 U	0.11 U
Dichloroprop	µG/L	0	0%				0	8	1.1 U	1.2 U	1.1 U	1.2 U	1.1 U	1.1 U
Dinoseb	µG/L	0	0%	GA	1	0	0	8	0.53 U	0.58 U	0.52 U	0.59 U	0.54 U	0.53 U
MCPA	µG/L	0	0%	GA	0.44	0	0	8	110 U	120 U	110 U	120 U	110 U	110 U
MCPP	µG/L	0	0%				0	8	110 U	120 U	110 U	120 U	110 U	110 U
Explosives														
1,3,5-Trinitrobenzene	µG/L	0	0%	GA	5	0	0	8	0.13 U	0.13 U	0.13 U	0.13 U	0.13 UJ	0.13 U
1,3-Dinitrobenzene	µG/L	0.067	13%	GA	5	0	1	8	0.13 U	0.13 U	0.13 U	0.13 U	0.13 UJ	0.13 U
2,4,6-Trinitrotoluene	µG/L	0	0%				0	8	0.13 U	0.13 U	0.13 U	0.13 U	0.13 UJ	0.13 U
2,4-Dinitrotoluene	µG/L	0	0%	GA	5	0	0	8	0.13 U	0.13 U	0.13 U	0.13 U	0.13 UJ	0.13 U
2,6-Dinitrotoluene	µG/L	0	0%	GA	5	0	0	8	0.13 U	0.13 U	0.13 U	0.13 U	0.13 UJ	0.13 U
2-amino-4,6-Dinitrotoluene	µG/L	0	0%				0	8	0.13 U	0.13 U	0.13 U	0.13 U	0.13 UJ	0.13 U
4-amino-2,6-Dinitrotoluene	µG/L	0	0%				0	8	0.13 U	0.13 U	0.13 U	0.13 U	0.13 UJ	0.13 U
HMX	µG/L	0.5	13%				1	8	0.5	0.13 U	0.13 U	0.13 U	0.13 UJ	0.13 U
RDX	µG/L	0	0%				0	8	0.13 U	0.13 U	0.13 U	0.13 U	0.13 UJ	0.13 U
Tetryl	µG/L	0	0%				0	8	0.13 U	0.13 U	0.13 U	0.13 U	0.13 UJ	0.13 U
Pesticides/PCBs														
4,4'-DDD	µG/L	0	0%	GA	0.3	0	0	8	0.14 U	0.11 U	0.1 U	0.12 U	0.11 U	0.12 U
4,4'-DDE	µG/L	0	0%	GA	0.2	0	0	8	0.14 U	0.11 U	0.1 U	0.12 U	0.11 U	0.12 U
4,4'-DDT	µG/L	0	0%	GA	0.2	0	0	8	0.14 U	0.11 U	0.1 U	0.12 U	0.11 U	0.12 U
Aldrin	µG/L	0	0%	GA	0		0	8	0.068 U	0.057 U	0.052 U	0.059 U	0.056 U	0.059 U
Alpha-BHC	µG/L	0	0%	GA	0.01	0	0	8	0.068 U	0.057 U	0.052 U	0.059 U	0.056 U	0.059 U
Alpha-Chlordane	µG/L	0	0%				0	8	0.068 U	0.057 U	0.052 U	0.059 U	0.056 U	0.059 U
Aroclor-1016	µG/L	0	0%	GA	0.09	0	0	8	1.4 U	1.1 U	1 U	1.2 U	1.1 U	1.2 U
Aroclor-1221	µG/L	0	0%	GA	0.09	0	0	8	2.7 U	2.3 U	2.1 U	2.4 U	2.2 U	2.4 U
Aroclor-1232	µG/L	0	0%	GA	0.09	0	0	8	1.4 U	1.1 U	1 U	1.2 U	1.1 U	1.2 U
Aroclor-1242	µG/L	0	0%	GA	0.09	0	0	8	1.4 U	1.1 U	1 U	1.2 U	1.1 U	1.2 U
Aroclor-1248	µG/L	0	0%	GA	0.09	0	0	8	1.4 U	1.1 U	1 U	1.2 U	1.1 U	1.2 U
Aroclor-1254	µG/L	0	0%	GA	0.09	0	0	8	1.4 U	1.1 U	1 U	1.2 U	1.1 U	1.2 U
Aroclor-1260	µG/L	0	0%	GA	0.09	0	0	8	1.4 U	1.1 U	1 U	1.2 U	1.1 U	1.2 U
Beta-BHC	µG/L	0	0%	GA	0.04	0	0	8	0.068 U	0.057 U	0.052 U	0.059 U	0.056 U	0.059 U
Delta-BHC	µG/L	0	0%	GA	0.04	0	0	8	0.068 U	0.057 U	0.052 U	0.059 U	0.056 U	0.059 U
Dieldrin	µG/L	0	0%	GA	0.004	0	0	8	0.14 U	0.11 U	0.1 U	0.12 U	0.11 U	0.12 U
Endosulfan I	µG/L	0	0%				0	8	0.068 U	0.057 U	0.052 U	0.059 U	0.056 U	0.059 U
Endosulfan II	µG/L	0	0%				0	8	0.14 U	0.11 U	0.1 U	0.12 U	0.11 U	0.12 U
Endosulfan sulfate	µG/L	0	0%				0	8	0.14 U	0.11 U	0.1 U	0.12 U	0.11 U	0.12 U
Endrin	µG/L	0	0%	GA	0		0	8	0.14 U	0.11 U	0.1 U	0.12 U	0.11 U	0.12 U
Endrin aldehyde	µG/L	0	0%	GA	5	0	0	8	0.14 U	0.11 U	0.1 U	0.12 U	0.11 U	0.12 U
Endrin ketone	µG/L	0	0%	GA	5	0	0	8	0.14 U	0.11 U	0.1 U	0.12 U	0.11 U	0.12 U
Gamma-BHC/Lindane	µG/L	0	0%	GA	0.05	0	0	8	0.068 U	0.057 U	0.052 U	0.059 U	0.056 U	0.059 U
Gamma-Chlordane	µG/L	0	0%				0	8	0.068 U	0.057 U	0.052 U	0.059 U	0.056 U	0.059 U
Heptachlor	µG/L	0	0%	GA	0.04	0	0	8	0.068 U	0.057 U	0.052 U	0.059 U	0.056 U	0.059 U
Heptachlor epoxide	µG/L	0	0%	GA	0.03	0	0	8	0.068 U	0.057 U	0.052 U	0.059 U	0.056 U	0.059 U
Methoxychlor	µG/L	0	0%	GA	35	0	0	8	0.68 U	0.57 U	0.52 U	0.59 U	0.56 U	0.59 U
Toxaphene	µG/L	0	0%	GA	0.06	0	0	8	6.8 U	5.7 U	5.2 U	5.9 U	5.6 U	5.9 U

Table A-2
Analytical Results of Groundwater Samples
Feasibility Study - OD Grounds
Seneca Army Depot

Parameter	Unit	Maximum Value	Frequency of Detection	Criteria Source	Criteria Value	Number of Exceedances	Number of Times Detected	Number of Samples Analyzed	SEAD-45 Value Qual	SEAD-45 Value Qual	SEAD-45 Value Qual	SEAD-45 Value Qual	SEAD-45 Value Qual	SEAD-45 Value Qual
Area									SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45
Loc ID									MW1	MW2	MW3	MW4	MW45-2	MW45-3
Sample ID									MW1	MW2	MW3	MW4	MW45-2	MW45-3
Matrix									GW	GW	GW	GW	GW	GW
Sample Date									2/1/1994	2/2/1994	2/1/1994	2/2/1994	2/3/1994	2/3/1994
QC Type									SA	SA	SA	SA	SA	SA
Study ID									ESI	ESI	ESI	ESI	ESI	ESI
									N	N	N	N	N	N
Inorganics														
Aluminum	µG/L	63,300	75%				9	12	124 J	828	83.5 J	17,700	42 U	7,510
Antimony	µG/L	52.1	58%	GA	3	7	7	12	**24.3 J**	**23.1 J**	**52.1 J**	**49.6 J**	**26.8 J**	**36.7 J**
Arsenic	µG/L	9.5	25%	MCL	10	0	3	12	1.4 U	1.4 U	1.4 U	1.7 J	1.4 U	1.8 J
Barium	µG/L	751	100%	GA	1,000	0	12	12	56.5 J	50.8 J	25.5 J	195 J	27.2 J	62.1 J
Beryllium	µG/L	5	25%	MCL	4	1	3	12	0.4 U	0.4 U	0.4 U	0.87 J	0.4 U	0.52 J
Cadmium	µG/L	3.8	33%	GA	5	0	4	12	2.2 J	2.1 U	2.1 U	3.8 J	2.9 J	3.2 J
Calcium	µG/L	660,000	100%				12	12	118,000	94,600	91,700	152,000	232,000	211,000
Chromium	µG/L	106	42%	GA	50	1	5	12	2.6 U	4.1 J	2.6 U	28.9	2.6 U	16.1
Cobalt	µG/L	94.4	33%				4	12	4.4 U	5.3 J	4.4 U	11 J	4.4 U	14.6 J
Copper	µG/L	123	58%	GA	200	0	7	12	3.1 U	7.2 J	3.9 J	79.2	3.1 U	11.9 J
Cyanide	µG/L	0	0%				0	11	5 U	5 U	5 U	5 U	5 U	5 U
Iron	µG/L	113,000	83%	GA	300	5	10	12	207	[illegible]	109	**27,500**	48.5 J	**14,100**
Iron+Manganese	µG/L	117,640	100%	GA	500	6	12	12	211.4 J	[illegible]	111.9 J	**27,884**	**1,449 J**	**14,725**
Lead	µG/L	75.6	67%	MCL	15	2	8	12	0.71 J	0.66 J	0.73 J	**15.7**	0.71 J	9.5
Magnesium	µG/L	77,900	100%				12	12	26,400	15,700	15,800	31,600	57,800	77,900
Manganese	µG/L	4,640	100%	GA	300	4	12	12	4.4 J	23.7	2.9 J	**384**	**1,400**	**625**
Mercury	µG/L	1.8	25%	GA	0.7	1	3	12	0.04 U	0.04 U	0.04 U	**1.8**	0.04 U	0.08 J
Nickel	µG/L	209	42%	GA	100	1	5	12	4 U	4 U	4 U	43.9	10.2 J	30.7 J
Potassium	µG/L	18,700	75%				9	12	910 U	1,050 J	904 U	6,540	9,660	18,700
Selenium	µG/L	2.5	42%	GA	10	0	5	12	0.99 J	0.7 U	0.7 U	1.9 J	2.5 J	1.9 J
Silver	µG/L	4.6	17%	GA	50	0	2	12	4.2 U	4.2 U	4.2 U	4.6 J	4.2 U	4.2 U
Sodium	µG/L	40,000	100%	GA	20,000	1	12	12	10,000	13,100	3,400 J	15,800	**40,000**	18,600
Thallium	µG/L	3.4	8%	MCL	2	1	1	12	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U
Vanadium	µG/L	93.1	25%				3	12	3.7 U	3.7 U	3.7 U	29.7 J	3.7 U	11.7 J
Zinc	µG/L	321	100%				12	12	15.3 J	23	14 J	164	31.6	81.1

Footnote:
1) Chemical result qualifiers are assigned by the laboratory and are evaluated and modified (if necessary) by during data validation.
U = non-detect, i.e. not detected equal to or above this value. J = estimated (detect or non-detect) value.
[blank] = detect, i.e. detected chemical result value. R = Rejected, data validation rejected the results.
2) Num of Analyses is the number of detected and non-detected results excluding rejected results. Sample duplicate pairs have not been averaged.
3) Chemical results greater than the action level are highlighted, bolded and boxed
4) Criteria action level source document and web address.
- The NYS GA Standard and EPA MCL values were obtained from the provided links.
http://www.dec.ny.gov/regulations/2652.html
http://water.epa.gov/drink/contaminants/index.cfm#List

Analytical Res roundwater Samples
Feasibility Study - OD Grounds
Seneca Army Depot

Parameter	Unit	Maximum Value	Frequency of Detection	Criteria Source	Criteria Value	Number of Exceedances	Number of Times Detected	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual
Area								SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45
Loc ID								MW45-4	MW45-4	MW45-4	MW45-4	MW45-4	MW5
Sample ID								122000	122247	122248	MW45-4	OB108	MW5
Matrix								GW	GW	GW	GW	GW	GW
Sample Date								4/9/1999	12/7/1999	12/7/1999	1/26/1994	6/18/1997	2/2/1994
QC Type								SA	SA	DU	SA	SA	SA
Study ID								RI	RI	RI	ESI	OB_Quarterly	ESI
								1	2	2		0	
								N	N	N	N	N	N
Volatile Organic Compounds													
1,1,1-Trichloroethane	μG/L	0	0%	GA	5	0	0				10 U		10 U
1,1,2,2-Tetrachloroethane	μG/L	0	0%	GA	5	0	0				10 U		10 U
1,1,2-Trichloroethane	μG/L	0	0%	GA	1	0	0				10 U		10 U
1,1-Dichloroethane	μG/L	0	0%	GA	5	0	0				10 U		10 U
1,1-Dichloroethene	μG/L	0	0%	GA	5	0	0				10 U		10 U
1,2-Dichloroethane	μG/L	0	0%	GA	0.6	0	0				10 U		10 U
1,2-Dichloroethene (total)	μG/L	0	0%	GA	5	0	0				10 U		10 U
1,2-Dichloropropane	μG/L	0	0%	GA	1	0	0				10 U		10 U
Acetone	μG/L	0	0%				0				10 U		10 U
Benzene	μG/L	0	0%	GA	1	0	0				10 U		10 U
Bromodichloromethane	μG/L	0	0%	MCL	80	0	0				10 U		10 U
Bromoform	μG/L	0	0%	MCL	80	0	0				10 U		10 U
Carbon disulfide	μG/L	0	0%				0				10 U		10 U
Carbon tetrachloride	μG/L	0	0%	GA	5	0	0				10 U		10 U
Chlorobenzene	μG/L	0	0%	GA	5	0	0				10 U		10 U
Chlorodibromomethane	μG/L	0	0%	MCL	80	0	0				10 U		10 U
Chloroethane	μG/L	0	0%	GA	5	0	0				10 U		10 U
Chloroform	μG/L	0	0%	GA	7	0	0				10 U		10 U
Cis-1,3-Dichloropropene	μG/L	0	0%	GA	0.4	0	0				10 U		10 U
Ethyl benzene	μG/L	0	0%	GA	5	0	0				10 U		10 U
Methyl bromide	μG/L	0	0%	GA	5	0	0				10 U		10 U
Methyl butyl ketone	μG/L	0	0%				0				10 U		10 U
Methyl chloride	μG/L	0	0%	GA	5	0	0				10 U		10 U
Methyl ethyl ketone	μG/L	0	0%				0				10 U		10 U
Methyl isobutyl ketone	μG/L	0	0%				0				10 U		10 U
Methylene chloride	μG/L	0	0%	GA	5	0	0				10 U		10 U
Styrene	μG/L	0	0%	GA	5	0	0				10 U		10 U
Tetrachloroethene	μG/L	1	13%	GA	5	0	1				10 U		10 U
Toluene	μG/L	0	0%	GA	5	0	0				10 U		10 U
Total Xylenes	μG/L	0	0%	GA	5	0	0				10 U		10 U
Trans-1,3-Dichloropropene	μG/L	0	0%	GA	0.4	0	0				10 U		10 U
Trichloroethene	μG/L	0	0%	GA	5	0	0				10 U		10 U
Vinyl chloride	μG/L	0	0%	GA	2	0	0				10 U		10 U
Semivolatile Organic Compounds													
1,2,4-Trichlorobenzene	μG/L	0	0%	GA	5	0	0				11 U		10 U
1,2-Dichlorobenzene	μG/L	0	0%	GA	3	0	0				11 U		10 U
1,3-Dichlorobenzene	μG/L	0	0%	GA	3	0	0				11 U		10 U
1,4-Dichlorobenzene	μG/L	0	0%	GA	3	0	0				11 U		10 U
2,2'-oxybis(1-Chloropropane)	μG/L	0	0%				0				11 U		10 U
2,4,5-Trichlorophenol	μG/L	0	0%	GA	1	0	0				27 U		26 U
2,4,6-Trichlorophenol	μG/L	0	0%	GA	1	0	0				11 U		10 U
2,4-Dichlorophenol	μG/L	0	0%	GA	5	0	0				11 U		10 U
2,4-Dimethylphenol	μG/L	0	0%				0				11 U		10 U
2,4-Dinitrophenol	μG/L	0	0%				0				27 U		26 U
2,4-Dinitrotoluene	μG/L	0	0%	GA	5	0	0				11 U		10 U
2,6-Dinitrotoluene	μG/L	0	0%	GA	5	0	0				11 U		10 U
2-Chloronaphthalene	μG/L	0	0%				0				11 U		10 U
2-Chlorophenol	μG/L	0	0%				0				11 U		10 U
2-Methylnaphthalene	μG/L	0	0%				0				11 U		10 U
2-Methylphenol	μG/L	0	0%				0				11 U		10 U

Area								SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45
Loc ID								MW45-4	MW45-4	MW45-4	MW45-4	MW45-4	MW5
Sample ID								122000	122247	122248	MW45-4	OB108	MW5
Matrix								GW	GW	GW	GW	GW	GW
Sample Date								4/9/1999	12/7/1999	12/7/1999	1/26/1994	6/18/1997	2/2/1994
QC Type								SA	SA	DU	SA	SA	SA
Study ID								RI	RI	RI	ESI	OB_Quarterly	ESI
								1	2	2		0	
			Frequency			Number	Number	N	N	N	N	N	N
		Maximum	of	Criteria	Criteria	of	of Times						
Parameter	Unit	Value	Detection	Source	Value	Exceedances	Detected	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual
2-Nitroaniline	µG/L	0	0%	GA	5	0	0				27 U		26 U
2-Nitrophenol	µG/L	0	0%	GA	1	0	0				11 U		10 U
3,3'-Dichlorobenzidine	µG/L	0	0%	GA	5	0	0				11 U		10 U
3-Nitroaniline	µG/L	0	0%	GA	5	0	0				27 U		26 U
4,6-Dinitro-2-methylphenol	µG/L	0	0%	GA	1	0	0				27 U		26 U
4-Bromophenyl phenyl ether	µG/L	0	0%				0				11 U		10 U
4-Chloro-3-methylphenol	µG/L	0	0%	GA	1	0	0				11 U		10 U
4-Chloroaniline	µG/L	0	0%	GA	5	0	0				11 U		10 U
4-Chlorophenyl phenyl ether	µG/L	0	0%				0				11 U		10 U
4-Methylphenol	µG/L	0	0%				0				11 U		10 U
4-Nitroaniline	µG/L	0	0%	GA	5	0	0				27 U		26 U
4-Nitrophenol	µG/L	0	0%	GA	1	0	0				27 U		26 U
Acenaphthene	µG/L	0	0%				0				11 U		10 U
Acenaphthylene	µG/L	0	0%				0				11 U		10 U
Anthracene	µG/L	0	0%				0				11 U		10 U
Benzo(a)anthracene	µG/L	0	0%				0				11 U		10 U
Benzo(a)pyrene	µG/L	0	0%	GA	0		0				11 U		10 U
Benzo(b)fluoranthene	µG/L	0	0%				0				11 U		10 U
Benzo(ghi)perylene	µG/L	0	0%				0				11 U		10 U
Benzo(k)fluoranthene	µG/L	0	0%				0				11 U		10 U
Bis(2-Chloroethoxy)methane	µG/L	0	0%	GA	5	0	0				11 U		10 U
Bis(2-Chloroethyl)ether	µG/L	0	0%	GA	1	0	0				11 U		10 U
Bis(2-Ethylhexyl)phthalate	µG/L	33	50%	GA	5	4	4				11 U		10 U
Butylbenzylphthalate	µG/L	0	0%				0				11 U		10 U
Carbazole	µG/L	0	0%				0				11 U		10 U
Chrysene	µG/L	0	0%				0				11 U		10 U
Dibenz(a,h)anthracene	µG/L	0	0%				0				11 U		10 U
Dibenzofuran	µG/L	0	0%				0				11 U		10 U
Diethyl phthalate	µG/L	0	0%				0				11 U		10 U
Dimethylphthalate	µG/L	0	0%				0				11 U		10 U
Di-n-butylphthalate	µG/L	0	0%	GA	50	0	0				11 U		10 U
Di-n-octylphthalate	µG/L	0	0%				0				11 U		10 U
Fluoranthene	µG/L	0	0%				0				11 U		10 U
Fluorene	µG/L	0	0%				0				11 U		10 U
Hexachlorobenzene	µG/L	0	0%	GA	0.04	0	0				11 U		10 U
Hexachlorobutadiene	µG/L	0	0%	GA	0.5	0	0				11 U		10 U
Hexachlorocyclopentadiene	µG/L	0	0%	GA	5	0	0				11 U		10 U
Hexachloroethane	µG/L	0	0%	GA	5	0	0				11 U		10 U
Indeno(1,2,3-cd)pyrene	µG/L	0	0%				0				11 U		10 U
Isophorone	µG/L	0	0%				0				11 U		10 U
Naphthalene	µG/L	0	0%				0				11 U		10 U
Nitrobenzene	µG/L	0	0%	GA	0.4	0	0				11 U		10 U
N-Nitroso-di-n-propylamine	µG/L	0	0%				0				11 U		10 U
N-Nitrosodiphenylamine	µG/L	0	0%				0				11 U		10 U
Pentachlorophenol	µG/L	0	0%	GA	1	0	0				27 U		26 U
Phenanthrene	µG/L	0	0%				0				11 U		10 U
Phenol	µG/L	0	0%	GA	1	0	0				11 U		10 U
Pyrene	µG/L	0	0%				0				11 U		10 U

Area								SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45
Loc ID								MW45-4	MW45-4	MW45-4	MW45-4	MW45-4	MW5
Sample ID								122000	122247	122248	MW45-4	OB108	MW5
Matrix								GW	GW	GW	GW	GW	GW
Sample Date								4/9/1999	12/7/1999	12/7/1999	1/26/1994	6/18/1997	2/2/1994
QC Type								SA	SA	DU	SA	SA	SA
Study ID								RI	RI	RI	ESI	OB Quarterly	ESI
								1	2	2		0	
			Frequency			Number	Number	N	N	N	N	N	N
		Maximum	of	Criteria	Criteria	of	of Times						
Parameter	Unit	Value	Detection	Source	Value	Exceedances	Detected	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual
Herbicides													
2,4,5-T	µG/L	0	0%	GA	35	0	0				0.11 U		0.11 U
2,4,5-TP/Silvex	µG/L	0	0%	GA	0.26	0	0				0.11 U		0.11 U
2,4-D	µG/L	0	0%	GA	50	0	0				1.1 U		1.1 U
2,4-DB	µG/L	0	0%				0				1.1 U		1.1 U
Dalapon	µG/L	0	0%	GA	50	0	0				2.5 U		2.5 U
Dicamba	µG/L	0	0%	GA	0.44	0	0				0.11 U		0.11 U
Dichloroprop	µG/L	0	0%				0				1.1 U		1.1 U
Dinoseb	µG/L	0	0%	GA	1	0	0				0.54 U		0.55 U
MCPA	µG/L	0	0%	GA	0.44	0	0				110 U		110 U
MCPP	µG/L	0	0%				0				110 U		110 U
Explosives													
1,3,5-Trinitrobenzene	µG/L	0	0%	GA	5	0	0				0.13 U		0.13 U
1,3-Dinitrobenzene	µG/L	0.067	13%	GA	5	0	1				0.13 U		0.067 J
2,4,6-Trinitrotoluene	µG/L	0	0%				0				0.13 U		0.13 U
2,4-Dinitrotoluene	µG/L	0	0%	GA	5	0	0				0.13 U		0.13 U
2,6-Dinitrotoluene	µG/L	0	0%	GA	5	0	0				0.13 U		0.13 U
2-amino-4,6-Dinitrotoluene	µG/L	0	0%				0				0.13 U		0.13 U
4-amino-2,6-Dinitrotoluene	µG/L	0	0%				0				0.13 U		0.13 U
HMX	µG/L	0.5	13%				1				0.13 U		0.13 U
RDX	µG/L	0	0%				0				0.13 U		0.13 U
Tetryl	µG/L	0	0%				0				0.13 U		0.13 U
Pesticides/PCBs													
4,4'-DDD	µG/L	0	0%	GA	0.3	0	0				0.11 UJ		0.11 U
4,4'-DDE	µG/L	0	0%	GA	0.2	0	0				0.11 UJ		0.11 U
4,4'-DDT	µG/L	0	0%	GA	0.2	0	0				0.11 UJ		0.11 U
Aldrin	µG/L	0	0%	GA	0		0				0.056 UJ		0.054 U
Alpha-BHC	µG/L	0	0%	GA	0.01	0	0				0.056 UJ		0.054 U
Alpha-Chlordane	µG/L	0	0%				0				0.056 UJ		0.054 U
Aroclor-1016	µG/L	0	0%	GA	0.09	0	0				1.1 UJ		1.1 U
Aroclor-1221	µG/L	0	0%	GA	0.09	0	0				2.2 UJ		2.2 U
Aroclor-1232	µG/L	0	0%	GA	0.09	0	0				1.1 UJ		1.1 U
Aroclor-1242	µG/L	0	0%	GA	0.09	0	0				1.1 UJ		1.1 U
Aroclor-1248	µG/L	0	0%	GA	0.09	0	0				1.1 UJ		1.1 U
Aroclor-1254	µG/L	0	0%	GA	0.09	0	0				1.1 UJ		1.1 U
Aroclor-1260	µG/L	0	0%	GA	0.09	0	0				1.1 UJ		1.1 U
Beta-BHC	µG/L	0	0%	GA	0.04	0	0				0.056 UJ		0.054 U
Delta-BHC	µG/L	0	0%	GA	0.04	0	0				0.056 UJ		0.054 U
Dieldrin	µG/L	0	0%	GA	0.004	0	0				0.11 UJ		0.11 U
Endosulfan I	µG/L	0	0%				0				0.056 UJ		0.054 U
Endosulfan II	µG/L	0	0%				0				0.11 UJ		0.11 U
Endosulfan sulfate	µG/L	0	0%				0				0.11 UJ		0.11 U
Endrin	µG/L	0	0%	GA	0		0				0.11 UJ		0.11 U
Endrin aldehyde	µG/L	0	0%	GA	5	0	0				0.11 UJ		0.11 U
Endrin ketone	µG/L	0	0%	GA	5	0	0				0.11 UJ		0.11 U
Gamma-BHC/Lindane	µG/L	0	0%	GA	0.05	0	0				0.056 UJ		0.054 U
Gamma-Chlordane	µG/L	0	0%				0				0.056 UJ		0.054 U
Heptachlor	µG/L	0	0%	GA	0.04	0	0				0.056 UJ		0.054 U
Heptachlor epoxide	µG/L	0	0%	GA	0.03	0	0				0.056 UJ		0.054 U
Methoxychlor	µG/L	0	0%	GA	35	0	0				0.56 UJ		0.54 U
Toxaphene	µG/L	0	0%	GA	0.06	0	0				5.6 UJ		5.4 U

Table A-2
Analytical Results of Groundwater Samples
Feasibility Study - OD Grounds
Seneca Army Depot

Area								SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45	SEAD-45
Loc ID								MW45-4	MW45-4	MW45-4	MW45-4	MW45-4	MW5
Sample ID								122000	122247	122248	MW45-4	OB108	MW5
Matrix								GW	GW	GW	GW	GW	GW
Sample Date								4/9/1999	12/7/1999	12/7/1999	1/26/1994	6/18/1997	2/2/1994
QC Type								SA	SA	DU	SA	SA	SA
Study ID								RI	RI	RI	ESI	OB_Quarterly	ESI
								1	2	2		0	
								N	N	N	N	N	N
Parameter	Unit	Maximum Value	Frequency of Detection	Criteria Source	Criteria Value	Number of Exceedances	Number of Times Detected	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual	Value Qual
Inorganics													
Aluminum	µG/L	63,300	75%				9	215	14.3 U	14.3 U	63,300	36.8	821
Antimony	µG/L	52.1	58%	GA	3	7	7	2.2 U	2.7 U	2.7 U	21.6 UJ	2.8 U	**28.1 J**
Arsenic	µG/L	9.5	25%	MCL	10	0	3	1.8 U	1.9 U	1.9 U	9.5 J	3.6 U	1.4 U
Barium	µG/L	751	100%	GA	1,000	0	12	24.4 J	28.2 J	28.4 J	751	23.4	82.8 J
Beryllium	µG/L	5	25%	MCL	4	1	3	0.1 U	0.2 U	0.2 U	**5**	2 U	0.4 U
Cadmium	µG/L	3.8	33%	GA	5	0	4	0.3 U	0.3 U	0.3 U	2.1 U	4 U	2.1 U
Calcium	µG/L	660,000	100%				12	144,000	177,000	181,000	660,000	112,000	123,000
Chromium	µG/L	106	42%	GA	50	1	5	0.7 U	0.9 U	0.9 U	[illegible]	1.3 U	2.6 J
Cobalt	µG/L	94.4	33%				4	1.5 U	2 U	2 U	94.4	1.4 U	4.4 U
Copper	µG/L	123	58%	GA	200	0	7	1 U	1.9 J	1.7 U	123	1.5	3.1 U
Cyanide	µG/L	0	0%				0	5 U	10 UJ	10 UJ	5 U		5 U
Iron	µG/L	113,000	83%	GA	300	5	10	256	25.4 U	25.4 U	**113,000**	62.8	**1,220**
Iron+Manganese	µG/L	117,640	100%	GA	500	6	12	263.1 J	13.8 J	13.7 J	**117,640**	67.8 J	**1,275**
Lead	µG/L	75.6	67%	MCL	15	2	8	0.9 U	1 U	1 U	**75.6**	2 U	1.1 J
Magnesium	µG/L	77,900	100%				12	31,400	36,500	37,400	73,500	24,200	27,700
Manganese	µG/L	4,640	100%	GA	300	4	12	7.1 J	1.1 J	1 J	**4,640**	5 J	55
Mercury	µG/L	1.8	25%	GA	0.7	1	3	0.1 UJ	0.1 UJ	0.1 UJ	0.29	0.2 U	0.04 U
Nickel	µG/L	209	42%	GA	100	1	5	1.4 U	1.7 U	1.7 U	**209**	2.2	4 U
Potassium	µG/L	18,700	75%				9	2,460 J	2,660 J	2,870 J	13,900	2,180	907 U
Selenium	µG/L	2.5	42%	GA	10	0	5	1.8 U	2.4 UJ	2.4 UJ	0.7 U	3.1 U	1.5 J
Silver	µG/L	4.6	17%	GA	50	0	2	0.9 U	1.9 UJ	1.9 UJ	4.2 U	0.98	4.2 U
Sodium	µG/L	40,000	100%	GA	20,000	1	12	11,400	14,000	13,900	17,300	10,600	16,100
Thallium	µG/L	3.4	8%	MCL	2	1	1	**3.4 J**	2.7 U	2.7 U	1.2 U	4 U	1.2 U
Vanadium	µG/L	93.1	25%				3	1.6 U	1.5 U	1.5 U	93.1	1.2 U	3.7 U
Zinc	µG/L	321	100%				12	5.8 J	5.1 J	5.3 J	321	6.8	24.5

Footnote:
1) Chemical result qualifiers are assigned by the laboratory and are evaluated and modified (if necessary) by during data validation.
U = non-detect, i.e. not detected equal to or above this value. J = estimated (detect or non-detect) value.
[blank] = detect, i.e. detected chemical result value. R = Rejected, data validation rejected the results.
2) Num of Analyses is the number of detected and non-detected results excluding rejected results. Sample duplicate pairs have not been averaged.
3) Chemical results greater than the action level are highlighted, bolded and boxed
4) Criteria action level source document and web address.
- The NYS GA Standard and EPA MCL values were obtained from the provided links.
http://www.dec.ny.gov/regulations/2652.html
http://water.epa.gov/drink/contaminants/index.cfm#List

Table A-3
Analytical Results For Surface Water Samples
Feasibility Study - OD Grounds
Seneca Army Depot

Area								SEAD-45	SEAD-45	SEAD-45	SEAD-45
Loc ID								SW/SD45-1	SW/SD45-2	SW/SD45-3	SW/SD45-4
Sample ID								SW45-1	SW45-2	SW45-3	SW45-4
Matrix								SURFACE WATER	SURFACE WATER	SURFACE WATER	SURFACE WATER
Sample Depth Interval (Ft)								0-0.1	0-0.1	0-0.1	0-0.1
Sample Date								11/1/1993	11/1/1993	11/1/1993	11/1/1993
QC Type								SA	SA	SA	SA
Study ID								ESI	ESI	ESI	ESI
Parameter	Unit	Maximum Value	Frequency of Detection	Criteria Value	Number of Exceedances	Number of Times Detected	Number of Samples Analyzed	Value Qual	Value Qual	Value Qual	Value Qual
Volatile Organic Compounds											
1,1,1-Trichloroethane	µG/L	0	0%			0	4	10 U	10 U	10 U	10 U
1,1,2,2-Tetrachloroethane	µG/L	0	0%			0	4	10 U	10 U	10 U	10 U
1,1,2-Trichloroethane	µG/L	0	0%			0	4	10 U	10 U	10 U	10 U
1,1-Dichloroethane	µG/L	0	0%			0	4	10 U	10 U	10 U	10 U
1,1-Dichloroethene	µG/L	0	0%			0	4	10 U	10 U	10 U	10 U
1,2-Dichloroethane	µG/L	0	0%			0	4	10 U	10 U	10 U	10 U
1,2-Dichloroethene (total)	µG/L	0	0%			0	4	10 U	10 U	10 U	10 U
1,2-Dichloropropane	µG/L	0	0%			0	4	10 U	10 U	10 U	10 U
Acetone	µG/L	0	0%			0	4	10 U	10 U	10 U	10 U
Benzene	µG/L	0	0%			0	4	10 U	10 U	10 U	10 U
Bromodichloromethane	µG/L	0	0%			0	4	10 U	10 U	10 U	10 U
Bromoform	µG/L	0	0%			0	4	10 U	10 U	10 U	10 U
Carbon disulfide	µG/L	0	0%			0	4	10 U	10 U	10 U	10 U
Carbon tetrachloride	µG/L	0	0%			0	4	10 U	10 U	10 U	10 U
Chlorobenzene	µG/L	0	0%	5	0	0	4	10 U	10 U	10 U	10 U
Chlorodibromomethane	µG/L	0	0%			0	4	10 U	10 U	10 U	10 U
Chloroethane	µG/L	0	0%			0	4	10 U	10 U	10 U	10 U
Chloroform	µG/L	0	0%			0	4	10 U	10 U	10 U	10 U
Cis-1,3-Dichloropropene	µG/L	0	0%			0	4	10 U	10 U	10 U	10 U
Ethyl benzene	µG/L	0	0%			0	4	10 U	10 U	10 U	10 U
Methyl bromide	µG/L	0	0%			0	4	10 U	10 U	10 U	10 U
Methyl butyl ketone	µG/L	0	0%			0	4	10 U	10 U	10 U	10 U
Methyl chloride	µG/L	0	0%			0	4	10 U	10 U	10 U	10 U
Methyl ethyl ketone	µG/L	0	0%			0	4	10 U	10 U	10 U	10 U
Methyl isobutyl ketone	µG/L	0	0%			0	4	10 U	10 U	10 U	10 U
Methylene chloride	µG/L	0	0%			0	4	10 U	10 U	10 U	10 U
Styrene	µG/L	0	0%			0	4	10 U	10 U	10 U	10 U
Tetrachloroethene	µG/L	0	0%			0	4	10 U	10 U	10 U	10 U
Toluene	µG/L	0	0%	6,000	0	0	4	10 U	10 U	10 U	10 U
Total Xylenes	µG/L	0	0%			0	4	10 U	10 U	10 U	10 U
Trans-1,3-Dichloropropene	µG/L	0	0%			0	4	10 U	10 U	10 U	10 U
Trichloroethene	µG/L	0	0%	40	0	0	4	10 U	10 U	10 U	10 U
Vinyl chloride	µG/L	0	0%			0	4	10 U	10 U	10 U	10 U
Semivolatile Organic Compounds											
1,2,4-Trichlorobenzene	µG/L	0	0%	5	0	0	4	10 U	11 U	11 U	10 U
1,2-Dichlorobenzene	µG/L	0	0%	5	0	0	4	10 U	11 U	11 U	10 U
1,3-Dichlorobenzene	µG/L	0	0%	5	0	0	4	10 U	11 U	11 U	10 U
1,4-Dichlorobenzene	µG/L	0	0%	5	0	0	4	10 U	11 U	11 U	10 U
2,2'-oxybis(1-Chloropropane)	µG/L	0	0%			0	4	10 U	11 U	11 U	10 U
2,4,5-Trichlorophenol	µG/L	0	0%			0	4	26 U	27 U	26 U	25 U
2,4,6-Trichlorophenol	µG/L	0	0%			0	4	10 U	11 U	11 U	10 U
2,4-Dichlorophenol	µG/L	0	0%	1	0	0	4	10 U	11 U	11 U	10 U
2,4-Dimethylphenol	µG/L	0	0%	1,000	0	0	4	10 U	11 U	11 U	10 U
2,4-Dinitrophenol	µG/L	0	0%	400	0	0	4	26 U	27 U	26 U	25 U
2,4-Dinitrotoluene	µG/L	0	0%			0	4	10 U	11 U	11 U	10 U
2,6-Dinitrotoluene	µG/L	0	0%			0	4	10 U	11 U	11 U	10 U
2-Chloronaphthalene	µG/L	0	0%			0	4	10 U	11 U	11 U	10 U

Table A-3
Analytical Results For Surface Water Samples
Feasibility Study - OD Grounds
Seneca Army Depot

	SW45-1	SW45-2	SW45-3	SW45-4
Area	SEAD-45	SEAD-45	SEAD-45	SEAD-45
Loc ID	SW/SD45-1	SW/SD45-2	SW/SD45-3	SW/SD45-4
Sample ID	SW45-1	SW45-2	SW45-3	SW45-4
Matrix	SURFACE WATER	SURFACE WATER	SURFACE WATER	SURFACE WATER
Sample Depth Interval (Ft)	0-0.1	0-0.1	0-0.1	0-0.1
Sample Date	11/1/1993	11/1/1993	11/1/1993	11/1/1993
QC Type	SA	SA	SA	SA
Study ID	ESI	ESI	ESI	ESI

Parameter	Unit	Maximum Value	Frequency of Detection	Criteria Value	Number of Exceedances	Number of Times Detected	Number of Samples Analyzed	SW45-1 Value Qual	SW45-2 Value Qual	SW45-3 Value Qual	SW45-4 Value Qual
2-Chlorophenol	µG/L	0	0%			0	4	10 U	11 U	11 U	10 U
2-Methylnaphthalene	µG/L	0	0%	4.7	0	0	4	10 U	11 U	11 U	10 U
2-Methylphenol	µG/L	0	0%			0	4	10 U	11 U	11 U	10 U
2-Nitroaniline	µG/L	0	0%			0	4	26 U	27 U	26 U	25 U
2-Nitrophenol	µG/L	0	0%			0	4	10 U	11 U	11 U	10 U
3,3'-Dichlorobenzidine	µG/L	0	0%			0	4	10 U	11 U	11 U	10 U
3-Nitroaniline	µG/L	0	0%			0	4	26 U	27 U	26 U	25 U
4,6-Dinitro-2-methylphenol	µG/L	0	0%			0	4	26 U	27 U	26 U	25 U
4-Bromophenyl phenyl ether	µG/L	0	0%			0	4	10 U	11 U	11 U	10 U
4-Chloro-3-methylphenol	µG/L	0	0%			0	4	10 U	11 U	11 U	10 U
4-Chloroaniline	µG/L	0	0%			0	4	10 U	11 U	11 U	10 U
4-Chlorophenyl phenyl ether	µG/L	0	0%			0	4	10 U	11 U	11 U	10 U
4-Methylphenol	µG/L	0	0%			0	4	10 U	11 U	11 U	10 U
4-Nitroaniline	µG/L	0	0%			0	4	26 U	27 U	26 U	25 U
4-Nitrophenol	µG/L	0	0%			0	4	26 U	27 U	26 U	25 U
Acenaphthene	µG/L	0	0%			0	4	10 U	11 U	11 U	10 U
Acenaphthylene	µG/L	0	0%			0	4	10 U	11 U	11 U	10 U
Anthracene	µG/L	0	0%			0	4	10 U	11 U	11 U	10 U
Benzo(a)anthracene	µG/L	0	0%			0	4	10 U	11 U	11 U	10 U
Benzo(a)pyrene	µG/L	0	0%			0	4	10 U	11 U	11 U	10 U
Benzo(b)fluoranthene	µG/L	0	0%			0	4	10 U	11 U	11 U	10 U
Benzo(ghi)perylene	µG/L	0	0%			0	4	10 U	11 U	11 U	10 U
Benzo(k)fluoranthene	µG/L	0	0%			0	4	10 U	11 U	11 U	10 U
Bis(2-Chloroethoxy)methane	µG/L	0	0%			0	4	10 U	11 U	11 U	10 U
Bis(2-Chloroethyl)ether	µG/L	0	0%			0	4	10 U	11 U	11 U	10 U
Bis(2-Ethylhexyl)phthalate	µG/L	0	0%	0.6	0	0	4	10 U	11 U	11 U	10 U
Butylbenzylphthalate	µG/L	0	0%			0	4	10 U	11 U	11 U	10 U
Carbazole	µG/L	0	0%			0	4	10 U	11 U	11 U	10 U
Chrysene	µG/L	0	0%			0	4	10 U	11 U	11 U	10 U
Dibenz(a,h)anthracene	µG/L	0	0%			0	4	10 U	11 U	11 U	10 U
Dibenzofuran	µG/L	0	0%			0	4	10 U	11 U	11 U	10 U
Diethyl phthalate	µG/L	0	0%			0	4	10 U	11 U	11 U	10 U
Dimethylphthalate	µG/L	0	0%			0	4	10 U	11 U	11 U	10 U
Di-n-butylphthalate	µG/L	0	0%			0	4	10 U	11 U	11 U	10 U
Di-n-octylphthalate	µG/L	0	0%			0	4	10 U	11 U	11 U	10 U
Fluoranthene	µG/L	0	0%			0	4	10 U	11 U	11 U	10 U
Fluorene	µG/L	0	0%			0	4	10 U	11 U	11 U	10 U
Hexachlorobenzene	µG/L	0	0%	0.00003	0	0	4	10 U	11 U	11 U	10 U
Hexachlorobutadiene	µG/L	0	0%	0.01	0	0	4	10 U	11 U	11 U	10 U
Hexachlorocyclopentadiene	µG/L	0	0%	0.45	0	0	4	10 U	11 U	11 U	10 U
Hexachloroethane	µG/L	0	0%	0.6	0	0	4	10 U	11 U	11 U	10 U
Indeno(1,2,3-cd)pyrene	µG/L	0	0%			0	4	10 U	11 U	11 U	10 U
Isophorone	µG/L	0	0%			0	4	10 U	11 U	11 U	10 U
Naphthalene	µG/L	0	0%			0	4	10 U	11 U	11 U	10 U
Nitrobenzene	µG/L	0	0%			0	4	10 U	11 U	11 U	10 U
N-Nitroso-di-n-propylamine	µG/L	0	0%			0	4	10 U	11 U	11 U	10 U
N-Nitrosodiphenylamine	µG/L	0	0%			0	4	10 U	11 U	11 U	10 U
Pentachlorophenol	µG/L	0	0%	1	0	0	4	26 U	27 U	26 U	25 U
Phenanthrene	µG/L	0	0%			0	4	10 U	11 U	11 U	10 U

Table A-3
Analytical Results For Surface Water Samples
Feasibility Study - OD Grounds
Seneca Army Depot

Area								SEAD-45	SEAD-45	SEAD-45	SEAD-45
Loc ID								SW/SD45-1	SW/SD45-2	SW/SD45-3	SW/SD45-4
Sample ID								SW45-1	SW45-2	SW45-3	SW45-4
Matrix								SURFACE WATER	SURFACE WATER	SURFACE WATER	SURFACE WATER
Sample Depth Interval (Ft)								0-0.1	0-0.1	0-0.1	0-0.1
Sample Date								11/1/1993	11/1/1993	11/1/1993	11/1/1993
QC Type								SA	SA	SA	SA
Study ID								ESI	ESI	ESI	ESI
Parameter	Unit	Maximum Value	Frequency of Detection	Criteria Value	Number of Exceedances	Number of Times Detected	Number of Samples Analyzed	Value Qual	Value Qual	Value Qual	Value Qual
Phenol	µG/L	0	0%	5	0	0	4	10 U	11 U	11 U	10 U
Pyrene	µG/L	0	0%			0	4	10 U	11 U	11 U	10 U
Herbicides											
2,4,5-T	µG/L	0	0%			0	4	0.12 U	0.12 U	0.11 U	0.11 U
2,4,5-TP/Silvex	µG/L	0	0%			0	4	0.12 U	0.12 U	0.11 U	0.11 U
2,4-D	µG/L	0	0%			0	4	1.2 U	1.2 U	1.1 U	1.1 U
2,4-DB	µG/L	0	0%			0	4	1.2 U	1.2 U	1.1 U	1.1 U
Dalapon	µG/L	0	0%			0	4	2.6 U	2.6 U	2.5 U	2.4 U
Dicamba	µG/L	0	0%			0	4	0.12 U	0.12 U	0.11 U	0.11 U
Dichloroprop	µG/L	0	0%			0	4	1.2 U	1.2 U	1.1 U	1.1 U
Dinoseb	µG/L	0	0%			0	4	0.56 U	0.56 U	0.54 U	0.52 U
MCPA	µG/L	0	0%			0	4	120 U	120 U	110 U	110 U
MCPP	µG/L	0	0%			0	4	120 U	120 U	110 U	110 U
Explosives											
1,3,5-Trinitrobenzene	µG/L	0	0%			0	4	0.13 U	0.13 U	0.13 U	0.13 U
1,3-Dinitrobenzene	µG/L	0	0%			0	4	0.13 U	0.13 U	0.13 U	0.13 U
2,4,6-Trinitrotoluene	µG/L	0	0%			0	4	0.13 U	0.13 U	0.13 U	0.13 U
2,4-Dinitrotoluene	µG/L	0	0%			0	4	0.13 U	0.13 U	0.13 U	0.13 U
2,6-Dinitrotoluene	µG/L	0	0%			0	4	0.13 U	0.13 U	0.13 U	0.13 U
2-amino-4,6-Dinitrotoluene	µG/L	0	0%			0	4	0.13 U	0.13 U	0.13 U	0.13 U
4-amino-2,6-Dinitrotoluene	µG/L	0	0%			0	4	0.13 U	0.13 U	0.13 U	0.13 U
HMX	µG/L	0.49	50%			2	4	0.13 U	0.45	0.49	0.13 U
RDX	µG/L	2	50%			2	4	0.24 J	2	0.13 U	0.13 U
Tetryl	µG/L	0	0%			0	4	0.13 U	0.13 U	0.13 U	0.13 U
Pesticides/PCBs											
4,4'-DDD	µG/L	0	0%	0.00008	0	0	4	0.1 U	0.1 U	0.12 U	0.12 U
4,4'-DDE	µG/L	0	0%	0.000007	0	0	4	0.1 U	0.1 U	0.12 U	0.12 U
4,4'-DDT	µG/L	0	0%	0.00001	0	0	4	0.1 U	0.1 U	0.12 U	0.12 U
Aldrin	µG/L	0	0%	0.001	0	0	4	0.052 U	0.052 U	0.058 U	0.058 U
Alpha-BHC	µG/L	0	0%			0	4	0.052 U	0.052 U	0.058 U	0.058 U
Alpha-Chlordane	µG/L	0	0%			0	4	0.052 U	0.052 U	0.058 U	0.058 U
Aroclor-1016	µG/L	0	0%	0.000001	0	0	4	1 U	1 U	1.2 U	1.2 U
Aroclor-1221	µG/L	0	0%	0.000001	0	0	4	2.1 U	2.1 U	2.3 U	2.3 U
Aroclor-1232	µG/L	0	0%	0.000001	0	0	4	1 U	1 U	1.2 U	1.2 U
Aroclor-1242	µG/L	0	0%			0	4	1 U	1 U	1.2 U	1.2 U
Aroclor-1248	µG/L	0	0%	0.000001	0	0	4	1 U	1 U	1.2 U	1.2 U
Aroclor-1254	µG/L	0	0%	0.000001	0	0	4	1 U	1 U	1.2 U	1.2 U
Aroclor-1260	µG/L	0	0%	0.000001	0	0	4	1 U	1 U	1.2 U	1.2 U
Beta-BHC	µG/L	0	0%			0	4	0.052 U	0.052 U	0.058 U	0.058 U
Delta-BHC	µG/L	0	0%			0	4	0.052 U	0.052 U	0.058 U	0.058 U
Dieldrin	µG/L	0	0%	0.0000006	0	0	4	0.1 U	0.1 U	0.12 U	0.12 U
Endosulfan I	µG/L	0	0%	0.009	0	0	4	0.052 U	0.052 U	0.058 U	0.058 U
Endosulfan II	µG/L	0	0%	0.009	0	0	4	0.1 U	0.1 U	0.12 U	0.12 U
Endosulfan sulfate	µG/L	0	0%			0	4	0.1 U	0.1 U	0.12 U	0.12 U
Endrin	µG/L	0	0%	0.002	0	0	4	0.1 U	0.1 U	0.12 U	0.12 U
Endrin aldehyde	µG/L	0	0%			0	4	0.1 U	0.1 U	0.12 U	0.12 U
Endrin ketone	µG/L	0	0%			0	4	0.1 U	0.1 U	0.12 U	0.12 U

Table A-3
Analytical Results For Surface Water Samples
Feasibility Study - OD Grounds
Seneca Army Depot

Area								SEAD-45	SEAD-45	SEAD-45	SEAD-45
Loc ID								SW/SD45-1	SW/SD45-2	SW/SD45-3	SW/SD45-4
Sample ID								SW45-1	SW45-2	SW45-3	SW45-4
Matrix								SURFACE WATER	SURFACE WATER	SURFACE WATER	SURFACE WATER
Sample Depth Interval (Ft)								0-0.1	0-0.1	0-0.1	0-0.1
Sample Date								11/1/1993	11/1/1993	11/1/1993	11/1/1993
QC Type								SA	SA	SA	SA
Study ID								ESI	ESI	ESI	ESI
Parameter	Unit	Maximum Value	Frequency of Detection	Criteria Value	Number of Exceedances	Number of Times Detected	Number of Samples Analyzed	Value Qual	Value Qual	Value Qual	Value Qual
Gamma-BHC/Lindane	µG/L	0	0%			0	4	0.052 U	0.052 U	0.058 U	0.058 U
Gamma-Chlordane	µG/L	0	0%			0	4	0.052 U	0.052 U	0.058 U	0.058 U
Heptachlor	µG/L	0	0%	0.0002	0	0	4	0.052 U	0.052 U	0.058 U	0.058 U
Heptachlor epoxide	µG/L	0	0%	0.0003	0	0	4	0.052 U	0.052 U	0.058 U	0.058 U
Methoxychlor	µG/L	0	0%	0.03	0	0	4	0.52 U	0.52 U	0.58 U	0.58 U
Toxaphene	µG/L	0	0%	0.000006	0	0	4	5.2 U	5.2 U	5.8 U	5.8 U
Inorganics											
Aluminum	µG/L	37,500	100%	100	4	4	4	**29,000**	**4,370**	**968**	**37,500**
Antimony	µG/L	0	0%			0	4	52.6 U	52.4 U	52.8 U	52.5 U
Arsenic	µG/L	2.3	25%	150	0	1	4	1.2 U	1.2 U	1.2 U	2.3 J
Barium	µG/L	439	100%			4	4	204	82.5 J	33.5 J	439
Beryllium	µG/L	1.5	50%	1,100	0	2	4	1.3 J	0.3 U	0.3 U	1.5 J
Cadmium	µG/L	11.2	25%	3.84	1	1	4	3.3 U	3.3 U	3.3 U	**11.2**
Calcium	µG/L	194,000	100%			4	4	194,000	38,500	33,800	105,000
Chromium	µG/L	50.8	75%	139.45	0	3	4	45.4	3.4 J	2.5 U	50.8
Cobalt	µG/L	18.2	50%	5	2	2	4	**15.2 J**	4.9 U	4.9 U	**18.2 J**
Copper	µG/L	612	100%	17.32	4	4	4	**203**	**119**	**24.8 J**	**612**
Cyanide	µG/L	47.7	25%	5.2	1	1	4	8.3 U	8.3 U	8.3 U	**47.7**
Iron	µG/L	60,400	100%	300	4	4	4	**47,700 J**	**5,920 J**	**1,270 J**	**60,400 J**
Lead	µG/L	68.7	100%	1.4624632	4	4	4	**27.2**	**10.9**	**1.9 J**	**68.7**
Magnesium	µG/L	24,300	100%			4	4	24,300	4,680 J	3,280 J	19,300
Manganese	µG/L	1,250	100%			4	4	841	56.7	21.1	1,250
Mercury	µG/L	3	100%	0.0007	4	4	4	**0.32**	**0.5**	**0.18 J**	**3**
Nickel	µG/L	74.2	100%	99.92	0	4	4	72.7	8.1 J	4.2 J	74.2
Potassium	µG/L	9,670	100%			4	4	6,650	5,020	1,530 J	9,670
Selenium	µG/L	0	0%	4.6	0	0	4	5.5 U	1.1 U	1.1 U	5.5 U
Silver	µG/L	0	0%	0.1	0	0	4	6.7 UJ	6.6 UJ	6.7 UJ	6.7 UJ
Sodium	µG/L	4,340	100%			4	4	2,810 J	899 J	1,080 J	4,340 J
Thallium	µG/L	0	0%	8	0	0	4	1.2 U	1.2 U	1.2 U	1.2 U
Vanadium	µG/L	54.9	75%	14	2	3	4	**48.9 J**	6.1 J	3.3 U	**54.9**
Zinc	µG/L	883	100%	159.25	2	4	4	**228**	98.9	23.3	**883**

Footnote:

1) Chemical result qualifiers are assigned by the laboratory and are evaluated and modified (if necessary) by during data validation.
U = non-detect, i.e. not detected equal to or above this value. J = estimated (detect or non-detect) value.
[blank] = detect, i.e. detected chemical result value. R = Rejected, data validation rejected the results.
2) Num of Analyses is the number of detected and non-detected results excluding rejected results.
3) Chemical results greater than the action level are highlighted, bolded and boxed

Table A-4
Analytical Results for Sediment Samples at OD Grounds
Feasibility Study - OD Grounds
Seneca Army Depot

Area								SEAD-45		SEAD-45		SEAD-45		SEAD-45	
Loc ID								SW/SD45-1		SW/SD45-2		SW/SD45-3		SW/SD45-4	
Sample ID								SD45-1		SD45-2		SD45-3		SD45-4	
Matrix								SEDIMENT		SEDIMENT		SEDIMENT		SEDIMENT	
Sample Depth Interval (ft)								0-0.5		0-0.5		0-0.5		0-0.5	
Sample Date								11/1/1993		11/1/1993		11/1/1993		11/1/1993	
QC Type								SA		SA		SA		SA	
Study ID								ESI		ESI		ESI		ESI	
Parameter	Unit	Max Detected Value	Frequency of Detects	Num of Detects	Num of Analyses	Action Level	Num of Detects Above Standard	Value	Qual	Value	Qual	Value	Qual	Value	Qual
Volatile Organic Compounds															
1,1,1-Trichloroethane	UG/KG	0	0%	0	4	680	0	13	U	14	U	15	U	13	U
1,1,2,2-Tetrachloroethane	UG/KG	0	0%	0	4			13	U	14	U	15	U	13	U
1,1,2-Trichloroethane	UG/KG	0	0%	0	4			13	U	14	U	15	U	13	U
1,1-Dichloroethane	UG/KG	0	0%	0	4	270	0	13	U	14	U	15	U	13	U
1,1-Dichloroethene	UG/KG	0	0%	0	4	330	0	13	U	14	U	15	U	13	U
1,2-Dichloroethane	UG/KG	0	0%	0	4	20	0	13	U	14	U	15	U	13	U
1,2-Dichloroethene (total)	UG/KG	0	0%	0	4	190	0	13	U	14	U	15	U	13	U
1,2-Dichloropropane	UG/KG	0	0%	0	4			13	U	14	U	15	U	13	U
Acetone	UG/KG	0	0%	0	4	50	0	13	U	14	U	15	U	13	U
Benzene	UG/KG	0	0%	0	4	60	0	13	U	14	U	15	U	13	U
Bromodichloromethane	UG/KG	0	0%	0	4			13	U	14	U	15	U	13	U
Bromoform	UG/KG	0	0%	0	4			13	U	14	U	15	U	13	U
Carbon disulfide	UG/KG	0	0%	0	4			13	U	14	U	15	U	13	U
Carbon tetrachloride	UG/KG	0	0%	0	4	760	0	13	U	14	U	15	U	13	U
Chlorobenzene	UG/KG	0	0%	0	4	1,100	0	13	U	14	U	15	U	13	U
Chlorodibromomethane	UG/KG	0	0%	0	4			13	U	14	U	15	U	13	U
Chloroethane	UG/KG	0	0%	0	4			13	U	14	U	15	U	13	U
Chloroform	UG/KG	0	0%	0	4	370	0	13	U	14	U	15	U	13	U
Cis-1,3-Dichloropropene	UG/KG	0	0%	0	4			13	U	14	U	15	U	13	U
Ethyl benzene	UG/KG	0	0%	0	4	1,000	0	13	U	14	U	15	U	13	U
Methyl bromide	UG/KG	0	0%	0	4			13	U	14	U	15	U	13	U
Methyl butyl ketone	UG/KG	0	0%	0	4			13	U	14	U	15	U	13	U
Methyl chloride	UG/KG	0	0%	0	4			13	U	14	U	15	U	13	U
Methyl ethyl ketone	UG/KG	0	0%	0	4	120	0	13	U	14	U	15	U	13	U
Methyl isobutyl ketone	UG/KG	0	0%	0	4			13	U	14	U	15	U	13	U
Methylene chloride	UG/KG	0	0%	0	4	50	0	13	U	14	U	15	U	13	U
Styrene	UG/KG	0	0%	0	4			13	U	14	U	15	U	13	U
Tetrachloroethene	UG/KG	0	0%	0	4	1,300	0	13	U	14	U	15	U	13	U
Toluene	UG/KG	0	0%	0	4	700	0	13	U	14	U	15	U	13	U
Total Xylenes	UG/KG	0	0%	0	4	260	0	13	U	14	U	15	U	13	U
Trans-1,3-Dichloropropene	UG/KG	0	0%	0	4			13	U	14	U	15	U	13	U
Trichloroethene	UG/KG	0	0%	0	4	470	0	13	U	14	U	15	U	13	U
Vinyl chloride	UG/KG	0	0%	0	4	20	0	13	U	14	U	15	U	13	U
Herbicides															
2,4,5-T	UG/KG	0	0%	0	4			6.4	U	8	U	7.6	U	6.8	U
2,4,5-TP/Silvex	UG/KG	0	0%	0	4	3,800	0	6.4	U	8	U	7.6	U	6.8	U
2,4-D	UG/KG	0	0%	0	4			64	U	80	U	76	U	68	U

Table A-4
Analytical Results for Sediment Samples at OD Grounds
Feasibility Study - OD Grounds
Seneca Army Depot

Area	SEAD-45	SEAD-45	SEAD-45	SEAD-45
Loc ID	SW/SD45-1	SW/SD45-2	SW/SD45-3	SW/SD45-4
Sample ID	SD45-1	SD45-2	SD45-3	SD45-4
Matrix	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT
Sample Depth Interval (ft)	0-0.5	0-0.5	0-0.5	0-0.5
Sample Date	11/1/1993	11/1/1993	11/1/1993	11/1/1993
QC Type	SA	SA	SA	SA
Study ID	ESI	ESI	ESI	ESI

Parameter	Unit	Max Detected Value	Frequency of Detects	Num of Detects	Num of Analyses	Action Level	Num of Detects Above Standard	Value	Qual	Value	Qual	Value	Qual	Value	Qual
2,4-DB	UG/KG	0	0%	0	4			64	U	80	U	76	U	68	U
Dalapon	UG/KG	0	0%	0	4			160	U	200	U	190	U	170	U
Dicamba	UG/KG	0	0%	0	4			6.4	U	8	U	7.6	U	6.8	U
Dichloroprop	UG/KG	0	0%	0	4			64	U	80	U	76	U	68	U
Dinoseb	UG/KG	0	0%	0	4			32	U	40	U	38	U	34	U
MCPA	UG/KG	0	0%	0	4			6,400	U	8,000	U	7,600	U	6,800	U
MCPP	UG/KG	0	0%	0	4			6,400	U	8,000	U	7,600	U	6,800	U
Explosives															
1,3,5-Trinitrobenzene	UG/KG	0	0%	0	4			130	U	130	U	130	U	130	U
1,3-Dinitrobenzene	UG/KG	0	0%	0	4			130	U	130	U	130	U	130	U
2,4,6-Trinitrotoluene	UG/KG	120	25%	1	4			130	U	120	J	130	U	130	U
2,4-Dinitrotoluene	UG/KG	83	25%	1	4			130	U	83	J	130	U	130	U
2,6-Dinitrotoluene	UG/KG	0	0%	0	4			130	U	130	U	130	U	130	U
2-amino-4,6-Dinitrotoluene	UG/KG	260	25%	1	4			130	U	260		130	U	130	U
4-amino-2,6-Dinitrotoluene	UG/KG	0	0%	0	4			130	U	130	U	130	U	130	U
HMX	UG/KG	0	0%	0	4			130	U	130	U	130	U	130	U
RDX	UG/KG	210	25%	1	4			130	U	210		130	U	130	U
Tetryl	UG/KG	140	25%	1	4			130	U	140	J	130	U	130	U
Semivolatile Organic Compounds															
1,2,4-Trichlorobenzene	UG/KG	0	0%	0	4			420	U	530	U	500	U	440	U
1,2-Dichlorobenzene	UG/KG	0	0%	0	4	1,100	0	420	U	530	U	500	U	440	U
1,3-Dichlorobenzene	UG/KG	0	0%	0	4	2,400	0	420	U	530	U	500	U	440	U
1,4-Dichlorobenzene	UG/KG	0	0%	0	4	1,800	0	420	U	530	U	500	U	440	U
2,2'-oxybis(1-Chloropropane)	UG/KG	0	0%	0	4			420	U	530	U	500	U	440	U
2,4,5-Trichlorophenol	UG/KG	0	0%	0	4			1,000	U	1,300	U	1,200	U	1,100	U
2,4,6-Trichlorophenol	UG/KG	0	0%	0	4			420	U	530	U	500	U	440	U
2,4-Dichlorophenol	UG/KG	0	0%	0	4			420	U	530	U	500	U	440	U
2,4-Dimethylphenol	UG/KG	0	0%	0	4			420	U	530	U	500	U	440	U
2,4-Dinitrophenol	UG/KG	0	0%	0	4			1,000	U	1,300	U	1,200	U	1,100	U
2,4-Dinitrotoluene	UG/KG	0	0%	0	4			420	U	530	U	500	U	440	U
2,6-Dinitrotoluene	UG/KG	0	0%	0	4			420	U	530	U	500	U	440	U
2-Chloronaphthalene	UG/KG	0	0%	0	4			420	U	530	U	500	U	440	U
2-Chlorophenol	UG/KG	0	0%	0	4			420	U	530	U	500	U	440	U
2-Methylnaphthalene	UG/KG	0	0%	0	4			420	U	530	U	500	U	440	U
2-Methylphenol	UG/KG	0	0%	0	4	330	0	420	U	530	U	500	U	440	U
2-Nitroaniline	UG/KG	0	0%	0	4			1,000	U	1,300	U	1,200	U	1,100	U
2-Nitrophenol	UG/KG	0	0%	0	4			420	U	530	U	500	U	440	U
3,3'-Dichlorobenzidine	UG/KG	0	0%	0	4			420	U	530	U	500	U	440	U

Table A-4
Analytical Results for Sediment Samples at OD Grounds
Feasibility Study - OD Grounds
Seneca Army Depot

Area								SEAD-45		SEAD-45		SEAD-45		SEAD-45	
Loc ID								SW/SD45-1		SW/SD45-2		SW/SD45-3		SW/SD45-4	
Sample ID								SD45-1		SD45-2		SD45-3		SD45-4	
Matrix								SEDIMENT		SEDIMENT		SEDIMENT		SEDIMENT	
Sample Depth Interval (ft)								0-0.5		0-0.5		0-0.5		0-0.5	
Sample Date								11/1/1993		11/1/1993		11/1/1993		11/1/1993	
QC Type								SA		SA		SA		SA	
Study ID								ESI		ESI		ESI		ESI	
Parameter	Unit	Max Detected Value	Frequency of Detects	Num of Detects	Num of Analyses	Action Level	Num of Detects Above Standard	Value	Qual	Value	Qual	Value	Qual	Value	Qual
3-Nitroaniline	UG/KG	0	0%	0	4			1,000	U	1,300	U	1,200	U	1,100	U
4,6-Dinitro-2-methylphenol	UG/KG	0	0%	0	4			1,000	U	1,300	U	1,200	U	1,100	U
4-Bromophenyl phenyl ether	UG/KG	0	0%	0	4			420	U	530	U	500	U	440	U
4-Chloro-3-methylphenol	UG/KG	0	0%	0	4			420	U	530	U	500	U	440	U
4-Chloroaniline	UG/KG	0	0%	0	4			420	U	530	U	500	U	440	U
4-Chlorophenyl phenyl ether	UG/KG	0	0%	0	4			420	U	530	U	500	U	440	U
4-Methylphenol	UG/KG	0	0%	0	4	330	0	420	U	530	U	500	U	440	U
4-Nitroaniline	UG/KG	0	0%	0	4			1,000	U	1,300	U	1,200	U	1,100	U
4-Nitrophenol	UG/KG	0	0%	0	4			1,000	U	1,300	U	1,200	U	1,100	U
Acenaphthene	UG/KG	0	0%	0	4	20,000	0	420	U	530	U	500	U	440	U
Acenaphthylene	UG/KG	0	0%	0	4	100,000	0	420	U	530	U	500	U	440	U
Anthracene	UG/KG	0	0%	0	4	100,000	0	420	U	530	U	500	U	440	U
Benzo(a)anthracene	UG/KG	32	50%	2	4	1,000	0	420	U	32	J	23	J	440	U
Benzo(a)pyrene	UG/KG	37	50%	2	4	1,000	0	420	U	37	J	28	J	440	U
Benzo(b)fluoranthene	UG/KG	37	50%	2	4	1,000	0	420	U	37	J	28	J	440	U
Benzo(ghi)perylene	UG/KG	48	25%	1	4	100,000	0	420	U	48	J	500	U	440	U
Benzo(k)fluoranthene	UG/KG	28	50%	2	4	800	0	420	U	28	J	26	J	440	U
Bis(2-Chloroethoxy)methane	UG/KG	0	0%	0	4			420	U	530	U	500	U	440	U
Bis(2-Chloroethyl)ether	UG/KG	0	0%	0	4			420	U	530	U	500	U	440	U
Bis(2-Ethylhexyl)phthalate	UG/KG	0	0%	0	4			420	U	530	U	500	U	440	U
Butylbenzylphthalate	UG/KG	0	0%	0	4			420	U	530	U	500	U	440	U
Carbazole	UG/KG	0	0%	0	4			420	U	530	U	500	U	440	U
Chrysene	UG/KG	50	75%	3	4	1,000	0	420	U	50	J	36	J	20	J
Dibenz(a,h)anthracene	UG/KG	0	0%	0	4	330	0	420	U	530	U	500	U	440	U
Dibenzofuran	UG/KG	0	0%	0	4	7,000	0	420	U	530	U	500	U	440	U
Diethyl phthalate	UG/KG	0	0%	0	4			420	U	530	U	500	U	440	U
Dimethylphthalate	UG/KG	0	0%	0	4			420	U	530	U	500	U	440	U
Di-n-butylphthalate	UG/KG	25	25%	1	4			420	U	25	J	500	U	440	U
Di-n-octylphthalate	UG/KG	0	0%	0	4			420	U	530	U	500	U	440	U
Fluoranthene	UG/KG	60	75%	3	4	100,000	0	420	U	60	J	47	J	31	J
Fluorene	UG/KG	0	0%	0	4	30,000	0	420	U	530	U	500	U	440	U
Hexachlorobenzene	UG/KG	40	50%	2	4	330	0	420	U	40	J	500	U	30	J
Hexachlorobutadiene	UG/KG	0	0%	0	4			420	U	530	U	500	U	440	U
Hexachlorocyclopentadiene	UG/KG	0	0%	0	4			420	U	530	U	500	U	440	U
Hexachloroethane	UG/KG	0	0%	0	4			420	U	530	U	500	U	440	U
Indeno(1,2,3-cd)pyrene	UG/KG	32	25%	1	4	500	0	420	U	32	J	500	U	440	U
Isophorone	UG/KG	0	0%	0	4			420	U	530	U	500	U	440	U
Naphthalene	UG/KG	24	25%	1	4	12,000	0	420	U	530	U	500	U	24	J

Table A-4
Analytical Results for Sediment Samples at OD Grounds
Feasibility Study - OD Grounds
Seneca Army Depot

Parameter	Unit	Max Detected Value	Frequency of Detects	Num of Detects	Num of Analyses	Action Level	Num of Detects Above Standard	Value	Qual	Value	Qual	Value	Qual	Value	Qual
Area								SEAD-45		SEAD-45		SEAD-45		SEAD-45	
Loc ID								SW/SD45-1		SW/SD45-2		SW/SD45-3		SW/SD45-4	
Sample ID								SD45-1		SD45-2		SD45-3		SD45-4	
Matrix								SEDIMENT		SEDIMENT		SEDIMENT		SEDIMENT	
Sample Depth Interval (ft)								0-0.5		0-0.5		0-0.5		0-0.5	
Sample Date								11/1/1993		11/1/1993		11/1/1993		11/1/1993	
QC Type								SA		SA		SA		SA	
Study ID								ESI		ESI		ESI		ESI	
Nitrobenzene	UG/KG	0	0%	0	4			420	U	530	U	500	U	440	U
N-Nitroso-di-n-propylamine	UG/KG	0	0%	0	4			420	U	530	U	500	U	440	U
N-Nitrosodiphenylamine	UG/KG	0	0%	0	4			420	U	530	U	500	U	440	U
Pentachlorophenol	UG/KG	0	0%	0	4	800	0	1,000	U	1,300	U	1,200	U	1,100	U
Phenanthrene	UG/KG	34	75%	3	4	100,000	0	420	U	34	J	24	J	25	J
Phenol	UG/KG	0	0%	0	4	330	0	420	U	530	U	500	U	440	U
Pyrene	UG/KG	110	75%	3	4	100,000	0	420	U	110	J	59	J	61	J
Pesticides/PCBs															
4,4'-DDD	UG/KG	0	0%	0	4	3.3	0	4.2	U	5.3	U	5	U	4.5	U
4,4'-DDE	UG/KG	12	50%	2	4	3.3	2	4.2	U	4.3	J	5	U	12	J
4,4'-DDT	UG/KG	0	0%	0	4	3.3	0	4.2	U	5.3	U	5	U	4.5	U
Aldrin	UG/KG	2.2	25%	1	4	5	0	2.2	U	2.7	U	2.6	U	2.2	J
Alpha-BHC	UG/KG	0	0%	0	4	20	0	2.2	U	2.7	U	2.6	U	2.3	U
Alpha-Chlordane	UG/KG	5.7	25%	1	4	94	0	2.2	U	2.7	U	2.6	U	5.7	J
Aroclor-1016	UG/KG	0	0%	0	4	100	0	42	U	53	U	50	U	45	U
Aroclor-1221	UG/KG	0	0%	0	4	100	0	85	U	110	U	100	U	91	U
Aroclor-1232	UG/KG	0	0%	0	4	100	0	42	U	53	U	50	U	45	U
Aroclor-1242	UG/KG	0	0%	0	4	100	0	42	U	53	U	50	U	45	U
Aroclor-1248	UG/KG	0	0%	0	4	100	0	42	U	53	U	50	U	45	U
Aroclor-1254	UG/KG	580	50%	2	4	100	1	42	U	74		50	U	580	J
Aroclor-1260	UG/KG	0	0%	0	4	100	0	42	U	53	U	50	U	45	U
Beta-BHC	UG/KG	0	0%	0	4	36	0	2.2	U	2.7	U	2.6	U	2.3	U
Delta-BHC	UG/KG	0	0%	0	4	40	0	2.2	U	2.7	U	2.6	U	2.3	U
Dieldrin	UG/KG	7.4	25%	1	4	5	1	4.2	U	5.3	U	5	U	7.4	J
Endosulfan I	UG/KG	2.7	50%	2	4	2,400	0	2.2	U	2.7	J	1.3	J	2.3	U
Endosulfan II	UG/KG	0	0%	0	4	2,400	0	4.2	U	5.3	U	5	U	4.5	U
Endosulfan sulfate	UG/KG	0	0%	0	4	2,400	0	4.2	U	5.3	U	5	U	4.5	U
Endrin	UG/KG	0	0%	0	4	14	0	4.2	U	5.3	U	5	U	4.5	U
Endrin aldehyde	UG/KG	3.2	25%	1	4			4.2	U	5.3	U	5	U	3.2	J
Endrin ketone	UG/KG	0	0%	0	4			4.2	U	5.3	U	5	U	4.5	U
Gamma-BHC/Lindane	UG/KG	0	0%	0	4	100	0	2.2	U	2.7	U	2.6	U	2.3	U
Gamma-Chlordane	UG/KG	0	0%	0	4			2.2	U	2.7	U	2.6	U	2.3	U
Heptachlor	UG/KG	0	0%	0	4	42	0	2.2	U	2.7	U	2.6	U	2.3	U
Heptachlor epoxide	UG/KG	0	0%	0	4			2.2	U	2.7	U	2.6	U	2.3	U
Methoxychlor	UG/KG	0	0%	0	4			22	U	27	U	26	U	23	U
Toxaphene	UG/KG	0	0%	0	4			220	U	270	U	260	U	230	U
Inorganics															
Aluminum	MG/KG	35,000	100%	4	4			14,400		35,000		22,300		21,100	

Table A-4
Analytical Results for Sediment Samples at OD Grounds
Feasibility Study - OD Grounds
Seneca Army Depot

Area								SEAD-45	SEAD-45	SEAD-45	SEAD-45
Loc ID								SW/SD45-1	SW/SD45-2	SW/SD45-3	SW/SD45-4
Sample ID								SD45-1	SD45-2	SD45-3	SD45-4
Matrix								SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT
Sample Depth Interval (ft)								0-0.5	0-0.5	0-0.5	0-0.5
Sample Date								11/1/1993	11/1/1993	11/1/1993	11/1/1993
QC Type								SA	SA	SA	SA
Study ID								ESI	ESI	ESI	ESI
Parameter	Unit	Max Detected Value	Frequency of Detects	Num of Detects	Num of Analyses	Action Level	Num of Detects Above Standard	Value Qual	Value Qual	Value Qual	Value Qual
Antimony	MG/KG	0	0%	0	4			10.1 U	13.4 U	11.7 U	7.2 UJ
Arsenic	MG/KG	16.1	100%	4	4	13	1	6.9	4.2	7.3	**16.1**
Barium	MG/KG	308	100%	4	4	350	0	85.4	308	187	176
Beryllium	MG/KG	1.4	100%	4	4	7.2	0	0.62 J	1.4	0.94 J	0.83
Cadmium	MG/KG	25.6	100%	4	4	2.5	3	0.76 J	**14.9**	**5.6**	**25.6 J**
Calcium	MG/KG	84,400	100%	4	4			84,400	21,700	25,100	25,100
Chromium	MG/KG	48.4	100%	4	4	30	3	22.5	**48.4**	**31.4**	**31.8**
Cobalt	MG/KG	19.7	100%	4	4			11.2	19.7	12.9	13.2
Copper	MG/KG	814	100%	4	4	50	4	**63.9**	**814**	**323**	**241**
Cyanide	MG/KG	0	0%	0	4	27	0	0.61 U	0.68 U	0.74 U	0.68 U
Iron	MG/KG	50,500	100%	4	4			25,600	50,500	32,600	33,200
Lead	MG/KG	101	100%	4	4	63	2	19.8	**101**	52.8	**[illegible]**
Magnesium	MG/KG	10,200	100%	4	4			9,720	10,200	7,630	7,510
Manganese	MG/KG	935	100%	4	4	1,600	0	458	692	616	935
Mercury	MG/KG	5.3	100%	4	4	0.18	4	**0.38**	**5.3**	**4.4**	**2.2 J**
Nickel	MG/KG	67.7	100%	4	4	30	4	**40.1**	**67.7**	**41.6**	**44.6**
Potassium	MG/KG	4,680	100%	4	4			2,580	4,680	3,360	2,840
Selenium	MG/KG	0	0%	0	4	3.9	0	0.19 U	0.35 U	0.24 U	0.28 UJ
Silver	MG/KG	5.8	75%	3	4	2	3	1.3 U	**5.8**	**3.1**	**2.5 J**
Sodium	MG/KG	377	100%	4	4			208 J	377 J	146 J	130 J
Thallium	MG/KG	0	0%	0	4			0.21 U	0.38 U	0.26 U	0.31 U
Vanadium	MG/KG	53.7	100%	4	4			23.9	53.7	37.2	32.9
Zinc	MG/KG	755	100%	4	4	109	3	104	**755**	**312**	**329**

Footnote:
1) Chemical result qualifiers are assigned by the laboratory and are evaluated and modified (if necessary) by during data validation.
U = non-detect, i.e. not detected equal to or above this value. J = estimated (detect or non-detect) value.
[blank] = detect, i.e. detected chemical result value.
2) Num of Analyses is the number of detected and non-detected results excluding rejected results.
3) Chemical results greater than the action level are highlighted, bolded and boxed.
4) Criteria action level source document and web address. The NYS SCO Unrestricted Use values were obtained from the NYSDEC Soil Cleanup Objectives.
http://www.dec.ny.gov/regs/15507.html

Table A-5
Comparison of Total Metal in Soil to SPLP Extract Concentrations

Seneca Army Depot

Parameter	Soil Guidance Values: EPA RSL Residential RSL mg/Kg	Soil Guidance Values: NYSDEC Unrestricted SCO mg/Kg	NYSDEC GA GW Effluent ug/L	Number of Exceedances	SEAD-45 S45-0DH-4-01 SOIL S45-0DH-4-01 X Y 3/12/2010 SA mg/Kg Value (Q)	*SEAD-45 S45-0DH-4-01 Leachate S45-0DH-4-01 X Y 3/12/2010 SA* ug/L Value (Q)	SEAD-45 S45-TP-1-02 SOIL S45-TP-1-02 X Y 3/12/2010 SA mg/Kg Value (Q)	*SEAD-45 S45-TP-1-02 Leachate S45-TP-1-02 X Y 3/12/2010 SA* ug/L Value (Q)	SEAD-45 S45-TP-2-04 SOIL S45-TP-2-04 X Y 3/12/2010 SA mg/Kg Value (Q)	SEAD-45 S45-TP-2-04 Leachate S45-TP-2-04 X Y 3/12/2010 SA ug/L Value (Q)
ALUMINUM	7700				15000		14400		16500	
ANTIMONY	3.1		*6*		0.47 U	*ND*	0.63 J	*ND*	0.29 J	*2.6 J*
ARSENIC	0.39	13	*50*		12.6	*7.4 J*	8.7	*1.86 U*	4.8	*16*
BARIUM	1500	350	*2000*		220	*495*	101	*132*	227	*1340*
BERYLLIUM	16	7.2			0.67		0.62		0.73	
CADMIUM	7	2.5	*10*	4	1100	*11*	13.4	*0.6 J*	7.6	*18.9*
CALCIUM					23200		62400		29500	
CHROMIUM	12000	30	*100*		37.8	*38.3*	35	*12.7 J*	26.7	*77.2*
COBALT	2.3				14	*10.5 J*	12.9	*2.3 J*	11.3	*32*
COPPER	310	50	*1000*	2	1780	*909*	7310	*139*	2490	*716*
IRON	5500				118000		60900		25600	
LEAD	40	63	*50*	6	57.2	*78*	22.3	*8.7*	91	*274*
MAGNESIUM					5680		9200		7380	
MANGANESE	180	1600			648		574		407	
MERCURY	2.3	0.18	*1.4*	6	3.1	*12.7 (1)*	4.3	*0.27 (1)*	9.1	*44.2 (1)*
NICKEL	150	30			46.2		54		38.2	
POTASSIUM					2160		2180		2400	
SELENIUM	39	3.9	*20*		1.03 U	*3.67 U*	0.59 U	*3.67 U*	0.4 U	*3.67 U*
SILVER	39	2	*100*		205	*6.2 J*	53.7	*0.75 J*	0.63 J	*3.5 J*
SODIUM					103		151		189	
THALLIUM					0.44 U		0.25 U		0.17 U	
VANADIUM	0.55				24.4	*50*	22.3	*19 J*	26.9	*98*
ZINC	2300	109	*5000 (3)*		1270	*767*	150	*100*	1470	*2770*

Key

0.55	**Exceeds most stringent soil criterion only**
39	**Exceeds most liberal and most stringent soil criterion**
0.7	**Exceeds most stringent groundwater criterion only**
1.4	**Exceeds most liberal and most stringent groundwater criteria**
(1)	**Mercury data may be affected by holding times greater than 28 days.**
(2)	**Based on Federal MCL**
(3)	**NYSDEC Guidance Value, GA Freshwater Aesthetics**

Table A-5
Comparison of Total Metal in Soil to SPLP Extract Concentrations

Seneca Army Depot

Parameter	Soil Guidance Values EPA RSL Residential RSL mg/Kg	Soil Guidance Values NYSDEC Unrestricted SCO mg/Kg	NYSDEC GA GW Effluent ug/L	Number of Exceedances	SEAD-45 S45-R4-01 SOIL S45-R4-01 0 0.2 4/1/2010 SA mg/Kg Value (Q)	SEAD-45 S45-R4-01 Leachate S45-R4-01 0 0.2 4/1/2010 SA ug/L Value (Q)	SEAD-45 S45-RI-02 SOIL S45-RI-02 0 0.2 4/1/2010 SA mg/Kg Value (Q)	SEAD-45 S45-RI-02 Leachate S45-RI-02 0 0.2 4/1/2010 SA ug/L Value (Q)	SEAD-45 S45-R2-02 SOIL S45-R2-02 0 0.2 4/1/2010 SA mg/Kg Value (Q)	SEAD-45 S45-R2-02 Leachate S45-R2-02 0 0.2 4/1/2010 SA ug/L Value (Q)
ALUMINUM	7700				19000		16200		17700	
ANTIMONY	3.1		6		0.18 U	ND	0.64 J	ND	0.62 J	3.7 J
ARSENIC	0.39	13	50		5.7	11.6	5.1	13.6	5.4	18.9
BARIUM	1500	350	2000		140	562	150	777	164	940
BERYLLIUM	16	7.2			0.88		0.72		0.86	
CADMIUM	7	2.5	10	4	1.1 J	4 J	7.7	17.3	9.1	25.3
CALCIUM					12200		25400		20300	
CHROMIUM	12000	30	100		2804	52	27.4	73	27.7	99.9
COBALT	2.3				10.9	11.7 J	12.3	37.5	11.8	29 J
COPPER	310	50	1000	2	82.6	243	794	1444	462	2260
IRON	5500				24000		25200		27600	
LEAD	40	63	50	6	22.5	52	69.2	147	72.3	193
MAGNESIUM					6750		7910		6560	
MANGANESE	180	1600			428		676		618	
MERCURY	2.3	0.18	1.4	6	1.4	12.2	3.5	13.2	3	9.8
NICKEL	150	30			37		39.6		39.8	
POTASSIUM					2970		2450		2920	
SELENIUM	39	3.9	20		0.63 U	3.67 U	0.7 U	3.67 U	0.72 U	3.67 U
SILVER	39	2	100		0.42 J	2 J	3.2	13.6 J	3.6	19.7
SODIUM					79 J		87.7 J		90.9 J	
THALLIUM					0.27 U		0.29 U		0.3 U	
VANADIUM	0.55				33.6	6.8 J	27.3	93	30.9	124
ZINC	2300	109	5000 (3)		160	1030	1350	3100	321	1750

Key

0.55	**Exceeds most stringent soil criterion only**
39	**Exceeds most liberal and most stringent soil criterion**
0.7	**Exceeds most stringent groundwater criterion only**
1.4	**Exceeds most liberal and most stringent groundwater criteria**

(1) **Mercury data may be affected by holding times greater than 28 days.**
(2) **Based on Federal MCL**
(3) **NYSDEC Guidance Value, GA Freshwater Aesthetics**

Table A-5
Comparison of Total Metal in Soil to SPLP Extract Concentrations

Seneca Army Depot

Parameter	Soil Guidance Values: EPA RSL Residential RSL mg/Kg	Soil Guidance Values: NYSDEC Unrestricted SCO mg/Kg	NYSDEC GA GW Effluent ug/L	Number of Exceedances	SEAD-45 S45-R5-05 SOIL S45-R5-05 0.2 0.8 3/16/2010 SA mg/Kg Value	(Q)	SEAD-45 S45-R5-05 Leachate S45-R5-05 0.2 0.8 3/16/2010 SA ug/L Value	(Q)	SEAD-45 S45-R15-01 SOIL S45-R15-01 0.2 0.8 3/16/2010 SA mg/Kg Value	(Q)	SEAD-45 S45-R15-01 Leachate S45-R15-01 0.2 0.8 3/16/2010 SA ug/L Value	(Q)
ALUMINUM	7700				18700				19900			
ANTIMONY	3.1		*6*		0.11	U	*ND*		0.25	U	*ND*	
ARSENIC	0.39	13	*50*		5.2		*9.8*		7.6		*6.8*	*J*
BARIUM	1500	350	*2000*		165		*703*		287		*487*	
BERYLLIUM	16	7.2			0.79				1			
CADMIUM	7	2.5	*10*	4	5.1		*8.7*	*J*	1.8	J	*1.2*	*J*
CALCIUM					29300				3630			
CHROMIUM	12000	30	*100*		26.7		*63.1*		24.6		*53.6*	
COBALT	2.3				10		*16.7*	*J*	26.8		*11.9*	*J*
COPPER	310	50	*1000*	2	219		*654*		22.8		*59.5*	
IRON	5500				25400				35300			
LEAD	40	63	*50*	6	42.9		*71*		22		*29*	
MAGNESIUM					7140				4080			
MANGANESE	180	1600			489				5040			
MERCURY	2.3	0.18	*1.4*	6	1.3		*4.2 (1)*		0.21		*0.34 (1)*	
NICKEL	150	30			33.4				29.8			
POTASSIUM					3220				2780			
SELENIUM	39	3.9	*20*		0.24	U	*3.67*	*U*	0.56	U	*3.67*	*U*
SILVER	39	2	*100*		0.46	J	*3.1*	*J*	0.17	U	*2.1*	*J*
SODIUM					127				87.4	J		
THALLIUM					0.1	U			0.24	U		
VANADIUM	0.55				30.1		*79*		30.7		*78*	
ZINC	2300	109	*5000 (3)*		360		*1290*		101		*243*	

Key

0.55	**Exceeds most stringent soil criterion only**
39	**Exceeds most liberal and most stringent soil criterion**
0.7	**Exceeds most stringent groundwater criterion only**
1.4	**Exceeds most liberal and most stringent groundwater criteria**

(1) **Mercury data may be affected by holding times greater than 28 days.**
(2) **Based on Federal MCL**
(3) **NYSDEC Guidance Value, GA Freshwater Aesthetics**

APPENDIX B

MEC HAZARD ASSESSMENT

MUNITIONS AND EXPLOSIVES OF CONCERN HAZARD ASSESSMENT FOR

OPEN DETONATION GROUNDS

SENECA ARMY DEPOT ACTIVITY
ROMULUS, SENECA COUNTY, NEW YORK

Prepared for:

U.S. Army Engineering and Support Center, Huntsville

and
SENECA ARMY DEPOT ACTIVITY
ROMULUS, NEW YORK

Prepared by:

PARSONS
100 High Street
Boston, MA 02110

Contract Number W912DY-08-D-0003
Task Order No. 0013
EPA Site ID# NY0213820830
NY Site ID# 8-50-006

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B.1 EXECUTIVE SUMMARY

Parsons was tasked by the U.S. Army Corps of Engineers (USACE), Huntsville District, under Contract No. W912DY-08-D-0003, Task Order No. 0013 to prepare a munitions and explosives of concern (MEC) hazard assessment (HA) for the Open Detonation (OD) Grounds, also known as SEAD-45, located at the Seneca Army Depot Activity (SEDA or the Depot) in Romulus, New York. The purpose of this MEC HA is to assess qualitatively the potential explosive hazards to human receptors associated with complete MEC exposure pathways at the OD Grounds munitions response site (MRS). This appendix contains a detailed description of the MEC HA conducted for the OD Grounds, including the information and assumptions used for this assessment.

The MEC HA method was developed by the Technical Working Group for Hazard Assessment, which included representatives from the Department of Defense (DoD), the U.S. Department of the Interior, the United State Environmental Protection Agency (USEPA), and various states and tribes. The method provides an assessment of the acute explosive hazards associated with remaining MEC at an MRS by analyzing site-specific conditions and human issues that affect the likelihood that a MEC accident will occur (Subchapter B.5). Under the MEC HA method, the potential MEC hazards are evaluated qualitatively for each MRS by evaluating site conditions and assigning related "input factors" that generate a total MEC HA score between 125 and 1,000, with the upper limit representing the maximum level of explosive hazard (Subchapters B.7 and B.8).

This MEC HA divides the OD Grounds into two areas for assessment purposes based on differing anticipated explosive hazard characteristics (Subchapter B.6). Previous investigations indicate the density of potential MEC is highest at the center of the OD Grounds, in the vicinity of the OD Hill where the demolition activities took place and areas in the immediate vicinity that received most of the "kick-outs" from those activities. This area is referred to as the "OD Hill area" in this MEC HA. The second assessment area includes areas further away from the OD Hill that received kick-outs, but in lower densities. This second assessment area is referred to as the "Kickout Area" in this MEC HA. The locations of these two assessment areas are shown on Figure 1-2 in the Feasibility Study (FS) Report.

A qualitative baseline evaluation of the potential MEC hazards posed was conducted by reviewing each of the MEC HA input factors for the OD Hill and Kickout areas (Subchapter B.9). Having generated baseline MEC HA scores for each assessment area, different remedial alternatives were further evaluated using the MEC HA method to compare how they might reduce the explosive hazards in each area (Subchapter B.10). The remedial alternatives evaluated were (1) geophysical mapping, intrusive investigation, and installation of an 18-inch thick cap, followed by implementation of land use controls (LUCs) and (2) geophysical mapping, intrusive investigation, excavation, off-site soil disposal, followed by implementation of LUCs. These are referred to here and in the FS as Remedial Alternatives 2 and 3, respectively. Remedial Alternative 1 represents the no action alternative, which is the baseline scenario for this MEC HA.

The results of the MEC HA conducted for both assessment areas are shown in Table B.6 (Subchapter B.9). For the OD Hill area, the baseline score (the no action alternative) results in a MEC HA score of 865. Remedial Alternative 2 (geophysical mapping, intrusive investigation, and installation of an 18-inch thick cap, followed by implementation of LUCs) results in a MEC HA score of 470. Remedial Alternative 3 (geophysical mapping, intrusive investigation, excavation, off-site disposal, and implementation of LUCs) was also evaluated for the OD Hill area, and resulted in a MEC HA score of 470, the same as Alternative 2. The reduction in MEC HA score from 865 to 470 reduces the corresponding Hazard Level rating from 1 ('highest potential explosive hazard conditions') to 4 ('low potential explosive hazard conditions'). Based on these results, there is no significant difference between these remedial alternatives with respect to reduction of explosive hazards at the OD Hill area.

For the Kickout area, the baseline score (the no action alternative) results in a MEC HA score of 715. Remedial Alternatives 2 and 3 both result in a MEC HA score of 445. This reduction in MEC HA score reduces the corresponding Hazard Level rating from 3 ('moderate potential explosive hazard conditions') to 4 ('low potential explosive hazard conditions'). Based on these results, there is no significant difference between these remedial alternatives with respect to reduction of explosive hazards at the Kickout area.

The remaining sections of this appendix provide information on the site history, current and future land use, the MEC HA input and output factors, the details of the baseline MEC HA evaluation, the remedial action alternatives, and the adjusted MEC HA scores resulting from the implementation of these remedial action alternatives.

B.2 SITE HISTORY AND PREVIOUS DISCOVERIES

Since its inception in 1941, SEDA's military mission included receipt, storage, distribution, maintenance, and demilitarization of conventional ammunition, explosives, and special weapons.

The OD Grounds located in the northwestern corner of the Depot and is designated as SEAD-45. The site is largely meadow with some wooded and heavily brushed areas. Reeder Creek runs through the OD Grounds. Access is possible via a paved road that enters the area from the southeast and roughly parallels the path of Reeder Creek along its western bank. The unnamed access road branches off North-South Baseline Road near Building 2104, which is located in the southeastern corner of the OD Grounds.

The OD Grounds were used to destroy munitions resulting from SEDA's military mission. Operations at the OD Grounds began circa 1941 when the Depot was first constructed and continued at regular intervals until circa 2000 when the military mission of the Depot ceased. Detonations were conducted on an approximately 30-foot high man-made hill constructed to buffer the intensity of planned detonations (the 'OD Hill'). Detonations occurred intermittently since the Depot closed as part of continuing munitions response activities being performed at the Depot. During operations, off specification munitions were placed in an excavated opening in the side of the OD Hill with additional demolition material, covered with a minimum of 8 feet of soil, and detonated remotely. After demolition was completed, explosively displaced portions of the mound were reconstructed by moving displaced and native soils back into the central earthen mound.

These historic operations resulted in MEC, material potentially presenting an explosive hazard (MPPEH), and munitions debris (MD) being expelled ("kicked out") from the OD Hill to the surrounding area. Investigations indicate the highest MPPEH densities are in the vicinity of the OD Hill, which is to be expected as this area contains both the former detonation location and the areas that would have received most "kick outs". Densities of "kick-outs" from the demolition operations decrease moving away from the demolition operations.

B.3 MEC POTENTIALLY PRESENT ONSITE

Several characterization efforts and investigations for MPPEH have been conducted at the OD Grounds and are summarized in the FS document. Based on historical data, previous investigations and removal actions, the MPPEH present at the site is summarized in Subchapter B.5.

B.4 CURRENT AND FUTURE LAND USE

The OD Grounds are currently closed. The planned future use for the area that encompasses the OD Grounds is projected to be a "Conservation/Recreation Area". For the remedial alternatives considered in this MEC HA, it is assumed LUCs will be implemented that will restrict the area to non-intrusive recreational activities such as hiking, with no camping allowed. The LUCs will also restrict access to groundwater, prohibit digging or any intrusive activities, and prohibit the use of the site for residential or day care uses.

B.5 EXPLOSIVE HAZARDS AND HAZARD ASSESSMENT

An explosive hazard exists at a site if there is a potentially complete MEC exposure pathway. A complete MEC exposure pathway is present any time a receptor can come near or into contact with MEC and interact with the item in a manner that might result in its detonation. There are three elements of a complete MEC exposure pathway: (1) a source of MEC, (2) a receptor, and (3) the potential for interaction between the MEC source and the receptor. All three of these elements must be present for a potentially complete MEC exposure pathway to exist.

Based on the findings of previous investigations, MPPEH remains or has the potential to remain within the OD Grounds area. Known or suspected munitions include the Mortar 81mm HE; Projectile 75mm HE, Projectile, 57 mm HE, Rocket,3.5 inch HEAT, Bomb 4lb Frag (Butterfly), Grenade 40mm HE, projectile 37mm HE, Projectile 75mm HEAT, Grenade Rifle Antitank, Fuze Bomb Nose, Fuze Tail, Projectile 20mm HEI, Grenade Hand Fragmentation, Fuze, Point Detonating, Fuze Base Detonating, Flare Trip Parachute, Grenade Hand Riot, Signal, Illuminating, Ground, Parachute, Projectile 40mm Practice, Rocket Sub-Caliber and Mortar 60mm Illumination.

The qualitative hazard assessment technique presented here follows the MEC HA method, which provides an assessment of the acute explosive hazards associated with remaining MEC at a MRS by analyzing site-specific conditions and human issues that affect the likelihood that a MEC accident will occur. The MEC HA method focuses on hazards to human receptors and does not directly address environmental or ecological concerns that might be associated with MEC. The process for conducting the MEC HA is described in the MEC HA interim guidance document (USEPA, 2008) and uses input data based on historical documentation, field observations, and the results of previous studies and removal actions. The MEC HA interim guidance was developed by the Technical Working Group for Hazard Assessment, which included representatives from the DoD, the U.S. Department of the Interior, the USEPA, and various states and tribes. The DoD has encouraged use of this method on a trial basis (DoD 2009).

The MEC HA method reflects the basic difference between assessing acute hazards from exposure to MEC and assessing chronic environmental risks from exposure to potential contaminants, such as munitions constituents (MC). An explosive hazard can result in immediate injury or death; therefore, risks from explosive hazards are evaluated either as being present or not present. If the potential for an encounter with MEC exists, then the potential that the encounter may result in injury or death also exists. This MEC HA was conducted to evaluate the baseline conditions for the site with regard to explosive hazards. These baseline evaluations provide the basis for the evaluation and implementation of effective management response alternatives in a FS for this property. The MEC HA also supports hazard communication among stakeholders by organizing site information in a consistent manner for the hazard management decision-making process. However, the MEC HA does not provide a quantitative assessment of MEC hazards and is not used to determine whether or not further action is necessary at a site.

B.6 DEFINING THE AREAS TO BE ASSESSED

A MEC HA is focused on each MRS at a site. However, the MEC-related characteristics of discrete areas within an MRS may differ with regard to the ordnance types and quantities, land uses, receptors, and other factors. If these factors vary significantly, the qualitative MEC hazards associated with the discrete areas are likely to differ. For example, the characteristics of a range impact area and its safety fan are likely to differ with regard to the amount of MEC potentially present or different land use activities may exist that create differing potentials for MEC interaction with human receptors within a large maneuver area.

Different MEC hazards may result in different response alternatives being appropriate for these discrete areas; consequently, an MRS may be subdivided into two or more distinct "assessment areas," each of which will be the subject of a separate MEC HA for purposes of hazard assessment and subsequent response alternative evaluation. However, if an MRS is likely to be the subject of only one response alternative (e.g., the MRS is small), the MRS may be evaluated as a single assessment area, despite the potential for differing MEC-related characteristics. In this event, the most conservative MEC HA input factors (see below) are selected for purposes of the MEC HA.

Based on the history of the site and the results of previous investigations, the area at and in the immediate vicinity of the OD Hill (within 1,000 feet), where demolition activities were previously conducted, are known to exhibit higher densities of MPPEH than the surrounding areas (e.g, the Kickout area). Due to these differing MEC-related characteristics, the OD Grounds is divided into two areas for assessment purposes: the OD Hill area and the Kickout area.

The OD Hill area, includes the OD Hill where detonations occurred, and the area in the immediate vicinity (within 1,000 feet) that received most of the kick-outs from those detonations. The Kickout area (more than 1,000 feet from the OD Hill) received lower quantities of kick-outs and therefore has a lower potential for MPPEH to be present. Separate MEC HA scores are calculated for each of these assessment areas. The two areas are shown on Figure 1-2 of the FS Report.

B.7 OVERVIEW OF MEC HA INPUT FACTORS

Under the MEC HA method, the potential MEC hazards are evaluated qualitatively for each MRS or assessment area by evaluating three primary factors. These primary factors are related to the three critical elements noted previously are:

- *Severity*: the potential consequences of the effect on a human receptor should a MEC item detonate;
- *Accessibility*: the likelihood that a human receptor will come into contact with a MEC item; and
- *Sensitivity*: the likelihood that a MEC item will detonate if a human receptor interacts with the item.

To complete the baseline MEC HA for each MRS/assessment area, the input factors are reviewed and suitable categories (baseline, surface MEC cleanup, or subsurface MEC cleanup) are selected based on historical documentation and field observations. The input factors for the MEC HA method are highlighted below (USEPA, 2008):

Energetic Material Type: This factor describes the general type of energetic material associated with the munition(s) known or suspected to be present within the MRS or assessment area. The six possible categories for this factor, ranging from the most to least potentially hazardous, are 'high explosives and low explosive fillers in fragmenting rounds,' 'white phosphorus (WP),' 'pyrotechnics,' 'propellants,' 'spotting charges,' and 'incendiaries.' The category selected for each MRS or assessment area is based on the energetic material with the greatest potential explosive hazard known or suspected to be present.

Location of Additional Human Receptors: Human receptors other than the individual who causes a detonation may be exposed to overpressure and/or fragmentation hazards from the detonation of MEC. This factor describes whether or not there are additional human receptors located within the MRS/assessment area or within the explosive safety quantity-distance (ESQD) arc surrounding the MRS/assessment area. The two possible categories for this factor are "inside the MRS or inside the ESQD arc surrounding the MRS" and "outside the ESQD arc."

Site Accessibility: The site accessibility factor describes how easily human receptors can gain access to the MRS or assessment area and takes into account the various barriers to entry that might be present. The four possible categories of site accessibility range from "full accessibility" (i.e., a site with no barriers to entry) to "very limited accessibility" (i.e., a site with guarded chain link fences or terrain that requires special skills and equipment to access). This factor differs from the Potential Contact Hours factor (see below) and does not include or account for LUCs that might restrict site access. The effects of LUCs are assessed in the FS alternatives assessment.

Potential Contact Hours: This factor accounts for the amount of time receptors spend within the MRS or assessment area during which they might come into contact with MEC and intentionally or unintentionally cause a detonation. Both the number of receptors and the amount of time each receptor spends in the MRS/assessment area are used to calculate the total "receptor-hours/year." This total is calculated for all activities that might result in potential MEC interaction and there are four possible categories, ranging from "many hours" (1,000,000 receptor-hours/year) to "very few hours" (< 10,000 receptor-hours/year).

Amount of MEC: This input factor describes the relative quantity of MEC anticipated to remain within the MRS or assessment area as a result of past munitions-related activities. For example, a greater quantity of MEC would be expected to be present in a former target area than at a former firing point. The nine possible categories for this factor, from the largest to the least anticipated amount of MEC, range from "target area" and "Open Burning/Open Detonation (OB/OD) area," through "burial pit" and "firing point," to "storage" and "explosives-related industrial facility."

Minimum MEC Depth Relative to the Maximum Receptor Intrusive Depth: This factor indicates whether the MEC in the MRS or assessment area are located at depths that might be reached by the anticipated human receptor activities. For the baseline MEC HA, the four possible categories concern whether or not MEC are located at the surface and in the subsurface within the MRS or assessment area, or whether MEC are present in the subsurface only, and whether or not the receptor intrusive depth overlaps with this MEC location.

Migration Potential: The migration potential factor addresses the likelihood that MEC in the MRS or assessment area might migrate by natural processes (e.g., erosion or frost heave) thereby increasing the chance of subsequent exposure to potential human receptors. The two possible categories for this factor are "possible" and "unlikely."

MEC Classification: This factor accounts for how easily a human receptor might cause a detonation of the MEC and relates directly to the MEC sensitivity. The six possible categories for this factor, ranging from the highest to lowest sensitivity (and explosive hazard) are "sensitive unexploded ordnance (UXO)," "other UXO," fuzed sensitive discarded military munitions (DMM)," "fuzed DMM," "unfuzed DMM," and "bulk explosives." The selection of category for each MRS or assessment area is made using the MEC with the highest potential sensitivity known or suspected to be present and, where uncertainty exists, conservative assumptions are made and documented. For example, UXO is always assumed to be present within a known target area, whether or not the investigation uncovers UXO at the site.

MEC Size: This factor indicates how easy it is for a typical human receptor to move the MEC item(s) present within the MRS or assessment area. For example, an individual is considerably more likely to pick up or accidentally kick a hand grenade than a 200-lb. bomb. The basic assumption used in this category is that MEC weighing 90-lbs or more is unlikely to be moved without the use of special equipment. Based on this assumption, the two possible categories for this factor are "small" (i.e., items weighing less than 90-lbs.) and "large" (items weighing 90-lbs. or more). The selection of category for each MRS or assessment area is based on the MEC known or suspected to be present with the highest potential to be moved (i.e., the smallest item).

Each category for each of the MEC HA input factors has an assigned score that relates to the relative contributions of the different input factors to the overall MEC hazard. These scores were developed by the Technical Working Group for HA. These factors and their associated scores for the baseline condition and after cleanup conditions are provided in Table B.1a. The detailed technical basis for the scores assigned is provided in the MEC HA interim guidance document (USEPA, 2008).

Table B.1a
Summary of MEC HA Input Factors and Associated Baseline Scores

Input Factor	Input Factor Category	Baseline Score	Score After Subsurface Cleanup
Energetic Material Type	HE and Low Explosive Fillers in Fragmenting Rounds	100	100
	White Phosphorus	70	70
	Pyrotechnic	60	60
	Propellant	50	50
	Spotting Charge	40	40
	Incendiary	30	30
Location of Additional Human Receptors	Inside the MRS or inside the ESQD arc surrounding the MRS	30	30
	Outside of the ESQD arc	0	0
Site Accessibility	Full Accessibility	80	80
	Moderate Accessibility	55	55
	Limited Accessibility	15	15
	Very Limited Accessibility	5	5
Potential Contact Hours	Many Hours	120	30
	Some Hours	70	20
	Few Hours	40	10
	Very Few Hours	15	5
Amount of MEC	Target Area	180	30
	Open Burning/Open Detonation (OB/OD) Area	180	30
	Function Test Range	165	25
	Burial Pit	140	10
	Maneuver Areas	115	5
	Firing Points	75	5
	Safety Buffer Areas	30	5
	Storage	25	5
	Explosive-Related Industrial Facility	10	5

Table B.1a, cont'd.
Summary of MEC HA Input Factors and Associated Baseline Scores

Input Factor	Input Factor Category	Baseline Score	Score After Subsurface Cleanup
Minimum MEC Depth vs. Maximum Intrusive Depth	**Baseline Condition**: MEC located on surface and in subsurface; **After Cleanup**: intrusive depth overlaps with minimum MEC depth	240	95
	Baseline Condition: MEC located on surface and in subsurface; **After Cleanup**: intrusive depth *does not* overlap with minimum MEC depth	240	25
	Baseline Condition: MEC located only in subsurface; **Baseline Condition or After Cleanup**: intrusive depth overlaps with minimum MEC depth	150	95
	Baseline Condition: MEC located only in subsurface; **Baseline Condition or After Cleanup**: intrusive depth *does not* overlap with minimum MEC depth	50	25
Migration Potential	Possible	30	10
	Unlikely	10	10
MEC Classification	Sensitive UXO	180	180
	UXO	110	110
	Fuzed Sensitive DMM	105	105
	Fuzed DMM	55	55
	Unfuzed DMM	45	45
	Bulk Explosives	45	45
MEC Size	Small	40	40
	Large	0	0

Source: MEC HA interim guidance document (USEPA, 2008)

NOTE: Alternative 2 (geophysical mapping, intrusive investigation, installation of cap, followed by implementation of LUCs), is equivalent to a subsurface clearance for MEC HA purposes.

Scores for the categories are in multiples of five, with a total maximum possible score for all factors of 1,000 and a minimum possible score of 125. These MEC HA scores are *qualitative references only* and should not be interpreted as quantitative measures of explosive hazard. A summary of the maximum possible scores and their related weights with regard to the overall MEC HA score are shown in Table B.1b.

Table B.1b
Summary of MEC HA Scoring

Explosive Hazard Component	Input Factor	Maximum Scores	Weights
Severity	Energetic Material Type	100	10%
	Location of Additional Human Receptors	30	3%
	Component Total	*130*	*13%*
Accessibility	Site Accessibility	80	8%
	Total Contact Hours	120	12%
	Amount of MEC	180	18%
	Minimum MEC Depth vs. Maximum Intrusive Depth	240	24%
	Migration Potential	30	3%
	Component Total	*650*	*65%*
Sensitivity	MEC Classification	180	18%
	MEC Size	40	4%
	Component Total	*220*	*22%*
	Maximum Total Score	**1,000**	**100%**

Source: MEC HA interim guidance document (USEPA, 2008)

B.8 OVERVIEW OF MEC HA OUTPUT FACTORS

Once the categories and scores for all input factors are defined for each MRS or assessment area at the site, the related scores for each category are totaled to calculate an overall MEC HA score for each MRS/assessment area. The total maximum possible MEC HA score for an MRS/assessment area ranges from 125 - 1,000. The MEC HA method identified the associated hazard levels for these scores, which range from 1 to 4. A Hazard Level of 1 indicates the highest potential explosive hazard conditions and a hazard level of 4 indicates low potential explosive hazard conditions. The basis for these hazard levels is detailed in the MEC HA interim guidance document (USEPA, 2008). The total MEC HA scores and associated hazard levels are *qualitative references only* and should not be interpreted as quantitative measures of explosive hazard or as the sole basis for determining whether or not further action is necessary at a site. A summary of the hazard levels and their related MEC HA scores is presented in Table B.2.

Table B.2
Hazard Level Scoring Rankings Table

Hazard Level	Maximum MEC HA Score	Minimum MEC HA Score	Associated Relative Explosive Hazard
1	1,000	840	Highest potential explosive hazard conditions
2	835	725	High potential explosive hazard conditions
3	720	530	Moderate potential explosive hazard conditions
4	525	125	Low potential explosive hazard conditions

Source: MEC HA interim guidance document (USEPA, 2008).

B.9 BASELINE MEC HAZARD EVALUATION

A qualitative baseline evaluation of the potential MEC hazards posed was conducted by reviewing each of the MEC HA input factors described above for the two assessment areas, the OD Hill and Kickout areas. Historical and field investigation data were used to determine the appropriate categories for each MEC HA input factor (see Subchapter B.7).

Based on the site history and previous investigations, the OD Grounds was the location of an area used to destroy munitions by detonation in support of the Army mission. The site is currently closed, although hunting is performed. Numerous MPPEH items including mortars, large or medium caliber projectiles, rockets, bombs, grenades, and fuzes have been removed from this site, some of which were configured with explosives, explosive bursters, and/or fuzes. All of the MPPEH items found were described as UXO based on the terminology used during the time of the investigation. No items were classified as DMM.

Assessment Area Definition: The assessment areas that are the subject of the MEC HA for the OD Grounds are the OD Hill and Kickout areas. The primary differences between these two assessment areas are the potential amount of MEC and contact hours in each one; most other site characteristics are identical for each assessment area.

Energetic Material Type: The MEC items known or suspected to be present within the OD Grounds include mortars, large or medium caliber projectiles, rockets, bombs, grenades, and fuzes. Items with various fillers have been found, and some of these items contain high explosives or are fragmenting rounds. The energetic material type selected for both assessment areas is determined to be 'high explosives and low explosive filler in fragmenting rounds', which is the most potentially hazardous of the available selections.

Location of Additional Human Receptors: The MEC item anticipated to be present within the OD Grounds that is considered to be the most hazardous, based on Hazardous Fragment Distance (HFD), is the Mortar, 81mm, HE, M374. For this item, the HFD is 239 feet. On this basis, the ESQD used for this MEC HA is 239 feet for both the OD Hill and Kickout areas. Although receptors are present in both assessment areas, there are no locations within the ESQD of either assessment area where people will congregate. Based on this information, the location of additional human receptors for the OD Hill and Kickout assessment areas is assessed to be 'outside the ESQD arc.'

Site Accessibility: The Current Site Conditions for both assessment areas assumes that no fence is present to limit access. Based on this information, both the OD Hill and Kickout assessment areas are classified as having 'full accessibility' under the Current Site Conditions scenario.

Potential Contact Hours: As described above, the Current Site Conditions for the OD Grounds MRS assumes the site is located at a closed military installation, and the OD Grounds are closed. Hunting is performed in the area. The deer hunting season begins approximately mid November and ends the second week of December.

- Under this scenario for both the OD Hill and the Kickout area, 10 hunters are assumed to hunt in the area, with each spending an average of 12 hours per day, 16 days per year, for a total of 192 hours per year per receptor. Based on this information, the total potential contact hours for the assessment area are calculated to be 1,920 receptor-hours/year, which corresponds to a classification of 'very few hours' (less than 10,000 receptor-hours/year) for the OD Hill assessment area.

Amount of MEC: The potential for MEC presence varies within the OD Grounds MRS.

- In the OD Hill assessment area, the primary cause of MPPEH presence is munitions disposal by open detonation. For this reason, a classification of 'OB/OD Area' is considered appropriate for purposes of this MEC HA.
- In the Kickout assessment area, which is outside the former OD area and is not where disposal activities were actually conducted, the presence of MPPEH is the result of potential kick-outs only. For this reason, a MEC HA classification of "Safety Buffer Area" is considered appropriate for purposes of this MEC HA.

Minimum MEC Depth Relative to the Maximum Receptor Intrusive Depth: At the OD Grounds MRS, MPPEH has been found on the ground surface and to depths of 36 inches bgs. There are currently no intrusive activities performed in this area so the maximum receptor intrusive depth at the site is assumed to be 0 inches. Based on this information, for the OD Hill and the Kickout areas, the minimum MEC depth relative to the maximum receptor intrusive depth for the assessment area is assessed to be 'MEC located surface and subsurface – intrusive depth overlaps with minimum MEC depth'.

Migration Potential: The site conditions at the OD Grounds are currently largely meadow with some wooded and, heavily brushed areas.

- The slopes of the OD Hill assessment area are steep (up to 2:1 ft/ft the eastern side of the hill), and therefore surface erosion that might result in the exposure of buried MEC is likely. Also, temperatures of freezing or below occur regularly each winter and the frost line extends down to approximately 3 ft, which is greater than the minimum MEC depth at the site (see above). Therefore, is possible that both erosion and frost heave might result in the exposure of buried MPPEH and the migration potential is evaluated as 'possible' for this assessment area.
- Within the Kickout assessment area, slopes are milder and not a concern, but freezing temperatures are present each winter. Therefore, it is possible that frost heave might result in the exposure of buried MPPEH and the migration potential is evaluated as 'possible' for this assessment area.

MEC Classification: As described previously, the MPPEH items known or suspected to be present at the OD Grounds MRS include mortars, large or medium caliber projectiles, rockets, bombs, grenades, and fuzes. Some of these items also contain high explosive anti-tank (HEAT) fillers. Mortars, hand grenades, and HEAT munitions are all classified as 'special case' items in the MEC HA guidance. Because UXO items have been found in both assessment areas during prior investigations and because MEC found would be the result of munitions disposal, it is assumed that UXO might be present. Therefore, according to the criteria listed in the MEC HA method, the MEC classification for MPPEH items that might remain at the site is 'Sensitive UXO.'

MEC Size: The MEC items known or suspected to be present within both assessment areas of the OD Grounds MRS include mortars, large or medium caliber projectiles, rockets, bombs, grenades, and fuzes. Based on the criteria defined in the MEC HA method, because many of the munitions known or suspected to be present weigh less than 90 pounds, the MEC size for the site is classified as having the highest potential to be moved or 'small' for purposes of this MEC HA.

MEC HA Baseline Results: The two assessment areas within the OD Grounds MRS, were evaluated separately. The primary differences between the two evaluations were the "Amount of MEC" and "Potential Contact Hours" classifications. The OD Hill assessment area was classified as an "OB/OD Area", while the Kickout assessment area was classified as a "Safety Buffer Area." Total receptor contact hours differed between the two assessment areas, though the classification for both areas was "very few hours." The resulting MEC HA scores are summarized below:

- The OD Hill assessment area has a total MEC HA score of 865 under the current site conditions, which equates to a Hazard Level of 1 (Table B.3). This hazard level indicates an area with 'Highest potential explosive hazard conditions' (USEPA, 2008).
- The Kickout assessment area has a total MEC HA score of 715 under the current site conditions, which equates to a Hazard Level of 3 (Table B.3). This hazard level indicates an area with 'moderate potential explosive hazard conditions' (USEPA, 2008).

This information provides the baseline for the assessment of response alternatives presented in Subchapter B.10.

Note that the total MEC HA score and the associated hazard level are *qualitative references only* and should not be interpreted as quantitative measures of explosive hazard. Also, this MEC HA does not address or otherwise evaluate potential risks related to munitions constituents posed by that might be present at the site.

Table B.3
Summary of MEC HA Baseline Scores
OD Hill and Kickout Assessment Areas
Current Site Conditions

Explosive Hazard Component	Input Factors	Category Selected for MRS/Area	Score (1), (2) (*Max. Score*)	
			OD Hill	**Kickout**
Severity	Energetic Material Type	High explosives and low explosive filler in fragmenting rounds	100 (*100*)	100 (*100*)
	Location of Additional Human Receptors	Outside of the ESQD arc	0 (*30*)	0 (*30*)
Accessibility	Site Accessibility	Full accessibility	80 (*80*)	80 (*80*)
	Total Contact Hours	Very few hours	15 (*120*)	15 (*120*)
	Amount of MEC	OB/OD Area (180) Safety Buffer Area (30)	180 (*180*)	30 (*180*)
	Minimum MEC Depth vs. Maximum Intrusive Depth	MEC located in surface and subsurface; max. intrusive depth overlaps min. MEC depth	240 (*240*)	240 (*240*)
	Migration Potential	Possible	30 (*30*)	30 (*30*)
Sensitivity	MEC Classification	Sensitive UXO	180 (*180*)	180 (*180*)
	MEC Size	Small	40 (*40*)	40 (*40*)
Total MEC HA Score (2)			**865 (*1,000*)**	**715 (*1,000*)**
MEC HA Hazard Level			**1(3)**	**3(4)**

(1) Scores assigned for each factor as listed and described in MEC HA interim guidance document (USEPA, 2008). The maximum possible MEC HA score is listed in parentheses beneath the assigned score(s) for reference purposes.

(2) The scores for the input factors are based on the baseline condition.

(3) A MEC HA Hazard Level of 1 indicates an area with "Highest potential explosive hazard conditions".

(4) A MEC HA Hazard Level of 3 indicates an area with "Moderate potential explosive hazard conditions".

B.10 EVALUATION OF POTENTIAL REMEDIAL ACTIONS

In addition to providing a technique to evaluate baseline MEC hazards, the MEC HA method also establishes a process to evaluate qualitatively the hazard mitigation that would be achieved by remedial actions. This process is based on assumptions made regarding the effects of a given remedial response (e.g., LUCs, surface cleanup, subsurface cleanup), coupled with modified scores for MEC HA input factors, to evaluate how the MEC HA score might be reduced following implementation of the response. The primary purpose of this process is to support the evaluation of response alternatives conducted during an FS; i.e., this evaluation should not be used as the sole basis upon which to recommend a remedial response. As with the baseline score, these total MEC HA scores and the associated hazard levels are *qualitative references only* and should not be interpreted as quantitative measures of explosive hazard.

Two potential remedial scenarios are evaluated in this document: The first scenario is presented as Alternative 2; the second as Alternative 3. Future land use under both scenarios would be assumed to be non-intrusive recreational land use (e.g., hiking, no camping). A brief description of each of these potential remedial alternative scenarios is provided in the following subchapters, together with the associated modifications to the MEC HA score.

The first remedial alternative considered (Alternative 2) would include geophysical mapping, intrusive investigation, the installation of an 18-inch cap compliant with New York State Department of Environmental Conservation (NYSDEC) Solid Waste Regulations for leaving waste in place, implementation of LUCs, and long term monitoring and maintenance. The net effect of installing the cap is considered equivalent to a subsurface MEC clearance to a depth of 18 inches. Under this scenario, activities at the property would be change to non-intrusive conservation/recreational use (hiking, no camping), monitoring and maintenance of the cap, and LUCs.

The second remedial alternative (Alternative 3) considered would be geophysical mapping, intrusive investigation, excavation, off-site disposal, and implementation of LUCs. Under this scenario, activities at the property would change to conservation/recreational use (hiking, no camping).

Both remedial alternatives considered in this MEC HA reflect a scenario under which the property is remediated and can revert to restricted public use. Under both alternatives, the LUCs would prohibit intrusive activities, prohibit use or access of groundwater, and prohibit any future land use other than non-intrusive recreation (e.g., no residential or day care use).

B.10.1 OD Hill Area

Both scenarios were considered for the OD Hill Assessment Area. Using the above assumptions, these scenarios modify the input assumptions for the assessment area with regard to *potential contact hours, amount of MEC, minimum MEC depth vs. maximum intrusive depth, and migration potential.* All other input assumptions and related MEC HA scores are unchanged. In accordance with USEPA (2008) guidance, the scores assigned for these categories under the baseline condition are reduced to reflect subsurface MEC clearance to either 18 inches (Remedial Alternative 2) or 36 inches (Remedial Alternative 3). Therefore, in both scenarios, after cleanup, activities do not overlap with MEC location.

Consequently, human receptors are no longer as likely to come into contact with MEC in the assessment area. The modified assumptions and their affect on the associated MEC HA input factors are described below. The effect of both scenarios is the same on MEC HA scoring and both scenarios are addressed together in the following sections.

MRS Definition: Unchanged from baseline evaluation.

Energetic Material Type: Unchanged from baseline evaluation.

Location of Additional Human Receptors: Unchanged from baseline evaluation.

Site Accessibility: Unchanged from baseline evaluation.

Potential Contact Hours: As described above, the future land use scenario considered for the OD Hill once a remedial response has been implemented assumes the future use of conservation/recreation, which includes hiking but no camping. Though it is not anticipated that the OD Grounds will become a hiking destination, for the purposes of this evaluation, this MEC HA conservatively assumes that 2,000 people visit the area each year and each person is assumed to spend an average of 4 hours on the site, for a total of 8,000 hours per year. No intrusive activities are permitted or expected to occur. Based on this information, the total potential contact hours for the assessment area under the future scenario are calculated to be 8,000 receptor-hours/year. This value corresponds to a classification of 'very few hours' (less than 10,000 receptor-hours/year). Even though the potential contact hours classification does not change, the MEC HA score is reduced from *15* to *5* for this input factor, because the remedial action (surface clearance and placement of the cap) is equivalent to a subsurface MEC clearance of 18 inches (USEPA, 2008).

Amount of MEC: The potential MEC presence at the OD Hill assessment area is the result of open detonation; therefore, the classification of 'OB/OD Area' is selected. However, the MEC HA associated score for this input factor is reduced from *180* to *30* due to the remedial action (surface clearance and the placement of cap) which is equivalent to a subsurface MEC clearance of 18 inches (USEPA, 2008).

Minimum MEC Depth Relative to the Maximum Receptor Intrusive Depth: The maximum receptor intrusive depth at the site is anticipated to be 0 feet with a future land use of non-intrusive conservation/recreation (hiking, no camping) and LUCs that restrict intrusive activity. As a result of the remedial actions, the minimum MEC depth would change to 18 inches (Remedial Alternative 2) and 36 inches (Remedial Alternative 3). The maximum intrusive depth for both scenarios would no longer overlap with the minimum MEC depth. The input parameter would change to 'MEC located only in subsurface – intrusive depth *does not* overlap with minimum MEC depth'. This approach has the result of reducing the score for this input factor from *240* to *25* for both scenarios.

Migration Potential: The selection for this factor ('possible') is unchanged from the baseline evaluation. However, the MEC HA associated score for this input factor is reduced from *30* to *10* for both remedial action scenarios due to the installation of the cap (equivalent to a subsurface clearance) or the excavation (USEPA, 2008).

MEC Classification: Unchanged from baseline evaluation.

MEC Size: Unchanged from baseline evaluation.

MEC HA Results: Accounting for these score modifications resulting from either Remedial Alternative 2 (or Remedial Action 3 and a land use change for both to non-intrusive conservation/recreational (hiking, no camping), the total MEC HA score for the OD Hill assessment area would be reduced from 865 to 470. This reduction in the MEC HA score reduces the corresponding Hazard Level rating from 1 ('highest potential explosive hazard conditions') to 4 ('low potential explosive hazard conditions') for both remedial alternatives. The revised MEC HA scores for both alternatives are shown in Table B.4.

Table B.4
Summary of MEC HA Score
Remedial Alternative 2 and Remedial Alternative 3
OD Hill Assessment Area

Explosive Hazard Component	Input Factors	Category Selected for Area	Score (1)(2) (*Max. Score*) Alt 2 and Alt 3
Severity	Energetic Material Type	High explosives and low explosive filler in fragmenting rounds	100 (*100*)
	Location of Additional Human Receptors	Outside of the ESQD arc	0 (*30*)
Accessibility	Site Accessibility	***Full accessibility***	***80 (80)***
	Total Contact Hours	Very few hours	***5 (120)***
	Amount of MEC	OB/OD Area	***30 (180)***
	Minimum MEC Depth vs. Maximum Intrusive Depth	***MEC located only in subsurface; max. intrusive depth <u>does not</u> overlap with min. MEC depth***	***25 (240)***
	Migration Potential	Possible	***10 (30)***
Sensitivity	MEC Classification	Sensitive UXO	180 (*180*)
	MEC Size	Small	40 (*40*)
Total MEC HA Score			**470 (*1,000*)**
MEC HA Hazard Level			4 (3)

(1) Scores assigned for each factor for Alternative 2 are considered equivalent to an 18 inch subsurface cleanup and are scored under a "subsurface cleanup" scenario as listed and described in USEPA (2008). The maximum possible MEC HA score is listed in parentheses beneath the assigned score(s) for reference purposes.

(2) Categories and/or scores that change from the baseline as a result of the assumed future scenario are shown in ***bold italics***.

(3) A MEC HA Hazard Level of 4 indicates an area with "Low potential explosive hazard conditions" (USEPA, 2008).

B.10.2 Kickout Area

Alternatives 2 and 3 were considered for the Kickout area. Using the above assumptions, this scenario modified the input assumptions for this assessment area with regard to *potential contact hours, amount of MEC, minimum MEC depth vs. maximum intrusive depth, and migration potential.* All other input assumptions and related MEC HA scores are unchanged. In accordance with USEPA (2008) guidance, the scores assigned for these categories under the baseline condition are reduced to reflect subsurface MEC clearance to depth of detection (Remedial Alternative 3). After cleanup, activities do not overlap with MEC location. Consequently, human receptors are no longer as likely to come into contact with MEC in the assessment area. The modified assumptions and their affect on the associated MEC HA input factors are described below.

MRS Definition: Unchanged from baseline evaluation.

Energetic Material Type: Unchanged from baseline evaluation.

Location of Additional Human Receptors: Unchanged from baseline evaluation.

Site Accessibility: Unchanged from baseline evaluation.

Potential Contact Hours: As described above, the future land use scenario considered for the Kickout assessment area after a remedial response has been implemented assumes the future use of conservation/recreation, which includes hiking but no camping. Though it is not anticipated that the OD Grounds will become a hiking destination, for the purposes of this evaluation, this MEC HA conservatively assumes that 2,000 people visit the area each year and each person is assumed to spend an average of 4 hours on the site, for a total of 8,000 hours per year. No intrusive activities are permitted or expected to occur. Based on this information, the total potential contact hours for the assessment area under the future scenario are calculated to be 8,000 receptor-hours/year. This value corresponds to a classification of 'very few hours' (less than 10,000 receptor-hours/year). Even though the potential contact hours classification does not change, the MEC HA score is reduced from *15* to *5* for this input factor, due to the remedial action (subsurface clearance) (USEPA, 2008).

Amount of MEC: The potential MEC presence in the Kickout assessment area is the result of kick-outs from open detonation, but with no actual detonation occurring in the area. Therefore, the MEC HA classification of 'Safety Buffer Area' is selected. However, the MEC HA associated score for this input factor is reduced from *30* to *5* due to the remedial action (subsurface clearance) (USEPA, 2008).

Minimum MEC Depth Relative to the Maximum Receptor Intrusive Depth: The maximum receptor intrusive depth at the site is anticipated to be 0 feet with a future land use of non-intrusive conservation/recreation (hiking, no camping) and LUCs that restrict intrusive activity. As a result of the remedial action (subsurface clearance), the minimum MEC depth would change to 36 inches. The maximum intrusive depth would no longer overlap with the minimum MEC depth. The input parameter would change to 'MEC located only in subsurface – intrusive depth *does not* overlap with minimum MEC depth'. This approach has the result of reducing the score for this input factor from *240* to *25*.

Migration Potential: The selection for this factor ('possible') is unchanged from the baseline evaluation. However, the MEC HA associated score for this input factor is reduced from *30* to *10* due to the subsurface clearance (USEPA, 2008).

MEC Classification: Unchanged from baseline evaluation.

MEC Size: Unchanged from baseline evaluation.

MEC HA Results: Accounting for these score modifications resulting from Remedial Alternative 2 or Remedial Alternative 3 , the total MEC HA score for the Kickout assessment area would be reduced from 715 to 445 under both remedial alternatives. This reduction in MEC HA score reduces the corresponding Hazard Level rating from 3 ('moderate potential explosive hazard conditions') to 4 ('low potential explosive hazard conditions'). The revised MEC HA scores for the Kickout assessment area are shown in Table B.5.

Table B.5
Summary of MEC HA Score
Remedial Alternative 2 and Remedial Alternative 3
Kickout Assessment Area

Explosive Hazard Component	Input Factors	Category Selected for Area	Score (1)(2) (*Max. Score*) Alt 2 and Alt 3
Severity	Energetic Material Type	High explosives and low explosive filler in fragmenting rounds	100 (100)
	Location of Additional Human Receptors	Outside of the ESQD arc	0 (30)
Accessibility	Site Accessibility	***Full accessibility***	***80 (80)***
	Total Contact Hours	Very few hours	***5 (120)***
	Amount of MEC	Safety Buffer Area	***5 (180)***
	Minimum MEC Depth vs. Maximum Intrusive Depth	***MEC located only in subsurface; max. intrusive depth does not overlap with min. MEC depth***	***25 (240)***
	Migration Potential	Possible	***10 (30)***
Sensitivity	MEC Classification	Sensitive UXO	180 (180)
	MEC Size	Small	40 (40)
Total MEC HA Score			**445 (1,000)**
MEC HA Hazard Level			4 (3)

(1) Scores assigned for each factor are scored under a "subsurface cleanup" scenario as listed and described in USEPA (2008). The maximum possible MEC HA score is listed in parentheses beneath the assigned score(s) for reference purposes.

(2) Categories and/or scores that change from the baseline as a result of the assumed future scenario are shown in bold italics.

(3) A MEC HA Hazard Level of 4 indicates an area with "Low potential explosive hazard conditions" (USEPA, 2008).

B.11 DISCUSSION OF RESULTS

A summary of the results of the MEC HAs conducted for the baseline and possible future remedial alternatives at the OD Grounds is presented in Table B.6. For the OD Hill area, the baseline score (the no action alternative) results in a MEC HA score of 865 and a Hazard Level of 1 ('highest potential explosive hazard conditions'). As shown in the table, Remedial Alternative 2 and Remedial Alternative 3, both result in the same MEC HA score of 470 for the OD Hill assessment area. Based on this result, both remedial alternative scenarios, if implemented, would significantly reduce the MEC hazards at the site (from 'highest potential explosive hazard conditions' to 'low potential explosive hazard conditions'). There would be no differences between these remedial alternatives with regard to reduction explosive hazards at the OD Hill area. The revised MEC HA scores for both alternatives are shown in Table B.6.

For the Kickout area, the baseline score (the no action alternative) results in a MEC HA score of 715 and a Hazard Level of 3 ('moderate potential explosive hazard conditions'). Remedial Alternative 2 and 3 both result in the same MEC HA score of 445. Based on this result, the remedial action scenario, if implemented, would reduce the MEC hazards at the site (from 'moderate potential explosive hazard conditions' to 'low potential explosive hazard conditions'). The revised MEC HA score for this alternative is shown in Table B.6.

Based on these results, there is no significant difference between these remedial alternatives with respect to reduction of explosive hazards at the OD Hill area. As has been noted before, these total MEC HA scores and the associated hazard levels are *qualitative references only* and should not be interpreted as quantitative measures of explosive hazard, nor should the results of this evaluation be used as the sole basis on which to recommend a remedial response. Also, this MEC HA does not address or otherwise evaluate potential risks related to MC that might be present at the site.

Table B.6
Summary of MEC HA Results for All Evaluated Scenarios and Assessment Areas
OD Grounds

Scenario Description	**Energetic Material Type**	**Location of Additional Human Receptors**	**Site Accessibility**	**Total Contact Hours**	**Amount of MEC**	**Minimum MEC Depth vs. Maximum Intrusive Depth**	**Migration Potential**	**MEC Classification**	**MEC Size**	**Total MEC HA Score** *(125-1,000)*	**MEC HA Hazard Level** *(1-4)*
Maximum MEC HA Score	*100*	*30*	*80*	*120*	*180*	*240*	*30*	*180*	*40*	***1,000***	***1***
OD Hill Assessment Area											
BASELINE SCENARIO: Current Conditions/No Action Alternative Current Site Conditions No Public Use.	100 *HE or fragmenting rounds*	0 *Outside MRS or ESQD arc*	*80* *Full accessibility*	15 *Very few hours*	180 *OB/OD Area*	240 *MEC located surface and subsurface; max. intrusive depth overlaps min. MEC depth*	30 *Possible*	180 *Sensitive UXO*	40 *Small*	865	**1** *Highest potential (840-1000)*
REMEDIAL ACTION Alternative - 2: geophysical mapping, intrusive investigation, Installation of cap, followed by implementation of LUCs Future Use: restricted Recreational (1)(2)	100 *HE or fragmenting rounds*	0 *Outside MRS or ESQD arc*	*80* *Full accessibility*	***5*** ***Very few hours***	***30*** ***OB/OD Area***	***25*** ***MEC located in subsurface only; max. intrusive depth does not overlap min. MEC depth***	***10*** ***Possible***	180 *Sensitive UXO*	40 *Small*	**470**	4 *Low potential (125-525)*
REMEDIAL ACTION Alternative - 3:: geophysical mapping, intrusive investigation, subsurface clearance to depth of detection, off-site disposal, and implementation of LUCs Future Use: restricted Recreational (1)(2)	100 *HE or fragmenting rounds*	0 *Outside MRS or ESQD arc*	*80* *Full accessibility*	***5*** ***Very few hours***	***30*** ***OB/OD Area***	***25*** ***MEC located in subsurface only; max. intrusive depth does not overlap min. MEC depth***	***10*** ***Possible***	180 *Sensitive UXO*	40 *Small*	**470**	4 *Low potential (125-525)*
Kickout Assessment Area											
BASELINE SCENARIO: Current Conditions/No Action Alternative Current Site Conditions No Public Use.	100 *HE or fragmenting rounds*	0 *Outside MRS or ESQD arc*	*80* *Full accessibility*	**15** ***Very few hours***	**30** ***Safety Buffer Area***	**240** ***MEC located surface and subsurface; max. intrusive depth overlaps min. MEC depth***	**30** ***Possible***	180 *Sensitive UXO*	40 *Small*	715	3 *Moderate potential (530-720)*
REMEDIAL ACTION Alternative - 2: geophysical mapping, intrusive investigation, Installation of cap, followed by implementation of LUCs Future Use: restricted Recreational (1)(2)	100 *HE or fragmenting rounds*	0 *Outside MRS or ESQD arc*	*80* *Full accessibility*	***5*** ***Very few hours***	***5*** ***Safety Buffer Area***	***25*** ***MEC located in subsurface only; max. intrusive depth does not overlap min. MEC depth***	***10*** ***Possible***	180 *Sensitive UXO*	40 *Small*	**445**	4 *Low potential (125-525)*
REMEDIAL ACTION Alternative -3: geophysical mapping, intrusive investigation, subsurface clearance to depth of detection, off-site disposal, and implementation of LUCs Future Use: restricted Recreational (1)(2)	100 *HE or fragmenting rounds*	0 *Outside MRS or ESQD arc*	*80* *Full accessibility*	***5*** ***Very few hours***	***5*** ***Safety Buffer Area***	***25*** ***MEC located in subsurface only; max. intrusive depth does not overlap min. MEC depth***	***10*** ***Possible***	180 *Sensitive UXO*	40 *Small*	**445**	4 *Low potential (125-525)*

(1) For these remedial actions, scores are assigned for each factor assuming a 'subsurface cleanup' scenario as listed and described in the MEC HA interim guidance document (USEPA, 2008). The installation of an 18 inch cap is equivalent to a subsurface clearance to 18 inches (USEPA, 2008).

(2) Categories and/or scores that change from the baseline as a result of the assumed future scenario are shown in ***bold italics***.

B.12 GLOSSARY OF TERMS

Discarded Military Munitions (DMM): Military munitions that have been abandoned without proper disposal or removed from storage in a military magazine or other storage area for the purpose of disposal. The term does not include unexploded ordnance, military munitions that are being held for future use or planned disposal, or military munitions that have been properly disposed of consistent with applicable environmental laws and regulations. (10 U.S.C. 2710(e)(2))

Munitions and Explosives of Concern (MEC): This term, which distinguishes specific categories of military munitions that may pose unique explosives safety risks, means: (a) Unexploded Ordnance (UXO), as defined in 10 U.S.C. 101 (e)(5); (b) Discarded Military Munitions (DMM), as defined in 10 U.S.C. 2710(e)(2), or (c) Munitions constituents (e.g., TNT, RDX) present in high enough concentrations to pose an explosive hazard.

Munitions Potentially Presenting an Explosive Hazard (MPPEH): Material that, prior to determination of its explosives safety status, potentially contains explosives or munitions (e.g., munitions containers and packaging material; munitions debris remaining after munitions use, demilitarization, or disposal; and range-related debris); or potentially contains a high enough concentration of explosives such that the material presents an explosive hazard (e.g., equipment, drainage systems, holding tanks, piping, or ventilation ducts that were associated with munitions production, demilitarization or disposal operations). Excluded from MPPEH are munitions within the DoD established munitions management system and other hazardous items that may present explosion hazards (e.g., gasoline cans, compressed gas cylinders) that are not munitions and are not intended for use as munitions.

Unexploded Ordnance (UXO): Military munitions that: (a) Have been primed, fuzed, armed, or otherwise prepared for action; (b) Have been fired, dropped, launched, projected or placed in such a manner as to constitute a hazard to operations, installations, personnel, or material; and (c) Remain unexploded either by malfunction, design, or any other cause (10 U.S.C. 101 (e)(5)).

B.13 REFERENCES

DoD, 2009. Memorandum for the Assistant Secretary of the Army (Installations and Environment); Assistant Secretary of the Navy (Installations and Environment); and Assistant Secretary of the Air Force (Installations, Environment, and Logistics). Subject: Trial Use of the Interim Munitions and Explosives of Concern Hazard Assessment (MEC HA) Methodology. Signed by Wayne Arny, Deputy Under Secretary of Defense (Installations and Environment). Office of the Under Secretary of Defense, 3000 Defense Pentagon, Washington, D.C. January 29, 2009.

Engineering Science, Inc, 1995. Expanded Site Investigation for Seven High Priority SWMU SEAD 1,16,17,24, 25,26,45, Seneca Army Depot. December 1995.

Parsons, 2004. Final Ordnance and Explosives Engineering Evaluation/Cost Analysis Report (OE EE/CA), Seneca Army Depot. February 2004.

Parsons, 2010a. Additional Munitions Response Site Investigation Report, Seneca Army Depot. May 2010.

USEPA, 2008. Munitions and Explosives of Concern Hazard Assessment Methodology. Interim. http://www.epa.gov/fedfac/documents/mec_methodology_document.htm. EPA 505B08001. October 2008.

Weston, 2005. Final Site Specific Project Report SEAD45/115 Open Detonation Grounds Ordnance and Explosives Removal Phase I Geophysical Survey and Cost Estimate, Seneca Army Depot. March 2005.

Weston, 2006. Draft Phase II Ordnance and Explosives Removal Report. March 2006.

MEC HA Summary Information

Site ID: OD Hill Assessment Area
Date: 4/2/2012

Comments

Please identify the single specific area to be assessed in this hazard assessment. From this point forward, all references to "site" or "MRS" refer to the specific area that you have defined.

A. Enter a unique identifier for the site:

OD Grounds/OD Hill Assessment Area

Provide a list of information sources used for this hazard assessment. As you are completing the worksheets, use the "Select Ref(s)" buttons at the ends of each subsection to select the applicable information sources from the list below.

Ref. No.	Title (include version, publication date)
1	Expanded Site Investigation (ESI) for Seven High Priority Solid Waste
2	Final Ordnance and Explosives Engineering Evaluation/Cost Analysis Report
3	Final Site Specific Project Report SEAD45/115 Open Detonation Grounds
4	Draft Phase II Ordnance and Explosives Removal Report (Weston, March
5	Additional Munitions Response Site Investigation Report, Seneca Army
6	Draft Feasibility Study, Seneca Army Depot (Parsons, 2012)
7	
8	
9	
10	
11	
12	

B. Briefly describe the site:

1. Area (include units): 72.1 acres
2. Past munitions-related use:

OB/OD Area

3. Current land-use activities (list all that occur):

Closed OD Area, Hunting.

4. Are changes to the future land-use planned? No — Comments: No changes to land use without remediation.
5. What is the basis for the site boundaries?

Area determined to have very high MEC density from previous investigations.

6. How certain are the site boundaries?

Certain. General area planned to be capped is 0-1000' from the OD Hill. Some variations may be necessary due to topography during implementation.

Reference(s) for Part B:
Draft Feasibility Study, Seneca Army Depot (Parsons, 2012)

Select Ref(s)

C. Historical Clearances

1. Have there been any historical clearances at the site? No, none — Comments: Intrusive investigation, but no clearances.
2. If a clearance occurred:
   a. What year was the clearance performed?

   b. Provide a description of the clearance activity (e.g., extent, depth, amount of munitions-related items removed, types and sizes of removed items, and whether metal detectors were used):

Reference(s) for Part C:

Select Ref(s)

D. Attach maps of the site below (select 'Insert/Picture' on the menu bar.)

Site ID: **OD Hill Assessment Area**
Date: **4/2/2012**

Cased Munitions Information

Item No.	Munition Type (e.g., mortar, projectile, etc.)	Munition Size	Munition Size Units	Mark/ Model	Energetic Material Type	Is Munition Fuzed?	Fuzing Type	Fuze Condition	Minimum Depth for Munition (ft)	Location of Munitions	Comments (include rationale for munitions that are "subsurface only")
1	Mortars	81	mm	M374	High Explosive	Yes		UNK	0	Surface and Subsurface	Item with greatest HFD
2	Fuzes							UNK	0	Surface and Subsurface	Smallest MEC items
3	Fuzes							UNK	0	Surface and Subsurface	Smallest MEC Items
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

Reference(s) for table above:
Draft Feasibility Study, Seneca Army Depot (Parsons, 2012)

Select Ref(s)

Bulk Explosive Information

Item No.	Explosive Type	Comments
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

Site ID: **OD Hill Assessment Area**
Date: **4/2/2012**

Activities Currently Occurring at the Site

Activity No.	Activity	Number of people per year who participate in the activity	Number of hours per year a single person spends on the activity	Potential Contact Time (receptor hours/year)	Maximum intrusive depth (ft)	Comments
1	Hunting	10	192	1,920	0	Assume 10 hunters, 12 hours/day 16 days/month, 1 months/year
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						

Total Potential Contact Time (receptor hrs/yr): **1,920**
Maximum intrusive depth at site (ft): **0**

Reference(s) for table above:
Draft Feasibility Study, Seneca Army Depot (Parsons, 2012)

Select Ref(s)

Activities Planned for the Future at the Site (If any are planned: see 'Summary Info' Worksheet, Question 4)

Activity No.	Activity	Number of people per year who participate in the activity	Number of hours per year a single person spends on the activity	Potential Contact Time (receptor hours/year)	Maximum intrusive depth (ft)	Comments
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						

Total Potential Contact Time (receptor hrs/yr):
Maximum intrusive depth at site (ft):

Reference(s) for table above:
Draft Feasibility Study, Seneca Army Depot (Parsons, 2012)

Select Ref(s)

Site ID: **OD Hill Assessment Area**
Date: **4/2/2012**

Planned Remedial or Removal Actions

Response Action No.	Response Action Description	Expected Resulting Minimum MEC Depth (ft)	Expected Resulting Site Accessibility	Will land use activities change if this response action is implemented?	What is the expected scope of cleanup?	Comments
1	geophysical mapping, intrusive investigation, installation of cap, followed by implementation of LUCs	1.5	Full Accessibility	Yes	cleanup of MECs located both on the surface and subsurface	The net effect of the cap is a sub-surface clearance to 1.5 ft.
2	geophysical mapping, intrusive investigation, subsurface clearance to depth of detection, off-site disposal, and implementation of LUCs	3	Full Accessibility	Yes	cleanup of MECs located both on the surface and subsurface	
3						
4						
5						
6						

According to the 'Summary Info' worksheet, no future land uses are planned. For those alternatives where you answered 'No' in Column E, the land use activities will be assessed against current land uses.

Reference(s) for table above:
Draft Feasibility Study, Seneca Army Depot (Parsons, 2012)

Select Ref(s)

Site ID: **OD Hill Assessment Area**
Date: **4/2/2012**

This worksheet needs to be completed for each remedial/removal action alternative listed in the 'Remedial-Removal Action' worksheet that will cause a change in land use.

Land Use Activities Planned After Response Alternative #1: geophysical mapping, intrusive investigation, installation of cap, followed by implementation of LUCs

Activity No.	Activity	Number of people per year who participate in the activity	Number of hours a single person spends on the activity	Potential Contact Time (receptor hours/year)	Maximum intrusive depth (ft)	Comments
1	Hiking	200	4	800	0	People: (20 people/month)(10 mo/yr); Hours: (1 hr/d) (4d/yr)
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						

Total Potential Contact Time (receptor hrs/yr): **800**
Maximum intrusive depth at site (ft): **0**

Reference(s) for table above:
Draft Feasibility Study, Seneca Army Depot (Parsons, 2012)

Select Ref(s)

investigation, subsurface clearance to depth of detection, off-site disposal, and implementation of LUCs

Activity No.	Activity	Number of people per year who participate in the activity	Number of hours a single person spends on the activity	Potential Contact Time (receptor hours/year)	Maximum intrusive depth (ft)	Comments
1	non-intrusive Conservation/Recreation, (hiking, no camping)	200	4	800	0	People: (20 people/month)(10 mo/yr); Hours: (1 hr/d) (4d/yr)
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						

Total Potential Contact Time (receptor hrs/yr): **800**
Maximum intrusive depth at site (ft): **0**

Reference(s) for table above:
Draft Feasibility Study, Seneca Army Depot (Parsons, 2012)

Select Ref(s)

Site ID: **OD Hill Assessment Area**
Date: **4/2/2012**

Energetic Material Type Input Factor Categories

The following table is used to determine scores associated with the energetic materials. Materials are listed in order from most hazardous to least hazardous.

	Baseline Conditions	Surface Cleanup	Subsurface Cleanup
High Explosive and Low Explosive Filler in Fragmenting Rounds	100	100	100
White Phosphorus	70	70	70
Pyrotechnic	60	60	60
Propellant	50	50	50
Spotting Charge	40	40	40
Incendiary	30	30	30

The most hazardous type of energetic material listed in the 'Munitions, Bulk Explosive Info' Worksheet falls under the category 'High Explosive and Low Explosive Filler in Fragmenting Rounds'.

	Score
Baseline Conditions:	**100**
Surface Cleanup:	**100**
Subsurface Cleanup:	**100**

Comments

Location of Additional Human Receptors Input Factor Categories

1. What is the Explosive Safety Quantity Distance (ESQD) from the Explosive Siting Plan or the Explosive Safety Submission for the MRS? **239** feet

2. Are there currently any features or facilities where people may congregate within the MRS, or within the ESQD arc? **No**

3. Please describe the facility or feature.

MEC Item(s) used to calculate the ESQD for current use activities
Item #1. Mortars (81mm, High Explosive)

Select MEC(s)

The following table is used to determine scores associated with the location of additional human receptors (current use activities):

	Baseline Conditions	Surface Cleanup	Subsurface Cleanup
Inside the MRS or inside the ESQD arc	30	30	30
Outside of the ESQD arc	0	0	0

4. Current use activities are 'Outside of the ESQD arc', based on Question 2.'

	Score
Baseline Conditions:	**0**
Surface Cleanup:	**0**
Subsurface Cleanup:	**0**

5. Are there future plans to locate or construct features or facilities where people may congregate within the MRS, or within the ESQD arc? No

6. Please describe the facility or feature.

Hiking trails, wildlife observation areas

MEC Item(s) used to calculate the ESQD for future use act vities
Item #1. Mortars (81mm, High Explosive)

Select MEC(s)

Site Accessibility Input Factor Categories

The following table is used to determine scores associated with site accessibility:

	Description	Baseline Conditions	Surface Cleanup	Subsurface Cleanup
Full Accessibility	No barriers to entry, including signage but no fencing	80	80	80
Moderate Accessibility	Some barriers to entry, such as barbed wire fencing or rough terrain	55	55	55
Limited Accessibility	Significant barriers to entry, such as unguarded chain link fence or requirements for special transportation to reach the site	15	15	15
Very Limited Accessibility	A site with guarded chain link fence or terrain that requires special equipment and skills (e.g., rock climbing) to access	5	5	5

Current Use Activities — ***Score***

Select the category that best describes the site accessibility under the current use scenario:

Full Accessibility

Baseline Conditions:	**80**
Surface Cleanup:	**80**
Subsurface Cleanup:	**80**

Future Use Activities

Select the category that best describes the site accessibility under the future use scenario:

Full Accessibility

Baseline Conditions:	80
Surface Cleanup	80
Subsurface Cleanup:	80

Reference(s) for above information

Draft Feasibility Study, Seneca Army Depot (Parsons, 2012)

Select Ref(s)

Response Alternative No. 1: geophysical mapping, intrusive investigation, installation of cap, followed by implementation of LUCs

Based on the 'Planned Remedial or Removal Actions' Worksheet, this alternative will lead to 'Full Accessibility'.

Baseline Conditions:	**80**
Surface Cleanup:	**80**
Subsurface Cleanup:	**80**

Response Alternative No. 2: geophysical mapping, intrusive investigation, subsurface clearance to depth of detection, off-site disposal, and

Based on the 'Planned Remedial or Removal Actions' Worksheet, this alternative will lead to 'Full Accessibility'.

Baseline Conditions:	**80**
Surface Cleanup:	**80**
Subsurface Cleanup:	**80**

Potential Contact Hours Input Factor Categories

The following table is used to determine scores associated with the total potential contact time:

	Description	Baseline Conditions	Surface Cleanup	Subsurface Cleanup
Many Hours	≥1,000,000 receptor-hrs/yr	120	90	30
Some Hours	100,000 to 999,999 receptor hrs/yr	70	50	20
Few Hours	10,000 to 99,999 receptor-hrs/yr	40	20	10
Very Few Hours	<10,000 receptor-hrs/yr	15	10	5

Current Use Activities:

Input factors are only determined for baseline conditions for current use activities. Based on the 'Current and Future Activities' Worksheet, the Total Potential Contact Time is: **1,920** receptor hrs/yr

Based on the table above, this corresponds to a input factor score for baseline conditions of: **15** Score

Future Use Activities:

Input factors are only determined for baseline conditions for future use activities Based on the 'Current and Future Activities' Worksheet, the Total Potential Contact Time is: receptor hrs/yr

Based on the table above, this corresponds to a input factor score of: Score

Response Alternative No. 1: geophysical mapping, intrusive investigation,

Based on the 'Planned Remedial or Removal Actions' Worksheet, land use activities will change if this alternative is implemented.

Total Potential Contact Time, based on the contact time listed for this alternative (see 'Post-Response Land Use' Worksheet) **800**

Based on the table above, this corresponds to input factor scores of: ***Score***

Baseline Conditions: **15**

Surface Cleanup: **10**

Subsurface Cleanup: **5**

Response Alternative No. 2: geophysical mapping, intrusive investigation,

Based on the 'Planned Remedial or Removal Actions' Worksheet, land use activities will change if this alternative is implemented.

Total Potential Contact Time, based on the contact time listed for this alternative (see 'Post-Response Land Use' Worksheet) **800**

Based on the table above, this corresponds to input factor scores of: ***Score***

Baseline Conditions: **15**

Surface Cleanup: **10**

Subsurface Cleanup: **5**

Amount of MEC Input Factor Categories

The following table is used to determine scores associated with the Amount of MEC:

	Description	Baseline Conditions	Surface Cleanup	Subsurface Cleanup
Target Area	Areas at which munitions fire was directed	180	120	30
OB/OD Area	Sites where munitions were disposed of by open burn or open detonation methods. This category refers to the core activity area of an OB/OD area. See the "Safety Buffer Areas" category for safety fans and kick-outs.	180	110	30
Function Test Range	Areas where the serviceability of stored munitions or weapons systems are tested. Testing may include components, partial functioning or complete functioning of stockpile or developmental items.	165	90	25
Burial Pit	The location of a burial of large quantities of MEC items.	140	140	10
Maneuver Areas	Areas used for conducting military exercises in a simulated conflict area or war zone	115	15	5
Firing Points	The location from which a projectile, grenade, ground signal, rocket, guided missile, or other device is to be ignited, propelled, or released.	75	10	5
Safety Buffer Areas	Areas outside of target areas, test ranges, or OB/OD areas that were designed to act as a safety zone to contain munitions that do not hit targets or to contain kick-outs from OB/OD areas.	30	10	5
Storage	Any facility used for the storage of military munitions, such as earth-covered magazines, above-ground magazines, and open-air storage areas.	25	10	5
Explosive-Related Industrial Facility	Former munitions manufacturing or demilitarization sites and TNT production plants	20	10	5

Select the category that best describes the ***most hazardous*** amount of MEC: ***Score***

OB/OD Area

Baseline Conditions:	**180**
Surface Cleanup:	**110**
Subsurface Cleanup:	**30**

Minimum MEC Depth Relative to the Maximum Intrusive Depth Input Factor Categories

Current Use Activities

The shallowest minimum MEC depth, based on the 'Cased Munitions Information' Worksheet: **0** ft
The deepest intrusive depth: **0** ft
The table below is used to determine scores associated with the minimum MEC depth relative to the maximum intrusive depth:

	Baseline Conditions	Surface Cleanup	Subsurface Cleanup
Baseline Condition: MEC located surface and subsurface. After Cleanup: Intrusive depth overlaps with subsurface MEC.	240	150	95
Baseline Condition: MEC located surface and subsurface, After Cleanup: Intrusive depth does not overlap with subsurface MEC.	240	50	25
Baseline Condition: MEC located only subsurface. Baseline Condition or After Cleanup: Intrusive depth overlaps with minimum MEC depth.	150	N/A	95
Baseline Condition: MEC located only subsurface. Baseline Condition or After Cleanup: Intrusive depth does not overlap with minimum MEC depth.	50	N/A	25

Because the shallowest minimum MEC depth is less than or equal to the deepest intrusive depth, the intrusive depth will overlap after cleanup. MECs are located at both the surface and subsurface, based on the 'Munitions, Bulk Explosive Info' Worksheet. Therefore, the category for this input factor is 'Baseline Condition: MEC located surface and subsurface. After Cleanup: Intrusive depth overlaps with subsurface MEC.' For 'Current Use Activities', only Baseline Conditions are considered. **240** ***Score***

Future Use Activities

Deepest intrusive depth: ft

Not enough information has been entered to determine the input factor category. ***Score***

Response Alternative No. 1: geophysical mapping, intrusive investigation, installation of

Expected minimum MEC depth (from the 'Planned Remedial or Removal Actions' Worksheet): **1.5** ft

Based on the 'Planned Remedial or Removal Actions' Worksheet, land use activities will change if this alternative is implemented.

Maximum Intrusive Depth, based on the maximum intrusive depth listed for this alternative (see 'Post-Response Land Use' Worksheet) **0** ft

Because the shallowest minimum MEC depth is greater than the deepest intrusive depth, the intrusive depth does not overlap. MECs are located at both the surface and subsurface, based on the 'Munitions, Bulk Explosive Info' Worksheet. Therefore, the category for this input factor is 'Baseline Condition: MEC located surface and subsurface, After Cleanup: Intrusive depth does not overlap with subsurface MEC.'

	Score
Baseline Conditions:	
Surface Cleanup:	
Subsurface Cleanup:	**25**

Response Alternative No. 2: geophysical mapping, intrusive investigation, subsurface

Expected minimum MEC depth (from the 'Planned Remedial or Removal Actions' Worksheet): **3** ft

Based on the 'Planned Remedial or Removal Actions' Worksheet, land use activities will change if this alternative is implemented.

Maximum Intrusive Depth, based on the maximum intrusive depth listed for this alternative (see 'Post-Response Land Use' Worksheet) **0** ft

Because the shallowest minimum MEC depth is greater than the deepest intrusive depth, the intrusive depth does not overlap. MECs are located at both the surface and subsurface, based on the 'Munitions, Bulk Explosive Info' Worksheet. Therefore, the category for this input factor is 'Baseline Condition: MEC located surface and subsurface, After Cleanup: Intrusive depth does not overlap with subsurface MEC.'

	Score
Baseline Conditions:	
Surface Cleanup:	
Subsurface Cleanup:	**25**

Migration Potential Input Factor Categories

Is there any physical or historical evidence that indicates it is possible for natural physical forces in the area (e.g., frost heave, erosion) to expose subsurface MEC items, or move surface or subsurface MEC items?

Yes

If "yes", describe the nature of natural forces. Indicate key areas of potential migration (e.g., overland water flow) on a map as appropriate (attach a map to the bottom of this sheet, or as a separate worksheet).

The slopes of the OD Hill are steep (up to .60 ft/ft on the eastern side of the hill), and therefore surface erosion that might result in the exposure of buried MEC is likely. Also, temperatures of freezing or below occur regularly each winter and the frost line extends down to approximately 3 feet, which is greater than the minimum MEC depth at the site.

The following table is used to determine scores associated with the migration potential:

	Baseline Conditions	Surface Cleanup	Subsurface Cleanup
Possible	30	30	10
Unlikely	10	10	10

Based on the question above, migration potential is 'Possible.'

	Score
Baseline Conditions:	**30**
Surface Cleanup:	**30**
Subsurface Cleanup:	**10**

Reference(s) for above information:

Draft Feasibility Study, Seneca Army Depot (Parsons, 2012)

Select Ref(s)

MEC Classification Input Factor Categories

Cased munitions information has been inputed into the 'Munitions, Bulk Explosive Info' Worksheet; therefore, bulk explosives do not comprise all MECs for this MRS.

The 'Amount of MEC' category is 'OB/OD Area'.

Has a technical assessment shown that MEC in the OB/OD Area is DMM? No

Are any of the munitions listed in the 'Munitions, Bulk Explosive Info' Worksheet: Yes

- Submunitions
- Rifle-propelled 40mm projectiles (often called 40mm grenades)
- Munitions with white phosphorus filler
- High explosive anti-tank (HEAT) rounds
- Hand grenades
- Fuzes
- Mortars

At least one item listed in the 'Munitions, Bulk Explosive Info' Worksheet was identified as 'fuzed'.

The following table is used to determine scores associated with MEC classification categories:

	UXO Special Case	Baseline Conditions	Surface Cleanup	Subsurface Cleanup
UXO Special Case		180	180	180
UXO		110	110	110
Fuzed DMM Special Case		105	105	105
Fuzed DMM		55	55	55
Unfuzed DMM		45	45	45
Bulk Explosives		45	45	45

Based on your answers above, the MEC classification is 'UXO Special Case'.

	Score
Baseline Conditions:	**180**
Surface Cleanup:	**180**
Subsurface Cleanup:	**180**

MEC Size Input Factor Categories

The following table is used to determine scores associated with MEC Size:

	Description	Baseline Conditions	Surface Cleanup	Subsurface Cleanup
Small	Any munitions (from the 'Munitions, Bulk Explosive Info' Worksheet) weigh less than 90 lbs; small enough for a receptor to be able to move and initiate a detonation	40	40	40
Large	All munitions weigh more than 90 lbs; too large to move without equipment	0	0	0

Based on the definitions above and the types of munitions at the site (see 'Munitions, Bulk Explosive Info' Worksheet), the MEC Size Input Factor is: Small

	Score
Baseline Conditions:	**40**
Surface Cleanup:	**40**
Subsurface Cleanup:	**40**

Scoring Summary

Site ID:	OD Hill Assessment Area	a. Scoring Summary for Current Use Activities	
Date:	4/2/2012	Response Action Cleanup:	No Response Action
Input Factor		**Input Factor Category**	**Score**
I. Energetic Material Type		High Explosive and Low Explosive Filler in Fragmenting Rounds	100
II. Location of Additional Human Receptors		Outside of the ESQD arc	0
III. Site Accessibility		Full Accessibility	80
IV. Potential Contact Hours		<10,000 receptor-hrs/yr	15
V. Amount of MEC		OB/OD Area	180
VI. Minimum MEC Depth Relative to Maximum Intrusive Depth		Baseline Condition: MEC located surface and subsurface. After Cleanup: Intrusive depth overlaps with subsurface MEC.	240
VII. Migration Potential		Possible	30
VIII. MEC Classification		UXO Special Case	180
IX. MEC Size		Small	40
		Total Score	**865**
		Hazard Level Category	**1**

Site ID:	OD Hill Assessment Area	[illegible]	
Date:	4/2/2012	Response Action Cleanup:	No Response Action
[illegible]		[illegible]	[illegible]
[illegible]		[illegible] and Low [illegible] nds	[illegible]
[illegible]		[illegible]	[illegible]
[illegible]		[illegible]	[illegible]
[illegible]			
[illegible]		[illegible] Area	[illegible]
[illegible] to [illegible]			
[illegible]		[illegible]	[illegible]
[illegible]		[illegible] Spec [illegible]	[illegible]
[illegible]		[illegible]	[illegible]
		Total [illegible]	610
		Hazard Level [illegible]	3

Site ID:	OD Hill Assessment Area	c. Scoring Summary for Response Alternative 1: geophysical mapping, intrusive investigation, installation o	
Date:	4/2/2012	Response Action Cleanup:	cleanup of MECs located both on the surface and subsurface
Input Factor		**Input Factor Category**	**Score**
I. Energetic Material Type		High Explosive and Low Explosive Filler in Fragmenting Rounds	100
II. Location of Additional Human Receptors		Outside of the ESQD arc	0
III. Site Accessibility		Full Accessibility	80
IV. Potential Contact Hours		<10,000 receptor-hrs/yr	5
V. Amount of MEC		OB/OD Area	30
VI. Minimum MEC Depth Relative to Maximum Intrusive Depth		Baseline Condition: MEC located surface and subsurface, After Cleanup: Intrusive depth does not overlap with subsurface MEC.	25
VII. Migration Potential		Possible	10
VIII. MEC Classification		UXO Special Case	180
IX. MEC Size		Small	40
		Total Score	**470**
		Hazard Level Category	**4**

Site ID:	OD Hill Assessment Area	d. Scoring Summary for Response Alternative 2: geophysical mapping, intrusive investigation, subsurface cl	
Date:	4/2/2012	Response Action Cleanup:	cleanup of MECs located both on the surface and subsurface
Input Factor		**Input Factor Category**	**Score**
I. Energetic Material Type		High Explosive and Low Explosive Filler in Fragmenting Rounds	100
II. Location of Additional Human Receptors		Outside of the ESQD arc	0
III. Site Accessibility		Full Accessibility	80
IV. Potential Contact Hours		<10,000 receptor-hrs/yr	5
V. Amount of MEC		OB/OD Area	30
VI. Minimum MEC Depth Relative to Maximum Intrusive Depth		Baseline Condition: MEC located surface and subsurface, After Cleanup: Intrusive depth does not overlap with subsurface MEC.	25
VII. Migration Potential		Possible	10
VIII. MEC Classification		UXO Special Case	180
IX. MEC Size		Small	40
		Total Score	**470**
		Hazard Level Category	**4**

MEC HA Hazard Level Determination		
Site ID: OD Hill Assessment Area		
Date: **4/2/2012**		
	Hazard Level Category	**Score**
a. Current Use Activities	1	865
[illegible]	[illegible]	[illegible]
c. Response Alternative 1: geophysical mapping, intrusive investigation, installation of cap, followed by implementation of	4	470
d. Response Alternative 2: geophysical mapping, intrusive investigation, subsurface clearance to depth of detection, off-site	4	470
e. Response Alternative 3:		
f. Response Alternative 4:		
g. Response Alternative 5:		
h. Response Alternative 6:		
Characteristics of the MRS		
Is critical infrastructure located within the MRS or within the ESQD arc?	No	
Are cultural resources located within the MRS or within the ESQD arc?	No	
Are significant ecological resources located within the MRS or within the ESQD arc?	No	

MEC HA Summary Information

Comments

Site ID: OD Grounds-Kickout Area
Date: 4/2/2012

Please identify the single specific area to be assessed in this hazard assessment. From this point forward, all references to "site" or "MRS" refer to the specific area that you have defined.

A. Enter a unique identifier for the site:

OD Grounds MRS - Kickout Area

Provide a list of information sources used for this hazard assessment. As you are completing the worksheets, use the "Select Ref(s)" buttons at the ends of each subsection to select the applicable information sources from the list below.

Ref. No.	Title (include version, publication date)
1	Expanded Site Investigation (ESI) for Seven High Priority Solid Waste
2	Final Ordnance and Explosives Engineering Evaluation/Cost Analysis
3	Final Site Specific Project Report SEAD45/115 Open Detonation Grounds
4	Draft Phase II Ordnance and Explosives Removal Report (Weston, March
5	Additional Munitions Response Site Investigation Report, Seneca Army
6	Draft Feasibility Study, Seneca Army Depot (Parsons, 2012)
7	
8	
9	
10	
11	
12	

B. Briefly describe the site:

1. Area (include units): 216.4 ac
2. Past munitions-related use:
   Safety Buffer Areas
3. Current land-use activities (list all that occur):
   Closed OD Area, Hunting
4. Are changes to the future land-use planned? No — Comment: No changes to land use without remediation.
5. What is the basis for the site boundaries?
   Area determined to have high MEC density from previous investigations.
6. How certain are the site boundaries?
   Certain. Area greater than 1000' radius from OD Hill center, and which investigations have determined to have high MEC density present. Some variations may be necessary due to topography during implementation.

Reference(s) for Part B:
Draft Feasibility Study, Seneca Army Depot (Parsons, 2012) Select Ref(s)

C. Historical Clearances

1. Have there been any historical clearances at the site? No, none — Comment: Intrusive investigation, but no clearances.
2. If a clearance occurred:
   a. What year was the clearance performed?
   b. Provide a description of the clearance activity (e.g., extent, depth, amount of munitions-related items removed, types and sizes of removed items, and whether metal detectors were used.)

Reference(s) for Part C:
Draft Feasibility Study, Seneca Army Depot (Parsons, 2012) Select Ref(s)

D. Attach maps of the site below (select 'Insert/Picture' on the menu bar.)

Site ID: **OD Grounds-Kickout Area**
Date: **4/2/2012**

Cased Munitions Information

Item No.	Munition Type (e.g., mortar, projectile, etc.)	Munition Size	Munition Size Units	Mark/ Model	Energetic Material Type	Is Munition Fuzed?	Fuzing Type	Fuze Condition	Minimum Depth for Munition (ft)	Location of Munitions	Comments (include rationale for munitions that are "subsurface only")
1	Mortars	81	mm	M374	High Explosive	Yes		UNK	0	Surface and Subsurface	Item with greatest HFD
2	Fuzes							UNK	0	Surface and Subsurface	Smallest Item
3	Fuzes							UNK	0	Surface and Subsurface	Smallest Item
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

Reference(s) for table above:
Draft Feasibility Study, Seneca Army Depot (Parsons, 2012)

Select Ref(s)

Bulk Explosive Information

Item No.	Explosive Type	Comments
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

Reference(s) for table above:

Site ID: **OD Grounds-Kickout Area**
Date: **4/2/2012**

Activities Currently Occurring at the Site

Activity No.	Activity	Number of people per year who participate in the activity	Number of hours per year a single person spends on the activity	Potential Contact Time (receptor hours/year)	Maximum intrusive depth (ft)	Comments
1	Hunting	10	192	1,920	0	Assume 10 hunters, 12 hours/day 16 days/month, 1 months/year
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						

Total Potential Contact Time (receptor hrs/yr): **1,920**
Maximum intrusive depth at site (ft): **0**

Reference(s) for table above:

Select Ref(s)

Activities Planned for the Future at the Site (If any are planned: see 'Summary Info' Worksheet, Question 4)

Activity No.	Activity	Number of people per year who participate in the activity	Number of hours per year a single person spends on the activity	Potential Contact Time (receptor hours/year)	Maximum intrusive depth (ft)	Comments
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						

Total Potential Contact Time (receptor hrs/yr):
Maximum intrusive depth at site (ft):

Reference(s) for table above:

Select Ref(s)

Site ID: **OD Grounds-Kickout Area**
Date: **4/2/2012**

Planned Remedial or Removal Actions

Response Action No.	Response Action Description	Expected Resulting Minimum MEC Depth (ft)	Expected Resulting Site Accessibility	Will land use activities change if this response action is implemented?	What is the expected scope of cleanup?	Comments
1	geophysical mapping, intrusive investigation, installation of cap, followed by implementation of LUCs	3	Full Accessibility	Yes	cleanup of MECs located both on the surface and subsurface	
2						
3						
4						
5						
6						

According to the 'Summary Info' worksheet, no future land uses are planned. For those alternatives where you answered 'No' in Column E, the land use activities will be assessed against current land uses

Reference(s) for table above:
Draft Feasibility Study, Seneca Army Depot (Parsons, 2012)

Select Ref(s)

Site ID: **OD Grounds-Kickout Area**
Date: **4/2/2012**

This worksheet needs to be completed for each remedial/removal action alternative listed in the 'Remedial-Removal Action' worksheet that will cause a change in land use.

Land Use Activities Planned After Response Alternative #1: geophysical mapping, intrusive investigation, installation of cap, followed by implementation of LUCs

Activity No.	Activity	Number of people per year who participate in the activity	Number of hours a single person spends on the activity	Potential Contact Time (receptor hours/year)	Maximum intrusive depth (ft)	Comments
1	Hiking	2,000	4	8,000	0	People: (200 people/mongh)(10 month/year); Hours (1 hr/d) (4d/yr)
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						

Total Potential Contact Time (receptor hrs/yr): **8,000**
Maximum intrusive depth at site (ft): **0**

Reference(s) for table above:
Draft Feasibility Study, Seneca Army Depot (Parsons, 2012)

Select Ref(s)

Land Use Activities Planned After Response Alternative #2:

Activity No.	Activity	Number of people per year who participate in the activity	Number of hours a single person spends on the activity	Potential Contact Time (receptor hours/year)	Maximum intrusive depth (ft)	Comments
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						

Total Potential Contact Time (receptor hrs/yr):
Maximum intrusive depth at site (ft):

Reference(s) for table above

Select Ref(s)

Site ID: **OD Grounds - Buffer Area**
Date: **4/1/2012**

Energetic Material Type Input Factor Categories

Comments

The following table is used to determine scores associated with the energetic materials. Materials are listed in order from most hazardous to least hazardous.

	Baseline Conditions	Surface Cleanup	Subsurface Cleanup
High Explosive and Low Explosive Filler in Fragmenting Rounds	100	100	100
White Phosphorus	70	70	70
Pyrotechnic	60	60	60
Propellant	50	50	50
Spotting Charge	40	40	40
Incendiary	30	30	30

The most hazardous type of energetic material listed in the 'Munitions, Bulk Explosive Info' Worksheet falls under the category 'High Explosive and Low Explosive Filler in Fragmenting Rounds'.

	Score
Baseline Conditions:	**100**
Surface Cleanup:	**100**
Subsurface Cleanup:	**100**

Location of Additional Human Receptors Input Factor Categories

1. What is the Explosive Safety Quantity Distance (ESQD) from the Explosive Siting Plan or the Explosive Safety Submission for the MRS? **239** feet

2. Are there currently any features or facilities where people may congregate within the MRS, or within the ESQD arc? **No**

3. Please describe the facility or feature.

MEC Item(s) used to calculate the ESQD for current use activities

Item #1. Mortars (81mm, High Explosive)

Select MEC(s)

The following table is used to determine scores associated with the location of additional human receptors (current use activities):

	Baseline Conditions	Surface Cleanup	Subsurface Cleanup
Inside the MRS or inside the ESQD arc	30	30	30
Outside of the ESQD arc	0	0	0

4. Current use activities are 'Outside of the ESQD arc', based on Question 2.'

	Score
Baseline Conditions:	**0**
Surface Cleanup:	**0**
Subsurface Cleanup:	**0**

5. Are there future plans to locate or construct features or facilities where people may congregate within the MRS, or within the ESQD arc?

6. Please describe the facility or feature.

MEC Item(s) used to calculate the ESQD for future use activities

Select MEC(s)

The following table is used to determine scores associated with the location of additional human receptors (future use activities):

	Baseline Conditions	Surface Cleanup	Subsurface Cleanup
Inside the MRS or inside the ESQD arc	30	30	30
Outside of the ESQD arc	0	0	0

7. Please answer Question 5 above to determine the scores.

	Score
Baseline Conditions:	
Surface Cleanup:	
Subsurface Cleanup:	

Site Accessibility Input Factor Categories

The following table is used to determine scores associated with site accessibility:

	Description	Baseline Conditions	Surface Cleanup	Subsurface Cleanup
Full Accessibility	No barriers to entry, including signage but no fencing	80	80	80
Moderate Accessibility	Some barriers to entry, such as barbed wire fencing or rough terrain	55	55	55
Limited Accessibility	Significant barriers to entry, such as unguarded chain link fence or requirements for special transportation to reach the site	15	15	15
Very Limited Accessibility	A site with guarded chain link fence or terrain that requires special equipment and skills (e.g., rock climbing) to access	5	5	5

Current Use Activities — ***Score***

Select the category that best describes the site accessibility under the current use scenario:

Full Accessibility

	Score
Baseline Conditions:	**80**
Surface Cleanup:	**80**
Subsurface Cleanup:	**80**

Future Use Activities

Select the category that best describes the site accessibility under the future use scenario:

Baseline Conditions:
Surface Cleanup:
Subsurface Cleanup:

R fer ... for abov ... ma io

Select Ref(s)

Response Alternative No. 1: geophysical mapping, intrusive investigation, installation of cap, followed by implementation of LUCs

Based on the 'Planned Remedial or Removal Actions' Worksheet, this alternative will lead to 'Full Accessibility'.

	Score
Baseline Conditions:	**80**
Surface Cleanup:	**80**
Subsurface Cleanup:	**80**

Potential Contact Hours Input Factor Categories

The following table is used to determine scores associated with the total potential contact time:

	Description	Baseline Conditions	Surface Cleanup	Subsurface Cleanup
Many Hours	≥1,000,000 receptor-hrs/yr	120	90	30
Some Hours	100,000 to 999,999 receptor hrs/yr	70	50	20
Few Hours	10,000 to 99,999 receptor-hrs/yr	40	20	10
Very Few Hours	<10,000 receptor-hrs/yr	15	10	5

Current Use Activities:

Input factors are only determined for baseline conditions for current use activities. Based on the 'Current and Future Activities' Worksheet, the Total Potential Contact Time is: **1,920** receptor hrs/yr
Based on the table above, this corresponds to a input factor score for baseline conditions of: **15** Score

Future Use Activities:

Input factors are only determined for baseline conditions for future use activities. Based on the 'Current and Future Activities' Worksheet, the Total Potential Contact Time is: receptor hrs/yr
Based on the table above, this corresponds to a input factor score of: Score

Response Alternative No. 1: geophysical mapping, intrusive investigation,

Based on the 'Planned Remedial or Removal Actions' Worksheet, land use activities will change if this alternative is implemented.
Total Potential Contact Time, based on the contact time listed for this alternative (see 'Post-Response Land Use' Worksheet) **8,000**
Based on the table above, this corresponds to input factor scores of: ***Score***
Baseline Conditions: **15**
Surface Cleanup: **10**
Subsurface Cleanup: **5**

Amount of MEC Input Factor Categories

The following table is used to determine scores associated with the Amount of MEC:

	Description	Baseline Conditions	Surface Cleanup	Subsurface Cleanup
Target Area	Areas at which munitions fire was directed	180	120	30
OB/OD Area	Sites where munitions were disposed of by open burn or open detonation methods. This category refers to the core activity area of an OB/OD area. See the "Safety Buffer Areas" category for safety fans and kick-outs.	180	110	30
Function Test Range	Areas where the serviceability of stored munitions or weapons systems are tested. Testing may include components, partial functioning or complete functioning of stockpile or developmental items.	165	90	25
Burial Pit	The location of a burial of large quantities of MEC items.	140	140	10
Maneuver Areas	Areas used for conducting military exercises in a simulated conflict area or war zone	115	15	5
Firing Points	The location from which a projectile, grenade, ground signal, rocket, guided missile, or other device is to be ignited, propelled, or released.	75	10	5
Safety Buffer Areas	Areas outside of target areas, test ranges, or OB/OD areas that were designed to act as a safety zone to contain munitions that do not hit targets or to contain kick-outs from OB/OD areas.	30	10	5
Storage	Any facility used for the storage of military munitions, such as earth-covered magazines, above-ground magazines, and open-air storage areas.	25	10	5
Explosive-Related Industrial Facility	Former munitions manufacturing or demilitarization sites and TNT production plants	20	10	5

Select the category that best describes the ***most hazardous*** amount of MEC: ***Score***

Safety Buffer Areas

Baseline Conditions:	**30**
Surface Cleanup:	**10**
Subsurface Cleanup:	**5**

Minimum MEC Depth Relative to the Maximum Intrusive Depth Input Factor Categories

Current Use Activities

The shallowest minimum MEC depth, based on the 'Cased Munitions Information' Worksheet: **0** ft

The deepest intrusive depth: **0** ft

The table below is used to determine scores associated with the minimum MEC depth relative to the maximum intrusive depth:

	Baseline Conditions	Surface Cleanup	Subsurface Cleanup
Baseline Condition: MEC located surface and subsurface. After Cleanup: Intrusive depth overlaps with subsurface MEC.	240	150	95
Baseline Condition: MEC located surface and subsurface, After Cleanup: Intrusive depth does not overlap with subsurface MEC.	240	50	25
Baseline Condition: MEC located only subsurface. Baseline Condition or After Cleanup: Intrusive depth overlaps with minimum MEC depth.	150	N/A	95
Baseline Condition: MEC located only subsurface. Baseline Condition or After Cleanup: Intrusive depth does not overlap with minimum MEC depth.	50	N/A	25

Because the shallowest minimum MEC depth is less than or equal to the deepest intrusive depth, the intrusive depth will overlap after cleanup. MECs are located at both the surface and subsurface, based on the 'Munitions, Bulk Explosive Info' Worksheet. Therefore, the category for this input factor is 'Baseline Condition: MEC located surface and subsurface. After Cleanup: Intrusive depth overlaps with subsurface MEC.' For 'Current Use Activities', only Baseline Conditions are considered. **240** ***Score***

Future Use Activities

Deepest intrusive depth: ft

Not enough information has been entered to determine the input factor category. ***Score***

Response Alternative No. 1: geophysical mapping, intrusive investigation, installation

Expected minimum MEC depth (from the 'Planned Remedial or Removal Actions' Worksheet): **3** ft

Based on the 'Planned Remedial or Removal Actions' Worksheet, land use activities will change if this alternative is implemented.

Maximum Intrusive Depth, based on the maximum intrusive depth listed for this alternative (see 'Post-Response Land Use' Worksheet) **0** ft

Because the shallowest minimum MEC depth is greater than the deepest intrusive depth, the intrusive depth does not overlap. MECs are located at both the surface and subsurface, based on the 'Munitions, Bulk Explosive Info' Worksheet. Therefore, the category for this input factor is 'Baseline Condition: MEC located surface and subsurface, After Cleanup: Intrusive depth does not overlap with subsurface MEC.'

	Score
Baseline Conditions:	
Surface Cleanup:	
Subsurface Cleanup:	**25**

Migration Potential Input Factor Categories

Is there any physical or historical evidence that indicates it is possible for natural physical forces in the area (e.g., frost heave, erosion) to expose subsurface MEC items, or move surface or subsurface MEC items?

Yes

If "yes", describe the nature of natural forces. Indicate key areas of potential migration (e.g., overland water flow) on a map as appropriate (attach a map to the bottom of this sheet, or as a separate worksheet).

Temperatures of freezing or below occur regularly each winter and the frost line extends down to approximately

The following table is used to determine scores associated with the migration potential:

	Baseline Conditions	Surface Cleanup	Subsurface Cleanup
Possible	30	30	10
Unlikely	10	10	10

Based on the question above, migration potential is 'Possible.' ***Score***

Baseline Conditions:	**30**
Surface Cleanup:	**30**
Subsurface Cleanup:	**10**

Reference(s) for above information:

Select Ref(s)

MEC Classification Input Factor Categories

Cased munitions information has been inputed into the 'Munitions, Bulk Explosive Info' Worksheet; therefore, bulk explosives do not comprise all MECs for this MRS.

The 'Amount of MEC' category is 'Safety Buffer Areas'. It cannot be automatically assumed that the MEC items from this category are DMM. Therefore, the conservative assumption is that the MEC items in this MRS are UXO.

Has a technical assessment shown that MEC in the OB/OD Area is DMM?

Are any of the munitions listed in the 'Munitions, Bulk Explosive Info' Worksheet: Yes

- Submunitions
- Rifle-propelled 40mm projectiles (often called 40mm grenades)
- Munitions with white phosphorus filler
- High explosive anti-tank (HEAT) rounds
- Hand grenades
- Fuzes
- Mortars

At least one item listed in the 'Munitions, Bulk Explosive Info' Worksheet was identified as 'fuzed'.

The following table is used to determine scores associated with MEC classification categories:

UXO Special Case	Baseline Conditions	Surface Cleanup	Subsurface Cleanup
UXO Special Case	180	180	180
UXO	110	110	110
Fuzed DMM Special Case	105	105	105
Fuzed DMM	55	55	55
Unfuzed DMM	45	45	45
Bulk Explosives	45	45	45

Based on your answers above, the MEC classification is 'UXO Special Case'. ***Score***

Baseline Conditions:	**180**
Surface Cleanup:	**180**
Subsurface Cleanup:	**180**

MEC Size Input Factor Categories

The following table is used to determine scores associated with MEC Size:

	Description	Baseline Conditions	Surface Cleanup	Subsurface Cleanup
Small	Any munitions (from the 'Munitions, Bulk Explosive Info' Worksheet) weigh less than 90 lbs; small enough for a receptor to be able to move and initiate a detonation	40	40	40
Large	All munitions weigh more than 90 lbs; too large to move without equipment	0	0	0

Based on the definitions above and the types of munitions at the site (see 'Munitions, Bulk Explosive Info' Worksheet), the MEC Size Input Factor is: Small

	Score
Baseline Conditions:	**40**
Surface Cleanup:	**40**
Subsurface Cleanup:	**40**

Scoring Summary

Site ID:	OD Grounds-Kickout Area	a. Scoring Summary for Current Use Activities	
Date:	4/2/2012	Response Action Cleanup:	No Response Action
Input Factor		Input Factor Category	Score
I. Energetic Material Type		High Explosive and Low Explosive Filler in Fragmenting Rounds	100
II. Location of Additional Human Receptors		Outside of the ESQD arc	0
III. Site Accessibility		Full Accessibility	80
IV. Potential Contact Hours		<10,000 receptor-hrs/yr	15
V. Amount of MEC		Safety Buffer Areas	30
VI. Minimum MEC Depth Relative to Maximum Intrusive Depth		Baseline Condition: MEC located surface and subsurface. After Cleanup: Intrusive depth overlaps with subsurface MEC.	240
VII. Migration Potential		Possible	30
VIII. MEC Classification		UXO Special Case	180
IX. MEC Size		Small	40
		Total Score	715
		Hazard Level Category	3

Site ID:	OD Grounds-Kickout Area	[illegible]	
Date:	4/2/2012	Response Action Cleanup:	No Response Action
Input Factor		Input Factor Category	Score
[illegible]		[illegible]	[illegible]
[illegible]			
[illegible]			
[illegible]			
[illegible]		[illegible]	[illegible]
[illegible]			
[illegible]		[illegible]	[illegible]
[illegible]		[illegible]	[illegible]
[illegible]		[illegible]	[illegible]
		Total Score	380
		Hazard Level Category	[illegible]

Site ID:	OD Grounds-Kickout Area	c. Scoring Summary for Response Alternative 1: geophysical mapping, intrusive investigation, installation of	
Date:	4/2/2012	Response Action Cleanup:	cleanup of MECs located both on the surface and subsurface
Input Factor		Input Factor Category	Score
I. Energetic Material Type		High Explosive and Low Explosive Filler in Fragmenting Rounds	100
II. Location of Additional Human Receptors		Outside of the ESQD arc	0
III. Site Accessibility		Full Accessibility	80
IV. Potential Contact Hours		<10,000 receptor-hrs/yr	5
V. Amount of MEC		Safety Buffer Areas	5
VI. Minimum MEC Depth Relative to Maximum Intrusive Depth		Baseline Condition: MEC located surface and subsurface, After Cleanup: Intrusive depth does not overlap with subsurface MEC.	25
VII. Migration Potential		Possible	10
VIII. MEC Classification		UXO Special Case	180
IX. MEC Size		Small	40
		Total Score	445
		Hazard Level Category	4

Site ID:	OD Grounds-Kickout Area	[illegible]	
Date:	4/2/2012	Response Action Cleanup:	
Input Factor		Input Factor Category	Score
[illegible]		[illegible]	
[illegible]		[illegible]	
[illegible]			
[illegible]			
[illegible]		[illegible] Areas	
[illegible]			
[illegible]		[illegible]	
[illegible]		[illegible]	
[illegible]		[illegible]	
		Total Score	
		Hazard Level Category	

MEC HA Hazard Level Determination		
Site ID: OD Grounds-Kickout Area		
Date: 4/2/2012		
	Hazard Level Category	Score
a. Current Use Activities	3	715
b. Future Use Activities	4	380
c. Response Alternative 1: geophysical mapping, intrusive investigation, installation of cap, followed by implementation of	4	445
d. Response Alternative 2:		
e. Response Alternative 3:		
f. Response Alternative 4:		
g. Response Alternative 5:		
h. Response Alternative 6:		
Characteristics of the MRS		
Is critical infrastructure located within the MRS or within the ESQD arc?	No	
Are cultural resources located within the MRS or within the ESQD arc?	No	
Are significant ecological resources located within the MRS or within the ESQD arc?	No	

APPENDIX C

DETAILED COST ESTIMATE

Table C-1A
Summary of Costs for Alternative 2
Feasibility Study Report - OD Grounds
Seneca Army Depot Activity

Description	Total Labor Hours	Total Labor Budget	Total Subs, Equipment, and ODCs	Total Costs
Capital Costs				
Reporting	6,350	$572,550	$23,000	$595,550
Field Work	36,280	$2,538,300	$4,843,249	$7,381,549
Capital Costs Total	**42,630**	**$3,110,850**	**$4,866,249**	**$7,977,099**
Annual LTM				
LTM	187	$16,120	$4,995	$21,115
LUCs	64	$6,070	$4,300	$10,370
Annual LTM Costs Total	**251**	**$22,190**	**$9,295**	**$31,485**
Five Year Review	**372**	**$35,300**	**$5,000**	**$40,300**
Total Present Worth Cost[1]				**$8,856,000**

Note:
1. The total present worth cost includes a 5-Year Review, and the annual LTM and LUC review, with a discount rate of 2% over a 30 year interval.

Table C-1B
Labor Costs for Alternative 2
Feasibility Study Report - OD Grounds
Seneca Army Depot Activity

Description	Project Manager	Safety Manager	Site Manager	Engineer II	Engineer I	Sr. Geologist	Geophysicist	Drafter	Admin Support	SUXOS	UXO QC	UXOSO	UXO Tech I	UXO Tech II	UXO Tech III	Total Hours	Total Labor
	$140	$120	$100	$90	$80	$75	$80	$60	$55	$75	$67	$69	$46	$55	$66		
Reporting	**910**	**600**	**0**	**1,470**	**1,760**	**280**	**0**	**1,180**	**150**	**0**	**0**	**0**	**0**	**0**	**0**	**6,350**	**$572,550**
Work Plans	550	400	0	800	1,012	100	0	692	75	0	0	0	0	0	0	3,629	$331,105
Completion Report	360	200	0	670	748	180	0	488	75	0	0	0	0	0	0	2,721	$241,445
Field Work	**1,500**	**120**	**3,000**	**1,200**	**3,000**	**3,000**	**1,200**	**60**	**0**	**2,800**	**2,000**	**2,200**	**7,500**	**6,700**	**2,000**	**36,280**	**$2,538,300**
DGM/Intrusive Invest.	1,000	80	2,000	600	300	1,500	1,200	0	0	2,800	2,000	2,200	7,500	6,100	2,000	29,280	$1,944,400
Capping	500	40	1,000	600	2,700	1,500	0	60	0	0	0	0	0	600	0	7,000	$593,900
Excavation, T&D	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	$0
LTM	**20**	**5**	**0**	**80**	**30**	**10**	**0**	**12**	**30**	**0**	**0**	**0**	**0**	**0**	**0**	**187**	**$16,120**
	20	5	0	80	30	10	0	12	30	0	0	0	0	0	0	187	$16,120
LUCs	**16**	**0**	**0**	**20**	**10**	**10**	**0**	**8**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**64**	**$6,070**
	16	0	0	20	10	10	0	8	0	0	0	0	0	0	0	64	$6,070
Total Hours	**2,446**	**725**	**3,000**	**2,770**	**4,800**	**3,300**	**1,200**	**1,260**	**180**	**2,800**	**2,000**	**2,200**	**7,500**	**6,700**	**2,000**	**42,881**	
Total Labor	**$342,440**	**$87,000**	**$300,000**	**$249,300**	**$384,000**	**$247,500**	**$96,000**	**$75,600**	**$9,900**	**$210,000**	**$134,000**	**$151,800**	**$345,000**	**$368,500**	**$132,000**		**$3,133,040**

Table C-1C
Equipment and ODC Costs for Alternative 2
Feasibility Study Report - OD Grounds
Seneca Army Depot Activity

Description	Quantity	Units	Unit Price	Total
Reporting				**$23,000**
Reproduction/Shipping	1	LS	$8,000	$8,000
Travel	1	LS	$15,000	$15,000
Field Work				**$1,595,770**
EM 61	55	/per unit/ mo	$1,774	$97,570
Radios	80	/per unit/ mo	$75	$6,000
Schonstedts	35	/per unit/ mo	$450	$15,750
Trimble	70	/per unit/ mo	$550	$38,500
Vehicles	50	/per unit/ mo	$900	$45,000
H&S equipment	2	LS	$10,000	$20,000
Office equipment	1	LS	$12,000	$12,000
Field materials (tape, flags, etc)	4	LS	$8,000	$32,000
Per Diem	6,700	/per day/per person	$146	$978,200
Kubota	10	/per unit/ mo	$1,575	$15,750
Tow Behind Magnet	1	LS	$35,000	$35,000
Other travel	1	LS	$300,000	$300,000
LTM				**$4,995**
Reproduction and Binding	4400	/page	0.64	$2,816
Airfare	2	/trip	500	$1,000
Per Diem	8	/day	123	$984
Mileage	100	/mile	0.55	$55
Car	4	/day	35	$140
LUCs				**$4,300**
Reproduction/Shipping	1	LS	$800	$800
Travel	1	LS	$3,500	$3,500
Total				**$1,628,065**

Table C-1D
Subcontractor Costs for Alternative 2
Feasibility Study Report - OD Grounds
Seneca Army Depot Activity

Description	Quantity	Units	Unit Price	Total
Reporting				**$0**
Field Work				**$3,247,479**
Brush Clearing	1	LS	$210,500	$210,500
UXO				$655,890
UXO Tech III and associated equipment	229.0	per day	$1,092	$250,022
Mob/demob for UXO Tech III and equipment	17.0	per event	$1,962	$33,357
UXO Tech II and associated equipment	229.0	per day	$990	$226,671
Mob/demob for UXO Tech II and equipment	17.0	per event	$1,962	$33,357
Project Management	58.0	per week	$278	$16,130
Per event explosives	58.0	per event	$862	$50,002
Per event, delivery of explosives and related materials	19.0	per event	$1,125	$21,370
4x4 Truck and fuel	58.0	per week	$407	$23,597
Mob/demob for 4x4 truck	17.0	per event	$81	$1,383
Scrap Disposal	1	LS	$37,200	$37,200
Scrap < 31 mm	45	ton	$250	$11,250
Scrap > 31 mm	12	ton	$600	$7,200
Transportation	5	per event	$2,000	$10,000
Documentation	5	per event	$1,750	$8,750
Surveyor	1	LS	29000	$29,000
Analytical	290	per sample	$120	$34,800
Geotech	1,125	per sample	$200	$225,000
Hydroseeding	1	LS	$55,000	$55,000
Earthwork				$1,307,000
Excavation	83,800	cy	$15	$1,257,000
Site prep/maintenance (e.g., haul road, restoration, erosion controls)	1	LS	$50,000	$50,000
LTM				**$0**
LUCs				**$0**
Total				**$3,247,479**

Table C-2A
Summary of Costs for Alternative 3
Feasibility Study Report - OD Grounds
Seneca Army Depot Activity

Description	Total Labor Hours	Total Labor Budget	Total Subs, Equipment, and ODCs	Total Costs
Capital Costs				
Reporting	6,350	$572,550	$23,000	$595,550
Field Work	67,350	$4,684,700	$22,272,035	$26,956,735
Capital Costs Total	**73,700**	**$5,257,250**	**$22,295,035**	**$27,552,285**
Annual LUC Inspections	**69**	**$6,470**	**$4,300**	**$10,770**
Five Year Review	**372**	**$35,300**	**$5,000**	**$40,300**
Total Present Worth Cost[1]				**$27,967,000**

Note:

1. The total present worth cost includes a 5-Year Review, and the annual LUC review, with a discount rate of 2% over a 30 year interval.

Table C-2B
Labor Costs for Alternative 3
Feasibility Study Report - OD Grounds
Seneca Army Depot Activity

Description	Project Manager	Safety Manager	Site Manager	Engineer II	Engineer I	Sr. Geologist	Geophysicist	Drafter	Admin Support	SUXOS	UXO QC	UXOSO	UXO Tech I	UXO Tech II	UXO Tech III	Total Hours	Total Labor
	$140	$120	$100	$90	$80	$75	$80	$60	$55	$75	$67	$69	$46	$55	$66		
Reporting	**910**	**600**	**0**	**1,470**	**1,760**	**280**	**0**	**1,180**	**150**	**0**	**0**	**0**	**0**	**0**	**0**	**6,350**	**$572,550**
Work Plans	550	400	0	800	1,012	100	0	692	75	0	0	0	0	0	0	3,629	$331,105
Completion Reports	360	200	0	670	748	180	0	488	75	0	0	0	0	0	0	2,721	$241,445
Field Work	**2,200**	**200**	**5,200**	**5,100**	**4,800**	**4,300**	**1,250**	**0**	**0**	**5,800**	**2,200**	**5,200**	**15,500**	**10,600**	**5,000**	**67,350**	**$4,684,700**
DGM/Intrusive Invest.	1,000	80	2,000	600	300	1,500	1,200	0	0	2,800	2,000	2,200	7,500	6,100	2,000	29,280	$1,944,400
Capping	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	$0
Excavation, T&D	1,200	120	3,200	4,500	4,500	2,800	50	0	0	3,000	200	3,000	8,000	4,500	3,000	38,070	$2,740,300
LTM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**$0**
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	$0
LUCs	**16**	**0**	**0**	**20**	**15**	**10**	**0**	**8**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**69**	**$6,470**
	16	0	0	20	15	10	0	8	0	0	0	0	0	0	0	69	$6,470
Total Hours	**3,126**	**800**	**5,200**	**6,590**	**6,575**	**4,590**	**1,250**	**1,188**	**150**	**5,800**	**2,200**	**5,200**	**15,500**	**10,600**	**5,000**	**73,769**	
Total Labor	**$437,640**	**$96,000**	**$520,000**	**$593,100**	**$526,000**	**$344,250**	**$100,000**	**$71,280**	**$8,250**	**$435,000**	**$147,400**	**$358,800**	**$713,000**	**$583,000**	**$330,000**		**$5,263,720**

Table C-2C
Equipment and ODC Costs for Alternative 3
Feasibility Study Report - OD Grounds
Seneca Army Depot Activity

Description	Quantity	Units	Unit Price	Total
Reporting				**$23,000**
Reproduction/Shipping	1	LS	$8,000	$8,000
Travel	1	LS	$15,000	$15,000
Field Work				**$2,217,675**
EM 61	100	/per unit/ mo	$1,774	$177,400
Radios	155	/per unit/ mo	$75	$11,625
Schonstedts	110	/per unit/ mo	$450	$49,500
Trimble	105	/per unit/ mo	$550	$57,750
Vehicles	120	/per unit/ mo	$900	$108,000
H&S equipment	3	LS	$10,000	$30,000
Office equipment	1	LS	$12,000	$12,000
Field materials (tape, flags, etc)	4	LS	$8,000	$32,000
Per Diem	9,000	/per day/per person	$146	$1,314,000
Kubota	32	/per unit/ mo	$1,575	$50,400
Tow Behind Magnet	1	LS	$35,000	$35,000
Other travel	1	LS	$300,000	$300,000
Demo	2	LS	$20,000	$40,000
LTM				**$0**
Reproduction and Binding		/page	0.64	$0
Airfare		/trip	500	$0
Per Diem		/day	123	$0
Mileage		/mile	0.55	$0
Car		/day	35	$0
LUCs				**$4,300**
Reproduction/Shipping	1	LS	$800	$800
Travel	1	LS	$3,500	$3,500
Total				**$2,244,975**

Table C-2D
Subcontractor Costs for Alternative 3
Feasibility Study Report - OD Grounds
Seneca Army Depot Activity

Description	Quantity	Units	Unit Price	Total
Reporting				$0
Field Work				$20,054,360
Brush Clearing	1	LS	$210,577	$210,577
UXO				
UXO Tech III and associated equipment	409.5	per day	$1,092	$447,092
Mob/demob for UXO Tech III and equipment	33.5	per event	$1,962	$65,732
UXO Tech II and associated equipment	409.5	per day	$990	$405,335
Mob/demob for UXO Tech II and equipment	32.3	per event	$1,962	$63,377
Project Management	104.6	per week	$278	$29,089
Per event explosives	123.4	per event	$862	$106,384
Per event, delivery of explosives and related materials	25.6	per event	$1,125	$28,794
4x4 Truck and fuel	103.6	per week	$407	$42,150
Mob/demob for 4x4 truck	32.3	per event	$81	$2,628
Scrap Disposal				
Scrap < 31 mm	45	ton	$250	$11,250
Scrap > 31 mm	12	ton	$600	$7,200
Transportation	5	per event	$2,000	$10,000
Documentation	5	per event	$1,750	$8,750
Surveyor	1	LS	$4,000	$4,000
Analytical	400	Per sample	$120	$48,000
Geotech	0	Per sample	$0	$0
Hydroseeding	0	LS	$0	$0
Earthwork				
Excavation	160,000	cy	$15	$2,400,000
Sifting	160,000	cy	$50	$8,000,000
Site prep/maintenance (e.g., haul road, restoration, erosion controls)	1	LS	$100,000	$100,000
T&D	268,800	ton	$30	$8,064,000
LTM				$0
LUCs				$0
Total				$20,054,360

Army's Response to Comments from the United States Environmental Protection Agency

Subject: Draft Feasibility Report
Munitions Response Action at Open Detonation Grounds
Seneca Army Depot
Romulus, New York

Comments Dated: October 18, 2012

Date of Comment Response: April 17, 2013

<u>Army's Response to Comments</u>

GENERAL COMMENTS

Comment 1. The FS does not clearly identify the boundaries of the Open Detonation (OD) Grounds. Figure 1-3, OD Grounds Site Plan, shows the OD Hill Area in blue shading, but it is unclear if the OD Hill Area represents just a portion of the OD Grounds or if the OD Grounds extends beyond this boundary. Section 1.2.1, OD Grounds Description, indicates that the OD Grounds consists of 365 acres. A clearly defined boundary for the OD Grounds, which encompasses these 365 acres of land, needs to be included in the FS to better portray the area that is addressed by this FS. Revise the FS to include site figures that clearly portray the boundaries of the OD Grounds.

Response 1: Figure 1-3 has been renumbered as Figure 1-2, and has been updated to better distinguish the extent of the OD grounds. The text was updated to provide a more through explanation of the OD Grounds boundary. The acreage was revised to 403 acres.

> The OD Grounds consists of 403 acres and was used to perform open detonation and burning of munitions. The acreage includes the area enveloped by a 2500 foot radius around OD Hill. Note that the Open Burning Grounds (also known as SEAD-23) is a separate site that was previously addressed and is not included in the calculation of the OD Grounds acreage.

Comment 2. The FS includes a Munitions and Explosives of Concern (MEC) Hazard Assessment for the Open Detonation Grounds (Appendix B) to assess qualitatively the potential explosive hazards to human receptors; however, this assessment focuses on the explosive hazard and does not address potential human health risks associated with chemical exposure to munitions constituents (MC) in site media nor does it address potential ecological risks. The FS does not include nor reference a baseline human health risk assessment (BHHRA) and/or baseline ecological risk assessment (BERA) to determine whether constituents identified in site media result in potentially unacceptable risks to human or ecological receptors. In order to determine whether remedial action is necessary to protect human health or the environment from exposure to unacceptable levels of MC, a BHHRA and a BERA need to be conducted, and results summarized in the FS in support of the need for remedial action at the site. The results of these risk assessments will also determine which media (i.e., surface water, soil, etc.) and which chemical constituents need to be addressed by a remedial action. Revise the FS to present the results of a BHHRA and a BERA in support of the need for remedial action, and revise the proposed remedial alternatives, as appropriate, to address the results of these risk assessments.

Response 2: Results of a baseline risk assessment are used to determine the need for and the scope of a potential remedial action. Risk is the common driver for remedial actions.

At the OD Grounds, the primary COC is the potential exposure to MPPEH, and the presence of metals contamination is incidental to the MPPEH concern. A MEC Hazard analysis (MEC HA) was conducted for the OD Grounds site, and the results are presented in the subject document, which indicate that a remedial action is necessary. The results of the MEC HA indicate that there is a threat to human health corresponding to a level of "highest potential explosive hazard conditions" based on the current condition of the OD Grounds. The MEC HA evaluated the impact of implementing either of the remedial alternatives presented in the FS, and the results of the analysis suggested that implementation of either remedy would significantly reduce the hazard to a level of "low potential explosive hazard conditions".

The Army intends to proceed with implementing a remedial action driven by the need to address the risk posed by the potential presence of MPPEH at the site. As such, a baseline HHRA is not necessary to determine if a remedial action is required. The metals contamination at the site will be compared to the relevant criteria values as a means to confirm that residual levels of metals that remain at the site after the completion of the remedial action would not be of concern. It is also noted that Figure 1-6A and 6B (formally Figures 1-5) highlight that elevated concentrations of metals are concentrated close to the OD Hill. Consequently, this area of soil would be addressed as part of either of the proposed remedial alternatives designed to address the MPPEH hazard.

Comment 3. The FS indicates that the New York State Department of Environmental Conservation (NYSDEC) Soil Cleanup Objectives (SCOs) for a commercial use scenario are the most relevant and appropriate criteria for the site based on the site's anticipated future use for recreation/conservation; however, the FS has not presented sufficient justification that the exposure assumptions inherent in the commercial use SCOs are consistent with anticipated future recreational exposures at the site. Furthermore, the *New York State Brownfield Cleanup Program Development of Soil Cleanup Objectives Technical Support Document,* dated September 2006 (Technical Support Document), Section 3.0, Land Use Descriptions, suggests that a "Restricted-residential use" land category, for which separate SCOs have been developed, may be more applicable to the site. The Technical Support Document states that a restricted-residential use scenario "includes active recreational uses, which are public uses with a reasonable potential for soil contact." Revise the FS to clarify whether the NYSDEC SCOs for a restricted-residential use land category are more appropriate for the site, based on the anticipated future use of the site, or provide further justification for selecting the NYSDEC SCOs for a commercial use scenario as the most relevant and appropriate criteria for the site. If it is determined that the NYSDEC SCOs for a restricted-residential use land category are more appropriate for the site, data summary tables should compare detected concentrations in site media to these criteria, and the nature and extent of contamination summaries should be updated accordingly. To satisfy the substantive requirements under CERCLA, site data should also be compared to the USEPA Regional Screening Levels (RSLs) based on residential exposures.

Response 3: As defined in NYSDEC regulations Subpart 375-1: General Remedial Programs Requirements, Subparagraph 375-1.8(g)(2)(iii) defines commercial use as: "the land use category which shall only be considered for the primary purpose of buying, selling or trading of merchandise or services. Commercial use includes *passive recreational uses*, which are public uses with limited potential for soil contact." The anticipated future use of the OD Grounds area is for conservation / recreation purposes (See Figure 1-3). LUCs will be implemented to included restrictions on the type of recreational use offered to the public. Intrusive activities such as camping or digging will not be allowed.

There is no expected residential use of any type (even with restrictions) do to the past use of the site as a OB/OD range and the planned future use for conservation/recreation. The Army did consider the application of the Restricted Residential SCO; however, this objective was not appropriate since no type of residential use will be permitted at the site.

We have prepared comparisons of Commercial SCOs, Restricted Residential SCOs, and USEPA RSLs for residential exposure, and they are provided as Attachments 1 and 2 to this response to comments. The difference between the commercial and restricted residential SCO is mainly the identification of one exceedence of lead. The lead is located close to the OD Hill and would be addressed as part of the selected remedial alternative. The goal of the remediation is to restore the site to a condition suitable for transfer. During the confirmatory sampling process following the remedial action, the Army may revisit the determination of the cleanup goal in light of property transfer requirements.

Comment 4. The FS has not demonstrated that the nature and extent of MC in soil has been sufficiently characterized. Section 1.3, Nature and Extent of Impacts, describes soil analytical results, but does not differentiate between surface soil samples and subsurface soil samples so the lateral and vertical extent of soil contamination is unclear. Figure 1-5 A, Metals Exceedances in Soil at the OD Grounds, and Figure 1-5B, Metals Exceedances in Soil at the OD Grounds (OD Hill Area), also do not distinguish between surface or subsurface soil sample locations. However, based on the limited information provided in these two figures, the extent of metals contamination has not been well delineated in the northeast and southeast quadrants within the 500-foot radius from the OD Hill center point as minimal sampling appears to have been conducted in these areas.

In addition, Section 1.3.1, Soil, notes that a concentration of Aroclor-1254 in one sample exceeded the Commercial SCO, but the FS does not further address this exceedance or indicate whether further samples have been collected that adequately bound the contamination both laterally and vertically.

Furthermore, it does not appear that any soil samples were analyzed for dioxins/furans based on the analytical descriptions in Section 1.2.6, Previous Investigations and Activities. Given the nature of activities at the site and the potential for the generation of dioxins/furans as a result of open burning/detonation activities, additional samples should be collected for these constituents to ensure an adequate dioxin/furan data set for site characterization and risk assessment.

If a comprehensive Remedial Investigation (RI) Report consistent with the *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA* (October 1988, EPA/540/G-89/004) (RI/FS Guidance), which summarizes all of the previously collected data and presents a complete evaluation of the nature and extent of contamination will not be prepared for the OD Grounds, the FS needs to demonstrate that the nature and extent of contamination has been adequately characterized prior to moving forward with remedy evaluation and selection. This will allow for a better approximation of the area and volume of site media that require remediation. In addition, please describe how the data gap associated with the lack of dioxin/furan data will be addressed, or provide adequate justification for not assessing these constituents.

Response 4: Figures 1-4 and 1-5 (now referred to as Figures 1-5 and 1-6) have been revised to denote whether the samples were surface or subsurface samples.

The previous soil sampling efforts have adequately described the nature and extent of contamination. Figures 1-5A and 1-5B provide a visual illustration that the impacts to soil are focused on the area surrounding the OD Hill, and the soil concentrations are below guidance levels at locations beyond the 500 foot radius depicted on the figures. All soil samples collected outside of the 500 ft radius ring, including samples located to the northeast and southeast quadrants, are below the Commercial SCOs for metals. This highlights that any potential impacts on soil are within the 500 foot radius. The exact boundary of impacted soil will be determined by soil sampling that will be conducted as part of the cap design.

The concentration of aroclor-1254 appears to be an isolated contaminant. Aroclor-1254 was detected at two soil sample locations. The maximum concentration of aroclor-1254, 2,000 µg/kg, was detected in the surface soil sample S45-ODH-4-01 located on the eastern side of the OD Hill, and this concentration is above the NYS Commercial SCO value of 1,000 µg/kg. The second detection of aroclor-1254 in the surface soil was observed in the sample duplicate collected at SS45-10 at an estimated concentration of 110 J µg/kg, below the commercial SCO; aroclor-1254 was not detected in the duplicate's associated sample. Aroclor-1254 was not detected in the subsurface soil or in groundwater. Based on the fact that the PCB was not detected in any other samples on or surrounding the OD Hill, and groundwater sampling has confirmed that the PCB has not migrated to groundwater, aroclor-1254 is not considered a constituent of concern.

Dioxin and furan testing was not considered as part of the confirmation testing program for this site. The precedence set at SEAD-23 was used as the basis for testing requirements here since the entire SEAD-23 is wholly within this site. The Army did not expect to be required to reopen the previously agreed on conditions and considered them as an acceptable basis for the remedial action proposed.

Comment 5. The FS has not identified numerous sampling locations on site figures, including groundwater sample locations, sediment sample locations, and surface water sample locations. This deficiency impedes an assessment of the data with respect to evaluating source areas and migration pathways. All sampling locations for the OD Grounds need to be adequately documented in this FS. Revise the FS to include site figures that identify all sample locations, including groundwater monitoring wells that may be located outside the boundary of the OD Grounds but were used to evaluate groundwater conditions at the OD Grounds.

Response 5: Figure 1-4 was added to the subject document, and it presents the historic sediment, surface water, and groundwater sample locations. It also shows groundwater contours at the OB Grounds from a recent OB Grounds LTM event. Note that figures previously labeled Figures 1-4 and 1-5 have been subsequently renumbered as 1-5 and 1-6, respectively.

Comment 6: Inconsistent screening criteria have been used to evaluate site sediment data. Table 1-4, Summary of Sediment Data, identifies the NYSDEC Commercial SCOs (6 NYCRR Subpart 375-6) as the applicable screening criteria for sediment whereas Table A-4, Analytical Results for Sediment Samples at OD Grounds, of Appendix A compares sediment data to the NYS SCO Unrestricted Use values. As previously noted, unless significant justification can be provided to show that the use of the Commercial SCOs are sufficiently protective of human health and the environment at this site, the unrestricted use criteria should be utilized during the initial assessment phase. Revise the FS to consistently compare sediment data to unrestricted use screening criteria, to include the USEPA RSLs for residential soil, or provide significant justification for use of the Commercial SCOs.

Response 6: Refer to response to general comment 3 above. Additionally, it should be noted that the remedy for the OB Grounds includes an annual sediment inspection of Reeder Creek. Should the condition of the sediment change it will be observed and documented as part of the OB Grounds annual survey.

Comment 7. The FS has not clearly defined general response actions for each medium of interest at the site. Table *2-2,* OD Grounds Feasibility Study ~ Technology Screening, only identifies a "No Action" general response action and a generic "Remedial Action" general response action under the General Response Action column. General response actions for soil, which is identified as a medium of interest in this FS, typically include no action; land use controls (LUCs); containment; excavation; treatment (in-situ or ex-situ); off-site disposal, or other action. The FS needs to expand its general response actions for soil to include, at a minimum, the actions listed above to ensure that all promising alternatives are considered. Table 2-2 should be updated to include these general response actions, and the text of the FS should present a narrative description of each general response included in the table. Technologies applicable to each of the general response actions (such as engineering controls [ECs] as a type of land use control [LUC]) could then be screened for effectiveness, implement ability, and relative cost in the preliminary identification and screening of technologies. Revise the FS to clearly define an expanded list of general response actions for each medium of interest at the site.

Response 7: A new section "Section 2.5 General Response Action" was added before the section previously numbered as 2.5, "Identification and Screening of Technologies".

The response actions presented are as follows:

- No Action
- Hazard Management – LUCs (etc)
- Remedial Action (Mapping, excavation, disposal, capping, restoration) – MEC removal through geophysical mapping and excavation, soil excavation, MEC disposal, soil capping, site restoration

With the exception of the No Action alternative, the general response actions identified above may be combined in developing remedial action alternatives for the project site. Some areas may exhibit a higher MEC density and a correspondingly greater potential for MEC hazards so it may be appropriate to apply a different response action or combination of response actions in different parts of the site.

The No Action alternative refers to a site remedy where no active remediation or enforceable LUCs are implemented. Under CERCLA, evaluation of a No-Action alternative is required, pursuant to the NCP (42 CFR 300.430 et seq.), to provide a baseline for comparison with other remedial technologies and alternatives.

Hazard management technologies include enforceable administrative institutional controls and/or physical measures (engineering controls) to prevent or limit exposure of receptors to MEC or MC. A deed notice/environmental easement is an example of an institutional control. Physical barriers and access restrictions (e.g., fencing, locked gates, and warning signs) or activity restrictions (prohibiting intrusive activities) are examples of engineering controls. LUCs can be cost-effective, reliable, and immediately effective, and can be implemented either alone or in conjunction with other remedial components. Inspections and monitoring typically are required to document long-term effectiveness of LUCs. The administrative feasibility of and cost to implement LUCs depend on site-specific circumstances (e.g., whether or not a site is under the direct operational control of the DoD, or has been transferred to non-federal ownership).

Table 2-2 was revised to include all three response actions.

Subsequent sections have been renumbered accordingly.

Comment 8. Section 3.2, Description of Alternatives, identifies LUCs as a component of Alternatives 2 and 3, yet LUCs were not included in the preliminary evaluation of alternatives, or even identified as a general response action for the site. LUCs need to be carried through the preliminary evaluation process just as any other technology prior to their inclusion as part of a remedial alternative. Revise the FS to identify LUCs as a general response action, identify the types of LUCs that may be used at the site (institutional controls [ICs] or ECs), and carry these technology types through the preliminary screening of technologies.

Response 8: Hazard management, with LUCs identified as the remedial technology, was added to the evaluation of technologies in Section 2.0. As noted in response to general comment 7, a new Section 2.5 "General Response Actions" has been added to the text and presents No Action, LUCs, and Remedial Action. LUCs were also added to Table 2-2.

Comment 9: The descriptions of the alternatives retained for detailed analysis in Section 4.0 are insufficiently detailed. The FS does not provide an estimate on the areal extent of the cap proposed as part of Alternative 2 nor does it provide an approximate volume of soil that may be excavated as part of Alternative 3. Uncertainties and assumptions associated with the alternatives are also not described. The RI/FS Guidance states, in Section 6.2.1, Alternative Definition, "Alternatives are defined during the development and screening phase. However, the alternatives selected as the most promising may need to be better defined during the detailed analysis. Each alternative should be reviewed to determine if an additional definition is required to apply the evaluation criteria consistently and to develop order-of-magnitude cost estimates (i.e., having a desired accuracy of +50 percent to -30 percent). The information developed to define alternatives at this stage in the RI/FS process may consist of preliminary design calculations, process flow diagrams, sizing of key process components, preliminary site layouts, and a discussion of limitations, assumptions, and uncertainties concerning each alternative." Revise the FS to present further definition of each of the alternatives retained for the detailed analysis consistent with the RI/FS Guidance to allow for a meaningful evaluation of these alternatives.

Response 9: At this time, the specific quantification information is not available for inclusion in the FS. A rough estimation of the excavation volume and the size (75,000 cy) of the cap has been added to Sections 3.2.2 and 3.2.3; however, the volume of soil excavated or and the aerial extent of the cap cannot be determined accurately until the extent of metallic saturation after the initial excavation is known. Following the excavation, the geophysical survey will be utilized to delineate the cap boundary, and GIS can be used to estimate the volume of excavated soil.

Comment 10. The detailed analysis of the nine evaluation criteria, presented in Section 4.0, Alternatives Retained for Detailed Analysis, are insufficiently detailed and do not adequately address all aspects of the evaluation criteria as presented in the RI/FS Guidance. For example, when evaluating long-term effectiveness of a remedy, the RI/FS Guidance states that the following components of the criterion should be addressed for each alternative: 1) magnitude or residual risk remaining from untreated water or waste residuals at the conclusion of remedial activities, and 2) adequacy and reliability of controls, if any, that are used to manage treatment residuals or untreated wastes that remain at the site. In Section 4.3.3.2, Assessment, for Alternative 3, neither of these components of the long-term effectiveness criterion is addressed. Substantial revision to the FS is necessary in order to present a thorough detailed evaluation of the alternatives that addresses all of the components of the nine evaluation criteria. Revise the FS to evaluate each of the alternatives with respect to all components of the nine evaluation criteria, as presented in the RI/FS Guidance, to allow for a meaningful evaluation of each alternative.

Response 10: The section has been revised to provide a more detailed evaluation against the nine criteria.

Comment 11. The comparative analyses of remedial alternatives, as presented in Table 4-1, Ranking of Alternatives, rank the proposed alternatives on a scoring system of 1 to 3. A score of 1 represents the least favorable score and 3 the most favorable. This approach does not constitute a sufficiently detailed rating system capable of providing a meaningful distinction among alternatives. Given the range of alternatives presented, three criteria do not allow for the assessment process to generate unique combinations thereby allowing for development of discriminating factors to aid in the selection of a preferred alternative. Page 55 FR 8719 of the Preamble, Section 300.430(e)(9), Detailed analysis of alternatives, states, "the purpose of the detailed analysis is to objectively assess the alternatives with respect to nine evaluation criteria that encompass statutory requirements and include other gauges of the overall feasibility and acceptability of remedial alternatives (53 FR 51428). This analysis is comprised of an individual assessment of the alternatives against each criterion and a comparative analysis designed to determine the relative performance of the alternatives and identify major trade-offs (i.e., relative advantages and disadvantages) among them. The decision-maker uses information assembled and evaluated during the detailed analysis in selecting a remedial action." The RI/FS Guidance states in Section 6.2.5, Comparative Analysis of Alternatives, page 6-14, "[a]n effective way of organizing this section is, under each individual criterion, to discuss the alternative(s) that performs the *best overall* in that category, with other alternatives discussed in the *relative order in which they perform* [emphasis added] ... . the presentation of differences among alternatives can be measured either qualitatively or quantitatively, as appropriate, and should identify substantive differences." Further discrimination between factors is needed to make this process transparent to the public and Regulatory Agencies. Revise the FS to provide a system of rating using a ranking scale that allows for differentiation of all alternatives (i.e., use a range of terminology and identify the differentiating features) so that a straightforward determination of the relative performance of the alternatives and identification of major trade-offs can be made. Please also ensure that the assessment clearly indicates the alternative(s) that performs the best overall in each category.

Response 11: The discussion has been revised to better follow the format of the RI/FS Guidance Section 6.2.5.

Comment 12. The FS assumes a discount rate of 7% when preparing the net present value cost estimates, which is not an appropriate discount rate. The note at the bottom of Page 4-5 *of A Guide to Developing and Documenting Cost Estimates During the Feasibility Study,* July 2000, states: "Real discount rates from Appendix C of OMB Circular A-94 should generally be used for all Federal facility sites." The real discount rate from Appendix C of OMB Circular A-94, Revised Dec 2011, is 2.0%, not 7% as used in the remedial alternative cost estimate tables. Please revise the FS to prepare the cost estimates using the most current discount rate from Appendix C of OMB Circular A-94.

Response 12: The FS has been updated to use the 2% discount rate.

Comment 13. The assumptions included in the cost estimates for each of the evaluated remedial alternatives are not sufficiently detailed to allow for meaningful evaluation and comparison of remedial alternatives. For example, Appendix C, Detailed Cost Estimate, Table C-1C, Equipment and ODC Costs for Alternative 2, includes a S300,000 estimate for "Other travel" without describing the basis for the estimate. Additionally, Table C-2D, Subcontractor Costs for Alternative 3, includes only lump sum costs for "Earthwork" and "T&D"(assumed to be transport and disposal costs for soil), without a breakdown of costs associated with these activities. As such, it is unclear if the remedial alternatives were appropriately scoped and costed so as to reflect a - 30% to +50% margin as allowed for during the FS process. Revise the FS to ensure all assumptions used in the cost estimates for all of the alternatives evaluated are noted and substantiated. In addition, please revise the cost estimate tables in Appendix C to define all acronyms and abbreviations used in the table to facilitate review.

Response 13: The cost estimate has been revised. The backup in Appendix C shows the detailed unit cost associated with earthwork, T&D, and UXO subcontractor costs. The revised estimate also reflects to the change to the 2% discount rate. The updated TPV costs are $8.9M and $28.0M for Alternatives 2 and 3, respectively.

Comment 14. The Draft OD MRA FS Report appears to be inconsistent with respect to the disposition of soil that is removed in Alternative 2. The Executive Summary states that, "In the metallic saturation (likely near the OD Hill), excavation of the top 6 inches of soil. Soil will be screened to remove potential MPPEH, followed by additional DGM, and intrusive investigation, (and additional excavation, if needed). The excavated overburden will be staged on-site for potential reuse and/or incorporation into the site cap." According to this statement, the soil may be used as a portion of the site cap.

However, a subsequent statement in the next portion of the Executive Summary indicates that the alternative will include "Design and construction of an engineered cap to cover contaminated soils and be at least 18 inches thick over the OD Hill area. Excavated soil that passed through the screen will be placed on the OD Hill under the cap." This seems to place all of the soil under the cap and eliminates its use in the cap itself.

Review all sections of the document that refer to Alternative 2 use of the excavated and screened soil and revise them as necessary to ensure a consistent placement of that soil on the site.

Response 14: The text in the FS has been revised to read "The excavated overburden will be staged on-site for potential reuse and/or incorporation under the site cap."

SPECIFIC COMMENTS

Comment 1. Section 1.2.1, OD Grounds Description, Page 1-2: The third paragraph of this section describes the OD Grounds, but it does not indicate how the OD Hill Area and Kick Out Area, shown on Figure 1-3, OD Grounds Site Plan, relate to the site. For clarity, a brief description of these site areas should be incorporated into the discussion of the site proper. Revise Section 1.2.1 to discuss the OD Hill Area and Kick Out Area of the OD Grounds.

Response 1: The figure (renumbered Figure 1-2) was revised to clearly show the boundary of the site. The following statement was added to the paragraph:

> For ease of discussion in this FS, two different portions of the OD Grounds Site were identified. They are referred to as the "Kickout Area" and the "OD Hill Area". The OD Hill Area is the location of demolition activities. The Kickout Area is the area in which blast fragments emanating from the OD Hill activity are expected to land. The boundaries of these areas are defined on Figure 1-3.

Comment 2. Section 1.2.1, OD Grounds Description, Page 1-2: The third paragraph describes an access road that branches off North-South Baseline Road near Building 2104, located in the southeastern corner of the OD Grounds, but the location of Building 2104 has not been identified on site figures (i.e., Figure 1-3, OD Grounds Site Plan). In addition, the FS has not identified current and historic use of Building 2104. This information needs to be provided in order to determine whether all potential sources of contamination have been identified and considered in the investigation of the OD Grounds. Revise the FS to identify Building 2104 on site figures. In addition, revise Section 1.2.1 to describe historic and current use of Building 2104.

Response 2: The text was updated to include a description of Building 2104.

> Building 2104 was built in 1951 and is described as "Change House (OB/OD Grounds)". The building is not included in lists of structures with potential UXO hazards or in which potentially hazardous materials were stored (Woodward-Clyde, 1997). A change house is a location for military personnel to change clothes and uniforms.

Figure 1-2 (formerly Figure 1-3) has been revised to designate the number of the building.

Comment 3. Section 1.2.2, Future Land Uses, Page 1-3: Section 1.2.2 refers to an incorrect site in the description of future land use. This section states, "The area that encompasses SEAD-12 was determined to be "Conservation/Recreation Area." The OD Grounds, also known as SEAD-006-R01 (formerly SEAD-45 and SEAD-115) is the subject of the FS, not SEAD-12. For accuracy, revise Section 1.2.2 to document future site use for the OD Grounds, and remove reference to SEAD-12.

Response 3: SEAD-12 was mentioned in error. The sentence was revised to remove the reference.

Comment 4. Section 1.2.4, Hydrogeology, Page 1-4: The last paragraph of Section 1.2.4 references ground water elevation data from April 1994. It is unclear if more recent data are available upon which to determine groundwater flow direction at the OD Grounds. Recent data are preferred so that current conditions at the site can be characterized with a high level of confidence. Revise the FS to clarify whether the April 1994 groundwater elevation data are the most recent data for the site.

Response 4: Samples have not been collected from the OD Grounds wells since 1994. Recent data has been collected at the adjacent Open Burning (OB) Grounds between 2007 and 2012 that suggests that groundwater flows to the northeast. The text has been revised as follows:

> Groundwater elevations collected within the Open Burning Grounds between 2007 and 2012 show a general groundwater flow to the northeast. Comparison between the 1994 data and the recent groundwater elevations suggests an approximately NNW-SSE trending groundwater divide through the western portion of the Open Burning Grounds (approximately at the large C-shaped berm visible in Figure 1-4) (Parsons, 2013). Groundwater east of the divide flows to the northeast while groundwater west of the divide flows to the southwest."

Comment 5. Section 1.2.5, SWMU History, Page 1-4: Section 1.2.5 states that the OD Grounds was used for "open burning and open detonation of explosives, propellants and pyrotechnics and other unserviceable ammunition" but specific types of explosives, propellants, pyrotechnics, and ammunition are not identified. A complete history of the site should be presented to ensure that appropriate analyses for potential chemicals of interest in site media have been selected. Revise the FS to clarify the types of explosives, propellants, pyrotechnics, and ammunition that may have been burned or detonated at the OD Grounds. Specific chemicals associated with these materials should be identified to the extent known or reasonably expected.

Response 5: There is no basis to list all items reasonably expected to have been on the site. The sampling requirements listed in the FS identify the contaminants of concern which are the most common and most abundant MC expected to be found in various types of military munitions. Any list as proposed could be misleading or subject to challenge for any munitions that may have been in the DOD inventory. No list will be provided in the FS.

Comment 6. Section 1.2.6.2, 2000 Ordnance and Explosives Engineering Evaluation and Cost Analysis, Page 1-6: This section indicates that anomalies were identified during various geophysical surveys at the site, but only a fraction of the anomalies were intrusively investigated. For example, the first paragraph on Page 1-6 notes, "Of the 1,337 anomalies identified in the EM61 surveyed grids, 86% were intrusively investigated." No discussion is presented concerning the status of the anomalies left unresolved. For clarity and completeness, expand Section 1.2.6.2 to provide a brief discussion of the unresolved anomalies, and clarify why they were not intrusively investigated. This comment also applies to the unresolved anomalies identified in Section 1.2.6.3, 2003 Phase I Geophysical Investigation, and Section 1.2.6.4, 2006 Phase II Ordnance and Explosives Removal Activities.

Response 6*:* The following text has been added to the FS:

> Occasionally, anomalies identified on the Anomaly Dig Sheet could not be reacquired with the instrument that performed the survey. In such instances, the anomaly was flagged at the coordinate location and the inability to reacquire the anomaly was documented on the reacquisition team dig sheet. The intrusive teams would again geophysically search the immediate area around the flag using both Schonstedt® and Foerster® metal-detectors. 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.

Comment 7. Section 1.2.6.3, 2003 Phase I Geophysical Investigation, Page 1-6: The second paragraph of this section states that "Of the 512 target anomalies excavated from the non-wooded / open areas, approximately 97% of the items were found at a maximum depth of 12 inches bgs. No items were excavated from a depth exceeding 20 inches bgs." The last sentence is unclear as to its exact intent. It is unclear if it indicates that all excavations stopped at 20 inches below ground surface (bgs) regardless of whether the anomaly was resolved, or if it means that all anomalies were resolved at 20 inches bgs or less. Revise the cited sentence to better explain its intent.

Response 7: The last sentence has been replaced with the following text: "No items were identified at depths exceeding 20 inches bgs."

Comment 8. Section 1.2.6.4, 2006 Phase II Ordnance and Explosives Removal Activities, Pages 1-6 and 1-7: This section uses the redundant term "MEC/UXO" in two instances. MEC (munitions and explosives of concern) is defined as follows:

"MEC: A term distinguishing specific categories of military munitions that may pose unique explosives safety risks. It is: UXO (unexploded ordnance); DMM (discarded military munitions); or MC (munition constituent) (e.g., TNT, cyclotrimethylenetrinitramine [RDX]), present in high enough concentrations to pose an explosive hazard." Based upon this definition, the term "MEC/UXO" is redundant and should be replaced with the term "MEC." Please make this correction.

Response 8: Footnote added to clarify. "*The Phase II report, and other older reports, use the term UXO to describe unexploded ordnance. UXO items were reclassified and included in the broader category of MEC. In this paragraph, both terms were used for clarity.*"

Comment 9. Section 1.2.6.3, 2003 Phase I Geophysical Investigation, Page 1-6: The last paragraph of Section 1.2.6.3 states, "This investigation identified approximately 14,700 anomalies that are to be investigated in the open areas between 1,000 ft. and 1,500 ft. from the OD Hill under an area munitions response action." The status of the area munitions response action for the area between 1,000 ft. and 1,500 ft. has not been described. For clarity, revise Section 1.2.6.3 to provide the current status of the munitions response action in this area.

Response 9: The text was revised. "*The anomalies identified within the 1,000 to 1,500 ft radius will be addressed as part of Alternatives 2 or 3 proposed in this FS.*"

Comment 10. Section 1.2.6.4, 2006 **Phase II Ordnance and Explosives Removal Activities, Page 1-7:** The last paragraph of Section 1.2.6.4 uses the term "CD" in relation to the items recovered during a removal action; however, this acronym has not been defined in the FS. For clarity, revise the FS to define CD in the List of Acronyms at the beginning of the document, and at its first use.

Response 10: The term CD was defined as cultural debris and was added to the acronym list. Cultural debris is non-munitions related debris such as barbed wire, horseshoes, and consumer hardware.

Comment 11. Section 1.2.6.5, 2010 Supplemental Work, Page 1-7: This section indicates that an objective of the 2010 supplemental investigation was to determine the volume of soil in the OD Hill, but the FS does not indicate if this objective was met. If the volume of soil in the OD Hill was determined, this information should be presented in the FS. Revise Section 1.2.6.5 to clarify if the volume of soil in the OD Hill was determined as this may impact the selection of remedial alternatives for the site.

Response 11: An estimated volume of the OD Hill was provided in the text. "*The estimated volume of the earthen mound above ground surface is 38,000 cubic yards (cy). The estimated volume of soil in the OD Hill above bedrock surface is 75,000 cy (Parsons, 2010).*"

Comment 12. Section 1.3.1, Soil, Page 1-8: This section states that soil data were compared to the May 2012 USEPA RSLs; however, a note at the bottom of Table 1-1, Summary of Surface and Subsurface Soil Samples, indicates that the June 2011 RSLs were used in the evaluation. For consistency, revise the FS to compare soil data to the most recent version of the USEPA RSL Table, currently the May 2012 update. In addition, as previously mentioned, site data should be compared to residential screening criteria, not industrial.

Response 12: The FS was revised to include the most up to date USEPA RSLs from November 2012. Please reference the response to general comment 3. Soil and sediment will remain compared to industrial screening criteria. When comparing the industrial and residential screening criteria, there are a minimal number of additional exceedances found for soil and sediment concentrations. See Attachments 1 and 2.

Comment 13. Section 1.3.1, Soil, Page 1-8: This section indicates that soil results were compared to USEPA RSLs as well as the NYSDEC SCOs for commercial use; however, the discussion of the results only addresses exceedances of the SCOs. The second paragraph of Section 1.3.1 states, "None of the VOC and SVOCs results exceed the Commercial SCOs." However, the FS fails to acknowledge that 2,4-dinitrotoluene exceeded the industrial RSL (Table 1-1, Summary of Surface and Subsurface Soil Samples). The discussion of analytical results should describe exceedances of both the SCOs and the RSLs. Revise the FS to present a discussion of soil analytical results in comparison to both the SCOs and the RSLs.

Response 13: The FS text was updated to include further discussion of soil results versus both NYSDEC SCOs (Commercial) and USEPA industrial RSLs.

> The analytical data are compared to the NYSDEC Commercial SCOs and EPA RSLs Industrial Soil. None of the VOC, herbicide, or explosive results exceed the Commercial SCOs or EPA RSLs for industrial soil. None of the SVOC results exceeded the Commercial SCOs; however, one SVOC (2,4 dinitrotoluene) exceeded its respective EPA RSL for industrial soil (Note: there is no corresponding SCO value). The concentration of one PCB, Aroclor-1254, exceed both its Commercial SCO and EPA RSL screening criteria in one sample. Among the metals, cadmium, copper and mercury were the only metals to exceed their respective Commercial SCOs. In comparison, arsenic, cadmium, and lead exceeded their respective EPA RSLs for industrial soil.

Comment 14. Section 1.3.2, Groundwater, Page 1-8: The first paragraph of this section indicates that groundwater data collected for the Open Burning (OB) Grounds site, located south of the OD Grounds, was used to evaluate groundwater conditions at the OD Grounds. The FS has not presented any figures that identify the locations of the monitoring wells used for this assessment; therefore, the applicability of using the OB Grounds wells to evaluate site groundwater at the OD Grounds cannot be established, hi addition, no potentiometric surface maps have been provided to show the anticipated groundwater flow direction at the site. A potentiometric surface map can be used to determine the relevance of using the OB Grounds data to evaluate the OD Grounds. Revise the FS to identify the monitoring wells used for the OD Grounds groundwater assessment on a site figure and justify why these wells are appropriately located and screened at appropriate depths to assess groundwater conditions at the OD Grounds. To further support the use of these wells for an assessment of groundwater conditions at the OD Grounds, revise the FS to include a recent potentiometric surface map which illustrates the groundwater flow direction in the vicinity of the site.

Response 14: The FS was updated to include a figure showing the applicable wells, potentiometric surface, and groundwater flow directions (Figure 1-4) based on available data. Additionally, see response to specific comment 4.

Comment 15. Section 1.3.2, Groundwater, Page 1-9: The last sentence of this section states, "It is not believed that the groundwater at the OD Grounds is impacted by historic site activities" but the FS has not presented sufficient evidence to justify this conclusion. First, the wells from which the data were obtained have not been identified on a figure in relation to the OD Grounds. Second, bis(2-ethylhexyl)phthalate and some metals were detected above screening criteria in groundwater samples used for the evaluation. The FS has not demonstrated that none of these constituents should be considered site-related. This section also notes that two explosives were detected in groundwater, but "below their groundwater criteria." This statement is misleading as Table 1-2 indicates that NYS Class GA criteria have not been established for one of the two explosives (i.e., HMX). Revise the discussion of the assessment of groundwater at the OD Grounds to clearly demonstrate that the wells used for the assessment are appropriate for the site, and none of the detected constituents in groundwater are site-related. In addition, revise Section 1.3.2 to more accurately present the explosives results in comparison to screening criteria by acknowledging that a NYS Class GA value has not been established for HMX. In this case, it may be appropriate to screen against the May 2012 USEPA tap water RSL for HMX (780 micrograms per liter [ug/L]).

Response 15: The groundwater well locations were added to Figure 1-4.

Adjacent to OD Hill, the groundwater within the OB Grounds site was sampled and six wells from this site currently are undergoing long-term monitoring. Groundwater monitoring for explosives, metals, total organic carbon, total organic halides, pH, pesticides, and nitrates between 1981 through 1987 indicated no exceedances of then current NYS AWQS except for iron and manganese. In 1989, sampling was conducted on ten additional installed wells and six of the seven previous wells. This round of sampling examined EP Toxicity metals and explosives. No metals or explosives exceeded applicable screening criteria.

Results from Phase I and II groundwater sampling at the OB Grounds were compiled in the OB Grounds RI Report. Analytes examined during these sampling events included VOA, semivolatiles (SVOCs), pesticides, and PCBs, TAL metals, and explosives. Groundwater was found to be minimally impacted by metals and explosives. Based on these results, the 1996 OB Grounds FS Report determined that groundwater was not a medium of concern.

Based on the 1999 Record of Decision (ROD) for the OB Grounds, lead and copper were the contaminants of concern proposed for remedy in the site soils and sediments adjacent to Reeder Creek. Between 2007 and 2012, long-term monitoring of wells within the Open Burning Grounds for copper and lead has shown no evidence of lead or copper in the groundwater above the cleanup goals subsequent to the completion of the remedial action for the Site. These findings are consistent with the groundwater analytical results obtained during the remedial investigation stage (1990s) of work at the Site, indicating that there is no evidence of groundwater quality deterioration over approximately 20 years (Parsons, 2012).

Although the OB Grounds are not immediately downgradient from the OD Grounds, the results from previous investigations at the OB Grounds site can be used as an analogue for the potential groundwater contamination expected in the adjacent OD Grounds. Potential contaminants, fate and transport, and exposure scenarios are expected to be the same as was discussed in previous studies. As such, groundwater is not expected to be a medium of concern within the OD Grounds; however, potential examination of the groundwater may be appropriate subsequent to the remedial alternative selected in this FS.

The text was revised as follows:

> Two explosives were detected in the groundwater one time. One of the explosives (1,3-Dinitrobenzene) was detected below its respective groundwater criteria. NYS AWQS and EPA MCL screening criteria for the other explosive (HMX) do not exist; however, the detected value (0.5 ug/L), for comparison, is far less than the EPA tap water screening criteria of 780 ug/L.

Comment 16. Section 1.3.3, Surface Water, Page 1-9: The FS has not demonstrated that surface water has been adequately characterized at the site. Surface water sample locations have not been identified on a site figure so their applicability to the site is unclear. In addition, it is noted that metals and nitroaromatics were detected in surface water samples above screening criteria, but further evaluation of these exceedances does not appear to have been conducted. In addition, Section 1.2.1, OD Grounds Description, states "Reeder Creek runs through the OD Grounds" but it is unknown if surface water from Reeder Creek itself has been sampled. Significant additional information needs to be provided to ensure that the extent of surface water impacts has been characterized. Revise the FS to identify surface water sample locations on a site figure, and clarify how the remaining data gaps associated with surface water characterization will be addressed.

Response 16: Surface water sample locations and drainage patterns are provided on Figure 1-4.

The four surface water samples collected as part of the 1995 OD Grounds ESI were from ephemeral drainage ditches and a low-lying swale. These on-site surface water pools are not classified by NYSDEC as surface water bodies and therefore NYS Ambient Water Quality Concentrations (AWQC) do not apply. Because the AWQC do not apply, on-site surface water in not considered a medium of concern. This approach was applied in the 1996 OB Grounds FS to on-site ephemeral pools sampled in the 1994 OB Grounds RI and, for consistency, will be applied in this FS.

During the 1994 OB Grounds RI, surface water sampling was conducted within Reeder Creek (Figure 1-6). Reeder Creek is a recognized surface water body and therefore AWQCs would apply to human and ecological receptors. Numerous surface water samples were collected from Reeder Creek up- and down-gradient of the OB Grounds. Reeder Creek serves as drainage for much of the OD Grounds; therefore, these samples would also be downgradient of various portions of the OD Grounds.

Results from Reeder Creek were compared to recent NYS AWQC values. No significant impacts to the surface water were found therefore it is not considered a medium of concern (Parsons, 1996).

Comment 17. Section 1.3.4, Sediment, Page 1-9: Section 1.3.4 does not present an accurate summary of all of the sediment data collected, and focuses instead, on only three metals: cadmium, copper, and mercury. The second paragraph of Section 1.3.4 states, "Several SVOCs, nitroaromatics, pesticides, and PCBs were detected [in sediment], primarily at low concentrations..."However, these detections are not addressed further or described in comparison to applicable screening criteria. Table A-4, Analytical Results for Sediment Samples at OD Grounds, of Appendix A shows that 4,4-DDE, Aroclor-1254, dieldrin, arsenic, chromium, lead, nickel, silver, and zinc also exceeded action levels, but these exceedances are not highlighted in Section 1.3.4. In addition, Table A-4 shows that numerous explosives and semi-volatile organic compounds (SVOCs) were detected in the sediment samples, but the results for many of these constituents are not compared to any screening values or action levels.

The FS needs to be revised to include an expanded discussion of the sediment data, which highlights exceedances of screening values and acknowledges the lack of screening values for other detected constituents. Revise the FS to address this concern. In addition, for a preliminary screening, sediment data should be compared to the USEPA RSLs for residential soil since the RSL table includes screening criteria for many of the detected constituents. Ecological screening criteria may also be appropriate for this site.

Response 17: The sediment samples collected as part of the 1995 OD Grounds ESI were coupled with the previously mentioned surface water samples. The collection areas were ephemeral and not representative of sediment within the site boundary. An ecological assessment of these areas suggests that they are more terrestrial in nature rather than aquatic (Parsons, 1996). Previous studies have included sediment samples collected from temporary water bodies in their soil assessments. Attachment 2 provides comparison of sediment results to EPA RSLs for residential soil and NYS SCOs for Commercial use.

In conjunction with surface water samples, collocated sediment samples were collected from within Reeder Creek (Figure 1-6). Arsenic, copper, lead, manganese, mercury, nickel and zinc exceeded NY Sediment Criteria values. These exceedances were for a TBC, therefore sediment was retained as a media of interest in the 1996 OB Grounds FS. The inspection of Reeder Creek has found sediment in various sections. The sediment is from decomposition of fallen leaves and tree material stockpiles by beavers in previous seasons and not the result of erosion of the site soil and soil transport (Parsons, 2013). Evidence for excessive erosion into the creek was not found. Current monitoring of the surface water indicates that Reeder Creek is not impacted by the surrounding OD Grounds. The FS was revised to include the above information.

Comment 18. Section 1.3.4, Sediment, Page 1-9: It is unknown if the nature and extent of sediment contamination has been sufficiently characterized. First, it is unclear if all potential drainage swales were sampled since the locations of the sediment samples have not been identified on a site figure. In addition, the locations of the site drainage swales have not been identified on a site figure. Of the four sediment samples that were collected, 4,4-DDE, Aroclor-1254, dieldrin, arsenic, cadmium, copper, chromium, lead, mercury, nickel, silver, and zinc were detected above screening criteria, but it is unclear if the extent of this contamination has been evaluated further. Revise the FS to identify all drainage swales at the site in relation to the existing sediment sample locations so that an evaluation of the extent of contamination can be conducted. If it is determined that four samples does not adequately address potential impacts to sediment at the site, revise the FS to clarify how this data gap will be addressed.

Response 18: Sediment samples from the 1995 OD Grounds ESI and the 1996 OB Ground RI are shown on Figure 1-4. Drainage pathways are noted.

See response to specific comment 17 for information on sediment. Additionally, 4,4-DDE, Aroclor-1254, dieldrin, chromium, lead, nickel, silver and zinc did not exceed NYSDEC commercial use SCOs (Attachment 2). There was one detection of arsenic which was 0.1 mg/kg above the Commercial use screening criteria. Gross contamination of the other analytes is not present and concentration of cadmium, copper, and mercury in the sediment did not exceed EPA RSLs for soil in a residential scenario.

Drainage features were added to Figure 1-4. See response to specific comment 17. Additional information related to Reeder Creek is available from previous studies.

Comment 19. Section 1.4, Fate and Transport, Page 1-10: This section presents conflicting information regarding contaminants at the site. The first paragraph states that the contaminants detected at the OD Grounds are metals, and potential Material Potentially Presenting an Explosive Hazard (MPPEH)/ Munitions Debris (MD). However, the third paragraph indicates that investigations at the site indicate the presence of MEC/MD, metals, nitrates and explosives at the OD Grounds. The process by which it is determined whether or not a chemical is considered a contaminant at the site has not been clearly presented. Furthermore, there is no explanation as to why constituents detected above screening criteria, such as SVOCs and Aroclor 1254, were excluded from further consideration in the fate and transport analysis and subsequent development of remedial alternatives. The FS needs to clearly state how chemicals considered for further evaluation in the fate and transport analysis and the subsequent development of remedial alternatives were identified. Revise the FS to include this information, and to ensure that the contaminants at the site are consistently identified in Section 1.4 and throughout the FS.

Response 19: Site contaminants are identified as constituents that have a significant impact on the matrix. The text was revised as follows:

> This section presents an overview of the fate and transport characteristics for the site contaminants identified as constituents that have an impact on the applicable matrix at the OD Grounds. Contaminants of concern may be selected because of their intrinsic toxicological properties, because they are present in large quantities, or because they are presently in or potentially may move into critical exposure pathways (e.g., drinking water supply) (EPA, 1988). Sediment and surface water collected on-site and downgradient of the site do not show gross contamination of site media indicative of an observed release. There was no evidence of a release to groundwater from either on-site samples or samples collected from an adjacent site. Constituents of concern for this site are MC (metals) in soil and potential items of MPPEH/MD.

As discussed in response to general comment 4, the detection of Aroclor-1254 is not considered a COC since it is not pervasive in the soil and has not migrated to other media. Explosives are not COCs since they were detected in soil below USEPA residential RSLs, with the exception of one detection of RDX.

Comment 20. Section 1.4, Fate and Transport, Page 1-10: The third paragraph uses the acronym COPC without defining it in the text or the List of Acronyms. For clarity, revise the FS to define COPC as chemical of potential concern in the List of Acronyms at the beginning of the document, and at its first use.

Response 20: COPC has been defined as Chemicals of Potential Concern in the text and the List of Acronyms.

Comment 21. Section 1.4.1, Metals, Page 1-11: This section describes the results of the soil samples that were selected for leachability determinations using the synthetic precipitation leaching procedure (SPLP), and indicates that results of these analyses are presented in Appendix A-5. This section also indicates that total metal analysis results were compared to EPA's RSLs for residential soils and NYSDEC Commercial SCO values, while the SPLP results are compared to NYSDEC GA Groundwater Effluent values. However, none of these screening criteria are presented in Appendix A-5 in comparison to data. To substantiate the discussion of the results, revise Appendix A-5 to compare the SPLP and total metals data to the appropriate screening criteria.

Response 21: Appendix A-5 was updated to include the appropriate screening criteria.

Comment 22. Section 2.0, Remedial Action Objectives, Page 2-1: The first paragraph indicates that the process for identifying and screening technologies/processes consists of six steps, but this statement is followed by only five steps in the bullet points. All six steps should be clearly presented. Revise the FS to document all steps in the identification and screening process, and ensure that the text consistently states the number of steps in the process.

Response 22: The FS was updated to include an additional step as follows: "Identify estimates of volumes or areas, to the extent practical, of media to which general response actions might be applied **(Section 2.0)**;"

Comment 23. Section 2.0, Remedial Action Objectives, Page 2-1: The first bulleted item, which addresses development of Remedial Action Objectives (RAOs), does not describe all of the RAO development criteria specified in the RI/FS Guidance. Section 4.1.2.1, Development and Screening of Alternatives, of the RI/FS Guidance states that RAOs should specify "the contaminants and media of interest, exposure pathways, and preliminary remediation goals that permit a range of treatment and containment alternatives to be developed." To be consistent with the RI/FS Guidance, revise the first bullet point of Section 2.0 to address the criteria for RAOs as outlined in the RI/FS Guidance.

Response 23: The first bulleted item was revised to include all of the development criteria specified in Section 4.1.2.1 of the EPA RI/FS Guidance.

> Develop RAOs that specify media of interest, chemical constituents of concern, exposure pathways, and preliminary remediation goals that permit a range of treatment and containment alternatives to be developed. The preliminary remediation goals will be based on chemical-specific ARARs and the results of the Hazard Assessment (**Section 2.0**);

Comment 24. Section 2.0, Remedial Action Objectives, Page 2-1: The FS has not identified the volumes or areas of media to which general response actions might be applied. The RI/FS Guidance indicates that this information should be described prior to the identification and screening of technologies. The volumes or areas of media to which general response actions might be applied should take into account the requirements for protectiveness as identified in the RAOs and the chemical and physical characterization of the site. To be consistent with the RI/FS Guidance, revise the FS to identify the volumes or areas of media to which general response actions might be applied.

Response 24: Section 2 was updated to include information regarding the areas of media impacted by general response actions.

Comment 25. Section 2.1, General Remedial Action Objectives, Page 2-1: This section states, "Based on the previous investigations and the proposed future site use, soil was identified as a media of interest" but the RI/FS does not state how soil was identified as the only media of interest at this site (i.e., through risk assessment). Section 1.3, Nature and Extent of Impacts, indicates that concentrations of detected constituents in groundwater, surface water, and sediment also exceeded screening criteria, so it is unclear why these media are not considered media of interest for this FS. Please revise the FS to present farther justification for excluding groundwater, surface water, and sediment as media of interest to be addressed by this FS.

Response 25: Please refer to response to specific comments 15, 16, 17, and 18.

Comment 26. Section 2.1, General Remedial Action Objectives, Page 2-1: Section 2.1 states that the "future use for the OD Grounds is recreation/conservation for walking and hiking activities and no intrusive soil activities such as digging, camping, camp fires, tent staking, trail construction, etc." It is unclear how it is known that these intrusive recreational activities will not be conducted at the site. The FS has not identified the means by which these restrictions will be implemented. For clarity, revise the FS to clarify how it is known that intrusive activities will not be conducted at the site, or it should generally be assumed that these activities could occur during recreational use of the site.

Response 26: Future land uses have been established for the Seneca Army Depot by the Seneca County Industrial Development Authority (SCIDA). The area is designated for Conservation/Recreation Use, shown in Figure 1-3 (formerly labeled 1-2). As such, the property will have a LUC restricting the land uses to those consistent with non-intrusive Conservation/Recreation activities, such as hiking and bird watching. Residential use and intrusive activities including camping would be restricted. The restrictions would be implemented through the deed restriction/environmental easement.

Comment 27. Section 2.1, General Remedial Action Objectives, Page 2-2: The RAOs do not address potential exposures to ecological receptors. The FS has not presented any information or results from an ecological risk assessment to conclude that potential ecological exposures need not be addressed. To ensure that the RAOs address all exposure pathways, revise the FS to develop RAOs specific to ecological exposures, or provide significant justification (i.e., the results of an ecological risk assessment) to show that these exposure pathways need not be addressed.

Response 27: Please refer to the response to general comment 2. The remedial action is being driven by addressing the hazards presented by the potential presence of MPPEH. The details of an Ecological Risk Assessment would not impact the path forward with proceeding with a remedial action.

Comment 28. Section 2.1, General Remedial Action Objectives, Page 2-2: The first RAO presented on Page 22 addresses contaminants, media of interest, and exposure pathways but it does not identify an acceptable contaminant level or range of levels for each exposure route, as specified in the RI/FS Guidance. A RAO developed to protect human health and the environment should specify an acceptable contaminant level or range of levels (such as a PRG for soil) which will allow for a range of alternatives to be developed. Revise the first RAO presented on Page 2-2 to include an acceptable contaminant level or range of levels for each exposure route.

Response 28: The first bullet addressing RAOs on page 2-2 was revised to indicate that the goal is to comply with NYSDEC Commercial SCOs. "*NYSDEC Commercial SCOs were determined to be an appropriate and acceptable contaminant level for protection of human health and the environment.*"

Comment 29. Section 2.1, General Remedial Action Objectives, Page 2-2: None of the RAOs address the protection of groundwater. Section 1.4.1, Metals, which presented the results of the SPLP analysis, indicated that a review of the data found that all of the metals detected show some potential to leach to groundwater. A RAO should be developed to limit potential impacts to groundwater. Revise the FS to include a RAO that addresses the protection of groundwater at the site.

Response 29: An additional RAO for protection of groundwater is not necessary. There is no indication that any analytes in the groundwater are leaching into the soil or other media. As part of LUC, digging will not be permitting on site therefore the groundwater will not be accessible.

Comment 30. Section 2.2.1, Soil, Page 2-3: This section identifies potential chemical-specific applicable or relevant and appropriate requirements (ARAR) for soil at the site but To Be Considered (TBC) criteria do not appear to have been addressed. USEPA RSLs should be identified as chemical-specific TBC for the site. Revise the FS to identify TBCs for the site, including the USEPA RSLs.

Response 30: The USEPA RSLs have been added as TBCs.

Comment 31. Section 2.3.1, Action-Specific ARARs, Page 2-5: Multiple federal and state action-specific ARARs are identified in this section, but the last sentence states, "Based on the OD Grounds conditions, further consideration of these action-specific ARARs does not appear warranted at this time." The FS does not provide sufficient justification for excluding these action-specific ARARs from further consideration. To substantiate the above referenced statement, revise the FS to clarify the OD Grounds conditions that warrant exclusion of the action-specific ARARs from further consideration during remedy evaluation.

Response 31: The text has been revised to provide a rationale for why each regulation wasn't an ARAR. Generally, it is noted that regulations that are not related to environmental law or do not govern activities that take place at the CERCLA site are not considered ARARs.

Comment 32. Section 2.4, Site-Specific Cleanup Goals, Page 2-5: Table 2-1, OD Grounds Remedial Action Objectives, presents RAOs that are not completely consistent with the RAOs described on Page 2-2. Table 2-1 summarizes two RAOs: one that addresses MC and one that addresses MEC. The RAOs described on Page 2-2 include both MC and MEC as contaminants of concern in one RAO, and a second RAO is developed that addresses restoration of the area to a condition that would comply with the SEDA LRA determination that the future use of the OD Grounds would be for recreation/conservation. Restoration of the site is not addressed in Table 2-1. Additionally the first RAO on Page 2-2 does not address the inhalation exposure pathway that Table 2-1 addresses. Revise Page 2-2 of the FS and Table 2-1 to consistently state the RAOs developed for the site.

Response 32: Page 2-2 and Table 2-1 were revised for consistency. A third row was added to Table 2-1 to address the restoration of the site. The inhalation exposure pathway was added to the first RAO on page 2-2.

Comment 33. Section 2.4, Site-Specific Cleanup Goals, Page 2-5: Table 2-1, OD Grounds Remedial Action Objectives, includes a notation in the Applicable ARAR/TBCs column, but this notation has not been defined. For clarity, all notations should be properly defined in notes at the end of the table. Revise Table 2-1 to define the notation used in the Applicable ARAR/TBCs column.

Response 33: Note 1 was included at the bottom of Table 2-1. "*1) ARARs and TBCs are described in Subchapter 2.1 of this report.*"

Comment 34. Section 2.5.1.3, Disposal Technologies for MEC, Page 2-8: The second and third paragraphs of this section state that "Engineering controls, such as sandbag mounds and sandbag walls over and around the MEC item, are often used to minimize the blast effects when an MEC item is destroyed in this manner." As these engineering controls are also used to minimize the effects of fragmentation as well as blast (See Department of Defense Technical Paper 15, Approved Protective

Construction), insert the words "and fragmentation" between the words "blast" and "effects" in the cited sentences.

Response 34: The text was revised as requested: "*...to minimize the blast and fragmentation effects when an MEC item is destroyed in this manner.*"

Comment 35. Section 2.5.2, Technologies for Soil Remediation, Page 2-8: The preliminary identification and screening of technologies applicable to each general response action that addresses MC is too limited, and does not evaluate a variety of technologies for the site. Only excavation and capping/containment technologies are described. To ensure that no potential remedial technology is overlooked, the FS should expand the preliminary identification and screening of technologies section to evaluate other potential technologies, such as in-situ and ex-situ treatment technologies and land use controls. Revise the FS to expand the preliminary identification and screening of technologies section to include additional potential remedial technologies.

Response 35: The evaluated technologies presented in the FS are considered adequate options. Further alternatives are not deemed appropriate. Because of the MEC hazard, other alternatives were not considered acceptable. The text in Section 2.6.3 was added to better clarify that LUCs are a technology that will be included in the alternatives.

Comment 36. Section 2.5.2, **Technologies for Soil Remediation, Page 2-8:** Table 2-2, OD Grounds Feasibility Study — Technology Screening, presents a preliminary evaluation of costs associated with each process option, but this evaluation should be separated by relative capital costs and relative operation and maintenance (O&M) costs. An example of this approach is shown on Figure 4-5, Evaluation of Process Options — Example, of the RI/FS Guidance. Revise Table 2-2 to separate costs by relative capital costs and relative O&M costs for each process option.

Response 36: Table 2-2 was revised to include relative capital and O&M costs.

Comment 37. Section 2.5.2, Technologies for Soil Remediation, Page 2-8: Table 2-2, OD Grounds Feasibility Study — Technology Screening, does not address all criteria used to evaluate the effectiveness of the remedial technology. With the exception of the No Action technology, all of the technologies are described as "potentially effective in meeting RAOs." However, Section 2.5.3, Evaluation of Technologies., indicates that the effectiveness category is divided into four evaluation criteria: Overall Protection of Public Safety and the Human Environment; Compliance with ARARs; Long-Term Effectiveness; and Short-Term Effectiveness. None of these evaluation criteria is specifically addressed in Table 2-2. In addition, Table 2-2 does not address all the criteria summarized in Section 2.5.3 to evaluate implementability. Revise Table 2-2 to provide a preliminary evaluation of the four criteria used to evaluate a technology's effectiveness, and the six criteria used to evaluate a technology's implementability.

Response 37: Table 2-2 was updated to include a screening column that addresses the technical implementability of each remedial technology. Further detail regarding the four evaluation criteria of effectiveness is provided in the text in Section 4.3.

Comment 38. Section 3.2, Description of Alternatives, Page 3-1: The first sentence of this section begins, "The following general response actions were retained for the OD Grounds..." However, the statement is followed by the remedial action alternatives, not general response actions. To ensure that accurate nomenclature is used, the above referenced statement should be revised to state, "The following remedial action alternatives were developed for the site..." Revise the FS to make this correction.

Response 38: The first line of Section 3.2 was revised as requested. "*The following remedial action alternatives were developed for the OD Grounds:*"

Comment 39. Section 3.2.2, Alternative 2, Geophysical Mapping/Intrusive Investigation/ Capping/LUCs, Page 3-2: This section states, "LUCs will be placed on the site to prohibit the use of groundwater, prohibit digging, and prevent the use of the site for use as a daycare or a residential facility..." but it does not clarify what types of LUCs will be used (ECs or ICs). If ICs are being considered, the FS needs to clarify what mechanism (deed restriction, master plan, etc.) will be used to enact these restrictions. Revise the FS to identify the types of LUCs anticipated under this alternative, and provide a brief description of the mechanisms that will be used to implement the restrictions, if ICs are anticipated. This comment also applies to Section 3.2.3, Alternative 3, in which LUCs were also identified as a component of the alternative.

Response 39: The LUC in the form of Institutional Controls will prohibit digging or any intrusive activities. The mechanism will be described in the Proposed Plan and the Record of Decision (ROD). Similar to other sites at Seneca, a LUC Remedial Design will be prepared which will provide for the recording of an environmental LUC which is consistent with Paragraphs (a) and (c) of the New York State Environmental Conservation Law (ECL) Article 27, Section 1318: Institutional and Engineering Controls. In addition, the Army will prepare an environmental LUC for the site, consistent with Section 27 1318(b) and Article 71, Title 36 of ECL, which will be recorded at the time of the property's transfer from Federal ownership and which will require the owner and/or any person responsible for implementing the LUCs set forth in the ROD to periodically certify that such institutional controls are in place.

Comment 40. Section 3.2.2, Alternative 2, Geophysical Mapping/Intrusive Investigation/ Capping/LUCs, Page 3-2: It is unclear why LUCs are necessary to prohibit the use of groundwater at the site if groundwater was not identified as a media of interest for this FS. Further clarifying information needs to be presented to explain why the use of groundwater should be prohibited. Revise the FS to address this concern.

Response 40: As per response to specific comment 15, Section 1.3.2 was revised to suggest that "...potential evaluation of site groundwater conditions may be appropriate subsequent to the remedial alternative selected in this FS." As part of LUC, digging will not be permitted on-site; therefore, the groundwater will not be accessible to potential receptors.

Comment 41. Section 3.2.3, Alternative 3, Geophysical Mapping/Intrusive Investigation/ Excavation/Off-Site Disposal/LUCs, Page 3-2: The first paragraph of this section refers to excavated soil potentially being incorporated into a site cap; however, capping is not a component of Alternative 3. The FS should consistently describe the components of each alternative. Revise Section. 3.2.3 to remove reference to a site cap since capping is not a component of Alternative 3.

Response 41: Reference to the site cap was removed from sections discussing Alternative 3.

Comment 42. Section 3.2.3, Alternative 3, Geophysical Mapping/Intrusive Investigation/ Excavation/Off-Site Disposal/LUCs, Page 3-3: The second paragraph on Page 3-3 states that excavated soils will be sampled, but it does not identify the proposed analyses or the number of samples anticipated. It also does not appear that costs associated with this sampling were incorporated into the cost estimate for Alternative 3 (Appendix C, Detailed Cost Estimate). Revise the FS to present additional details on the proposed soil sampling and ensure that costs associated with this sampling are included in the cost estimate.

Response 42: The second paragraph of Section 3.2.3 was revised to include the proposed analyses for excavated soil.

> Excavated soils will be sampled for RCRA hazardous waste characteristics to include a full TCLP analysis (TCLP VOCs, TCLP SVOCs, TCLP pesticides and herbicides, TCLP metals plus ignitability,

corrosivity, and reactivity). Soils deemed free from MPPEH and meeting site or unrestricted cleanup standards will be left for potential re-use at the Depot.

The cost estimate in Appendix C previously included the expected analytical sampling costs.

Comment 43. Section 3.2.3, Alternative 3, Geophysical Mapping/Intrusive Investigation/ Excavation/Off-Site Disposal/LUCs, Page 3-3: The third paragraph on Page 3-3 states, "The LTM of groundwater described as part of Alternative 2 would be a part of Alternative 3 as well." However, no long term monitoring of groundwater was included as part of Alternative 2. In addition, it is unclear why long-term monitoring will be included as part of Alternative 3 when groundwater was not identified as a media of interest for this FS. The FS needs to clearly and consistently state whether or not groundwater needs to be addressed as part of this FS. This information should be supported by the results of a BHHRA and BERA. Remedies that address groundwater, such as natural attenuation with long term monitoring, need to be identified and evaluated in the preliminary screening of technologies. If it is determined that long-term monitoring of groundwater should be a component of the remedy, the FS needs to clearly state the purpose of this long-term monitoring. Revise the FS to address these concerns.

Response 43: Refer to response to specific comment 15. Based on the existing data from the OD Grounds and the adjacent OB Grounds sites, it does not appear that groundwater is a media of concern. However, as a conservative measure, the groundwater conditions may be re-evaluated to confirm whether LUCs to prohibit groundwater are necessary. As part of the LUC, digging will not be permitted therefore the groundwater will not be accessible.

Comment 44. Section 3.2.3, Alternative 3, Geophysical Mapping/Intrusive Investigation/ Excavation/Off-Site Disposal/LUCs, Page 3-3: Alternative 3 includes excavation and off-site disposal of contaminated soil, but the FS does not indicate whether confirmatory soil samples will be collected after the excavation to determine the effectiveness of this remedy at removing contamination. Post-excavation confirmatory soil sampling needs to be incorporated into this alternative to ensure that all soil exceeding clean-up criteria have been removed. Costs associated with this activity also need to be incorporated into the cost estimate. Revise the FS to include post-excavation confirmatory soil sampling as part of this alternative, or provide significant justification for excluding this sampling and clarify how the effectiveness of the remedy will be determined. If confirmatory sampling becomes part of this alternative, ensure the associated costs are added to the cost estimate.

Response 44: The second paragraph of Section 3.2.3 was revised to include the proposed analyses for in-situ soil.

> Post-excavation, in-situ soil will be sampled for metals by EPA method SW846 6010C as part of the confirmatory sampling. A more detailed sampling strategy for the soil surface within the 0 to 1,000-foot radius, including sample locations, sampling frequency, and the complete analytical list, will be addressed in a follow-on document subsequent to MEC clearance activities.

The cost estimate in Appendix C previously included the expected analytical sampling costs.

Comment 45. Section 3.2.3, Alternative 3, Geophysical Mapping/Intrusive Investigation/ Excavation/Off-Site Disposal/LUCs, Page 3-3: The last paragraph of Section 3.2.3 incorrectly states that Alternative 3 which includes excavation and off-site disposal, "would be highly effective in reducing the toxicity, mobility, and volume of MPPEH and MC." Removing contaminated soil from the site and disposing of it off-site does not reduce the toxicity, mobility, and volume of MC; it simply moves it from one place to another. In addition, EPA's preference is for remedies that reduce the toxicity, mobility, and volume of contaminants through treatment, which is not a component of Alternative 3. Revise the FS to remove statements that indicate Alternative 3 would be highly effective in reducing the toxicity, mobility, and volume of MC at the site.

Response 45: The last paragraph of Section 3.2.3 was revised as follows:

> Implementation of this alternative using excavation and off-site disposal would be effective in reducing the on-site toxicity, mobility, and volume of MPPEH and MC at the OD Grounds, and transfer the impact of the overall toxicity and volume to a controlled environment. The associated costs for excavation and off-site disposal are extremely high.

The FS has been revised to remove statements that indicate Alternative 3 would be highly effective in reducing the toxicity, mobility, and volume of MC at the site.

Comment 46. Section 4.3.2.2, Assessment, Page 4-5: This section appears to present conflicting information when addressing threshold factors for Alternative 2. First, the discussion notes that Alternative 2 cannot completely control behavior or restrict access to residual soil contamination, and then continues on to state that Alternative 2 complies with the ARARs identified for the site. ARARs for this site were identified as the NYS SCOs. If residual soil contamination above the NYS SCO remains at the site, compliance with ARARs may not be achieved for this alternative. Revise the FS to clarify if Alternative 2 will allow residual contamination above NYS SCOs to remain at the site.

Response 46: The FS was clarified to state that Alternative 2 will not allow exposure to contamination above NYS SCOs that remain at the site. The text in Section 4.3.2.2 was revised as follows:

> Additionally, although access to potentially contaminated soils will be prevented by the cap, Alternative 2 will allow residual contamination above NYS Commercial SCOs to remain at the site therefore the Site is not suitable for residential activities. Alternative 2 prevents exposure to soil with concentrations above the SCO specified in the ARARs by preventing access to soils above the SCO through the use of a cap and LUCs.

Comment 47. Section 4.3.2.2, Assessment, Page 4-5: Under Balancing Factors, it appears that the FS does not address the reduction of toxicity, mobility, or volume through treatment criterion as intended by the RI/FS Guidance. The FS states, "This alternative provides a degree of reduction in toxicity, mobility, and volume of potential MPPEH by removing it through intrusive investigations and surface excavations in areas of metallic saturation." However, this proposed remedy does not employ treatment technologies that permanently and significantly reduce toxicity, mobility, or volume of the hazardous substances. Revise Section 4.3.2.2 to indicate that Alternative 2 does not reduce the toxicity, mobility, and volume of potential MPPEH through treatment.

Response 47: The text in Section 4.3.2.2, Balancing Factors, 2nd paragraph was revised as requested. "*This alternative does not employ treatment technologies that permanently and significantly reduce toxicity, mobility, or volume of the hazardous substances.*"

Comment 48. Section 4.3.3.2, **Assessment, Page 4-7:** Under Threshold Factors, the FS states, "Alternative 3 complies with the action-specific ARAR identified for the site..." It is unclear to which action-specific ARAR this statement is referring, particularly since Section 2.3.1, Action-Specific ARARs, indicated that none of the action-specific ARARs described needed further consideration for remedy evaluation/selection. In addition, Section 4.3.3.2 does not indicate if the chemical-specific ARARs will be met under this alternative. For clarity, revise Section 4.3.3.2 to identify the action-specific ARAR that is being addressed, and state if the chemical-specific ARARs will be met under this alternative.

Response 48: The text should have referenced "chemical specific". Chemical-specific ARARs will be addressed through the sampling strategy as per response to specific comment 42. Additional text was added to Section 4.3.3.2. "*Chemical-specific ARARs will be addressed by addressed by achieving the Commercial SCOs for soil remaining on-site.*"

Comment 49. Section 4.4.1, Overall Protection of Human Health and the Environment, Page 4-8: This section does not address the overall protection of the environment. This criterion was only evaluated in terms of possible human interaction. The RI/FS Guidance states, "Evaluation of the overall protectiveness of an alternative should focus on whether a specific alternative achieves adequate protection and should describe how site risks posed through each pathway being addressed by the FS are eliminated, reduced, or controlled through treatment., engineering, or institutional controls." Revise Section 4.4.1 to address the overall protection of human health and the environment consistent with the intent of the RI/FS Guidance.

Response 49: Section 4.4.1 was revised to include an evaluation with regards to overall protection of the environment. A portion of Section 4.4.1 was revised as follows:

> Alternative 1 provides the least overall protection of human health and the environment because it does not remove or restrict access to potential MPPEH or reduce the in-situ toxicity, mobility, and volume of soil contamination. Alternatives 2 and 3 both provide good protection of both human health and the environment by limiting exposure to MPPEH or soil contamination. The limitation of Alternative 2 with regards to environmental protection, is the potential for soil contamination remaining under the soil cap above screening criteria; however, the implementation of LUC would make Alternative 2 equally protective of human health. Alternative 3 has a higher level of permanence since soil and MPPEH would be removed off-site and analytical sampling would confirm that remaining in-situ soils were below the selected screening criteria.

Comment 50. Appendix B, MEC Hazard Assessment, Page B-25: Section B.12, Glossary of Terms, contains some obsolete term definitions. The definitions with issues include those of the following terms:

- Munitions and Explosives of Concern (MEC'): The citation for the source of the UXO definition contained in the MEC definition should read "10 U.S.C. 101 (e)(5)."
- Munitions Potentially Presenting an Explosive Hazard (MPPEH): The incorrect definition on page B-25 should be replaced with the current official definition, which reads: "Material that, prior to determination of its explosives safety status, potentially contains explosives or munitions (e.g., munitions containers and packaging material; munitions debris remaining after munitions use, demilitarization, or disposal; and range-related debris); or potentially contains a high enough concentration of explosives such that the material presents an explosive hazard (e.g., equipment, drainage systems, holding tanks, piping, or ventilation ducts that were associated with munitions production, demilitarization or disposal operations). Excluded from MPPEH are munitions within the DoD established munitions management system and other hazardous items that may present explosion hazards (e.g., gasoline cans, compressed gas cylinders) that are not munitions and are not intended for use as munitions."
- Unexploded Ordnance (UXO): The citation for the source of the UXO definition contained in the definition should read "10 U.S.C. 101 (e)(5)."

Correct these definitions as noted (See Department of Defense Ammunition and Explosives Safety Standards, Volume 8, Glossary [DoDM 6055.09-M-V8]).

Response 50: The Appendix B glossary was revised as requested.

MINOR COMMENTS

Comment 51. Section 1.3.3, Surface Water, Page 1-9: The first sentence of Section 1.3.3 repeats the term "surface water." Revise the sentence to state surface water only once.

Response 51: The sentence was revised.

Comment 52. Appendix A, Table A-5, Summary of SPLP Extract and Total Metals Analysis: Analysis is misspelled in the title of Table A-5. Please correct this error.

Response 52: The spelling of 'analysis' was corrected in the title of Table A-5.

Attachment 1
Comparison of Soil Data to Criteria Levels
OD Grounds
Seneca Army Depot Activity

Parameter	Unit	Max Value	Frequency of Detection	No. of Detects	No. of Analyses	NYSDEC SCOs UNRESTRICTED USE Criteria Level	NYSDEC SCOs UNRESTRICTED USE No. Above Criteria	NYSDEC SCOs RESTRICTED RESIDENTIAL USE Criteria Level	NYSDEC SCOs RESTRICTED RESIDENTIAL USE No. Above Criteria	NYSDEC SCOs COMMERCIAL USE Criteria Level	NYSDEC SCOs COMMERCIAL USE No. Above Criteria	EPA RSL RESIDENTIAL SOIL Criteria Level	EPA RSL RESIDENTIAL SOIL No. Above Criteria
VOCs													
Tetrachloroethene	UG/KG	19	38%	6	16	1,300	0	19,000	0	150,000	0	22,000	0
Herbicides													
MCPA	UG/KG	9,400	6%	2	35							31,000	0
Explosives													
1,3,5-Trinitrobenzene	UG/KG	190	60%	28	47							2,200,000	0
2,4,6-Trinitrotoluene	UG/KG	1,400	81%	38	47							19,000	0
2,4-Dinitrotoluene	UG/KG	1,100	77%	36	47							1,600	0
2-amino-4,6-Dinitrotoluene	UG/KG	680	77%	36	47							150,000	0
4-amino-2,6-Dinitrotoluene	UG/KG	500	57%	27	47							150,000	0
HMX	UG/KG	470	68%	32	47							3,800,000	0
Nitroglycerine	UG/KG	1,500	3%	1	31							6,100	0
RDX	UG/KG	5,800	83%	39	47							5,600	1
Tetryl	UG/KG	330	9%	4	47							240,000	0
Semivolatile Organic Compounds													
2,4-Dinitrotoluene	UG/KG	14,000	37%	13	35							1,600	2
2,6-Dinitrotoluene	UG/KG	700	6%	2	35							61,000	0
Acenaphthylene	UG/KG	30	9%	3	35	100,000	0	100,000	0	500,000	0		
Anthracene	UG/KG	18	6%	2	35	100,000	0	100,000	0	500,000	0	17,000,000	0
Benzo(a)anthracene	UG/KG	50	23%	8	35	1,000	0	1,000	0	5,600	0	150	0
Benzo(a)pyrene	UG/KG	82	23%	8	35	1,000	0	1,000	0	1,000	0	15	8
Benzo(b)fluoranthene	UG/KG	55	26%	9	35	1,000	0	1,000	0	5,600	0	150	0
Benzo(ghi)perylene	UG/KG	66	20%	7	35	100,000	0	100,000	0	500,000	0		
Benzo(k)fluoranthene	UG/KG	56	20%	7	35	800	0	3,900	0	56,000	0	1,500	0
Bis(2-Ethylhexyl)phthalate	UG/KG	740	26%	9	35							4,600	0
Chrysene	UG/KG	130	34%	12	35	1,000	0	3,900	0	56,000	0	15,000	0
Diethyl phthalate	UG/KG	35	3%	1	35							49,000,000	0
Di-n-butylphthalate	UG/KG	6,800	34%	12	35							6,100,000	0
Fluoranthene	UG/KG	66	31%	11	35	100,000	0	100,000	0	500,000	0	2,300,000	0
Hexachlorobenzene	UG/KG	110	31%	11	35	330	0	1,200	0	6,000	0	300	0
Hexachloroethane	UG/KG	1,100	17%	6	35							12,000	0
Indeno(1,2,3-cd)pyrene	UG/KG	52	11%	4	35	500	0	500	0	5,600	0	150	0
Naphthalene	UG/KG	30	14%	5	35	12,000	0	100,000	0	500,000	0	3,600	0
N-Nitrosodiphenylamine	UG/KG	320	6%	2	35								
N-Nitrosodipropylamine	UG/KG	1,600	14%	5	35							99,000	0
Phenanthrene	UG/KG	46	26%	9	35	100,000	0	100,000	0	500,000	0		
Pyrene	UG/KG	110	34%	12	35	100,000	0	100,000	0	500,000	0	1,700,000	0
Pesticides & PCBs													
Aroclor-1254	UG/KG	2,000	6%	2	34	100	2	1,000	1	1,000	1	220	1
4,4'-DDD	UG/KG	2.4	6%	2	34	3.3	0	13,000	0	92,000	0	2,000	0
4,4'-DDE	UG/KG	4.2	63%	22	35	3.3	2	8,900	0	62,000	0	1,400	0
4,4'-DDT	UG/KG	3.4	50%	17	34	3.3	1	7,900	0	47,000	0	1,700	0
Alpha-Chlordane	UG/KG	2	12%	4	34	94	0	4,200	0	24,000	0		
Dieldrin	UG/KG	3.2	41%	14	34	5	0	200	0	1,400	0	30	0
Endosulfan I	UG/KG	55	60%	21	35	2,400	0	24,000	0	200,000	0		
Endosulfan II	UG/KG	0.88	3%	1	34	2,400	0	24,000	0	200,000	0		
Endrin	UG/KG	3.6	3%	1	34	14	0	11,000	0	89,000	0	18,000	0
Endrin ketone	UG/KG	0.58	3%	1	34								
Gamma-Chlordane	UG/KG	1.1	9%	3	34								
Methoxychlor	UG/KG	45	3%	1	34							310,000	0
Inorganics													
Aluminum	MG/KG	27,900	100%	97	97							77,000	0
Antimony	MG/KG	5.1	33%	32	97							31	0
Arsenic	MG/KG	12.6	100%	97	97	13	0	16	0	16	0	0.39	97
Barium	MG/KG	365	100%	97	97	350	1	400	0	400	0	15,000	0
Beryllium	MG/KG	1.2	98%	95	97	7.2	0	72	0	590	0	160	0
Cadmium	MG/KG	1,100	81%	77	95	2.5	67	4.3	60	9.3	11	70	1
Calcium	MG/KG	193,000	99%	96	97								
Chromium	MG/KG	446	100%	97	97	30	23	180	1	1,500	0		
Cobalt	MG/KG	26.8	100%	97	97							23	2
Copper	MG/KG	7,310	100%	97	97	50	79	270	52	270	52	3,100	2
Cyanide	MG/KG	0.7	13%	2	16	27	0	27	0	27	0	22	0
Iron	MG/KG	118,000	100%	97	97							55,000	3
Lead	MG/KG	998	100%	97	97	63	31	400	1	1,000	0	400	1
Magnesium	MG/KG	15,000	100%	97	97								
Manganese	MG/KG	5,040	100%	97	97	1,600	1	2,000	1	10,000	0	1,800	1
Nickel	MG/KG	59.3	100%	92	92	30	78	310	0	310	0	1,500	0
Potassium	MG/KG	4,880	100%	76	76								
Selenium	MG/KG	0.92	4%	4	97	3.9	0	180	0	1,500	0	390	0
Silver	MG/KG	205	68%	66	97	2	48	180	1	1,500	0	390	0
Sodium	MG/KG	213	84%	81	97								
Thallium	MG/KG	0.27	6%	6	97							0.78	0
Vanadium	MG/KG	41.9	100%	97	97								
Zinc	MG/KG	1,470	100%	92	92	109	78	10,000	0	10,000	0	23,000	0
Mercury	MG/KG	9.1	99%	96	97	0.18	84	0.81	71	2.8	49	23	0

Footnotes:

1) No.of Analyses is the number of detected and non-detected results excluding rejected results. Sample duplicate pairs have not been averaged.

2) Criteria level source document and web address.

- The NYS SCO Unrestricted Use values were obtained from the NYSDEC Soil Cleanup Objectives.
http://www.dec.ny.gov/regs/15507.html
- The NYS SCO Restricted Residential Use values were obtained from the NYSDEC Soil Cleanup Objectives.
http://www.dec.ny.gov/regs/15507.html
- The NYS SCO Commercial Use values were obtained from the NYSDEC Soil Cleanup Objectives.
http://www.dec.ny.gov/regs/15507.html
- The USEPA RSLs for soil, residential scenario are from November, 2012.
http://www.epa.gov/region9/superfund/prg/

Attachment 2
Comparison of Sediment Data to Criteria Levels
OD Grounds
Seneca Army Depot Activity

Parameter	Unit	Max Value	Frequency of Detection	No. of Detects	No. of Analyses	NYSDEC SCOs UNRESTRICTED USE		NYSDEC SCOs RESTRICTED RESIDENTIAL USE		NYSDEC SCOs COMMERCIAL USE		EPA RSL RESIDENTIAL SOIL	
						Criteria Level	No. Above Criteria	Criteria Level	No. Above Criteria	Criteria Level	No. Above Criteria	Criteria Level	No. Above Criteria
Explosives													
2,4,6-Trinitrotoluene	UG/KG	120	25%	1	4							19,000	0
2,4-Dinitrotoluene	UG/KG	83	25%	1	4							1,600	0
2-amino-4,6-Dinitrotoluene	UG/KG	260	25%	1	4							150,000	0
RDX	UG/KG	210	25%	1	4							5,600	0
Tetryl	UG/KG	140	25%	1	4							240,000	0
Semivolatile Organic Compounds													
Benzo(a)anthracene	UG/KG	32	50%	2	4	1,000	0	1,000	0	5,600	0	150	0
Benzo(a)pyrene	UG/KG	37	50%	2	4	1,000	0	1,000	0	1,000	0	15	2
Benzo(b)fluoranthene	UG/KG	37	50%	2	4	1,000	0	1,000	0	5,600	0	150	0
Benzo(ghi)perylene	UG/KG	48	25%	1	4	100,000	0	100,000	0	500,000	0		
Benzo(k)fluoranthene	UG/KG	28	50%	2	4	800	0	3,900	0	56,000	0	1,500	0
Chrysene	UG/KG	50	75%	3	4	1,000	0	3,900	0	56,000	0	15,000	0
Di-n-butylphthalate	UG/KG	25	25%	1	4							6,100,000	0
Fluoranthene	UG/KG	60	75%	3	4	100,000	0	100,000	0	500,000	0	2,300,000	0
Hexachlorobenzene	UG/KG	40	50%	2	4	330	0	1,200	0	6,000	0	300	0
Indeno(1,2,3-cd)pyrene	UG/KG	32	25%	1	4	500	0	500	0	5,600	0	150	0
Naphthalene	UG/KG	24	25%	1	4	12,000	0	100,000	0	500,000	0	3,600	0
Phenanthrene	UG/KG	34	75%	3	4	100,000	0	100,000	0	500,000	0		
Pyrene	UG/KG	110	75%	3	4	100,000	0	100,000	0	500,000	0	1,700,000	0
Pesticides & PCBs													
4,4'-DDE	UG/KG	12	50%	2	4	3.3	2	8900	0	62,000	0	1,400	0
Aldrin	UG/KG	2.2	25%	1	4	5	0	97	0	680	0	29	0
Alpha-Chlordane	UG/KG	5.7	25%	1	4	94	0	4200	0	24,000	0		
Aroclor-1254	UG/KG	580	50%	2	4	100	1	1000	0	1,000	0	220	1
Dieldrin	UG/KG	7.4	25%	1	4	5	1	200	0	1,400	0	30	0
Endosulfan I	UG/KG	2.7	50%	2	4	2,400	0	24,000	0	200,000	0		
Endrin aldehyde	UG/KG	3.2	25%	1	4								
Inorganics													
Aluminum	MG/KG	35,000	100%	4	4							77,000	0
Arsenic	MG/KG	16.1	100%	4	4	13	1	16	1	16	1	0.39	4
Barium	MG/KG	308	100%	4	4	350	0	400	0	400	0	15,000	0
Beryllium	MG/KG	1.4	100%	4	4	7.2	0	72	0	590	0	160	0
Cadmium	MG/KG	25.6	100%	4	4	2.5	3	4.3	3	9.3	2	70	0
Calcium	MG/KG	84,400	100%	4	4								
Chromium	MG/KG	48.4	100%	4	4	30	3	180	0	1,500	0		
Cobalt	MG/KG	19.7	100%	4	4							23	0
Copper	MG/KG	814	100%	4	4	50	4	270	2	270	2	3,100	0
Iron	MG/KG	50,500	100%	4	4							55,000	0
Lead	MG/KG	101	100%	4	4	63	2	400	0	1,000	0	400	0
Magnesium	MG/KG	10,200	100%	4	4								
Manganese	MG/KG	935	100%	4	4	1,600	0	2,000	0	10,000	0	1,800	0
Mercury	MG/KG	5.3	100%	4	4	0.18	4	0.81	3	2.8	2	23	0
Nickel	MG/KG	67.7	100%	4	4	30	4	310	0	310	0	1,500	0
Potassium	MG/KG	4,680	100%	4	4								
Silver	MG/KG	5.8	75%	3	4	2	3	180	0	1,500	0	390	0
Sodium	MG/KG	377	100%	4	4								
Vanadium	MG/KG	53.7	100%	4	4								
Zinc	MG/KG	755	100%	4	4	109	3	10,000	0	10,000	0	23,000	0

Footnotes:

1) No. of analyses is the number of detected and non-detected results excluding rejected results. Sample duplicate pairs have not been averaged.

2) Criteria level source document and web address.

- The NYS SCO Unrestricted Use values were obtained from the NYSDEC Soil Cleanup Objectives.

http://www.dec.ny.gov/regs/15507.html

- The NYS SCO Restricted Residential Use values were obtained from The NYSDEC Soil Cleanup Objectives.

http://www.dec.ny.gov/regs/15507.html

- The NYS SCO Commercial Use values were obtained from the NYSDEC Soil Cleanup Objectives.

http://www.dec.ny.gov/regs/15507.html

- The USEPA RSLs for soil, residential scenario are from November, 2012.

http://www.epa.gov/region9/superfund/prg/