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May 14, 2009

Mr. John Nohrstedt
U.S. Army Corps of Engineers
Engineering and Support Center, Huntsville
Attn: CEHNC-FS-IS
4820 University Square
Huntsville, AL 35816-1822

SUBJECT: Draft Work Plan for Removal Action at the Waste Burial Radiological Sites (SEAD-12), Seneca Army Depot Activity, Romulus, New York; Contract W912DY-08-D-0003, Task Order 0003

Dear Mr. Nohrstedt:

Parsons Infrastructure & Technology Group, Inc. (Parsons) is pleased to submit the Draft Work Plan for the Removal Action at the Waste Burial Radiological Sites (SEAD-12) located at the Seneca Army Depot Activity in Romulus, New York. This work was performed in accordance with the Scope of Work for Task Order 0003 under Contract W912DY-08-D-0003.

Parsons appreciates the opportunity to provide you with the Work Plan for this work. Should you have any questions, please do not hesitate to call me at (617) 449-1405 to discuss them.

Sincerely,

Todd Heino
Project Manager

Enclosures

cc: S. Absolom, SEDA
K. Hoddinott, USACHPPM
R. Walton, USAEC
R. Battaglia, USACE, NY
T. Battaglia, USACE, NY
T. Andrews, Parsons

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May 14, 2009

Mr. Julio Vazquez
U.S. Environmental Protection Agency, Region II
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New York, NY 10007-1866

Mr. Kuldeep K. Gupta, P.E.
New York State Department of Environmental Conservation (NYSDEC)
Division of Environmental Remediation
Remedial Bureau A, Section C
625 Broadway
Albany, NY 12233-7015

Mr. Mark Sergott
Bureau of Environmental Exposure Investigation, Room 300
New York State Department of Health
547 River Street, Flanigan Square
Troy, NY 12180

SUBJECT: Draft Work Plan for Removal Action at the Waste Burial Radiological Sites (SEAD-13), Seneca Army Depot Activity, Romulus, New York; EPA Site ID# NY0213820830 and NY Site ID# 8-50-006

Dear Mr. Vazquez/Mr. Gupta/Mr. Sergott:

Parsons Infrastructure & Technology Group, Inc. (Parsons) is pleased to submit the Draft Work Plan for the Removal Action at the Waste Burial Radiological Sites (SEAD-13) located at the Seneca Army Depot Activity in Romulus, New York (EPA Site ID# NY0213820830 and NY Site ID# 8-50-006).

Should you have any questions, please do not hesitate to call me at (617) 449-1405 to discuss them.

Sincerely,

Todd Heino
Project Manager

Enclosures

cc: M. Heaney, TechLaw
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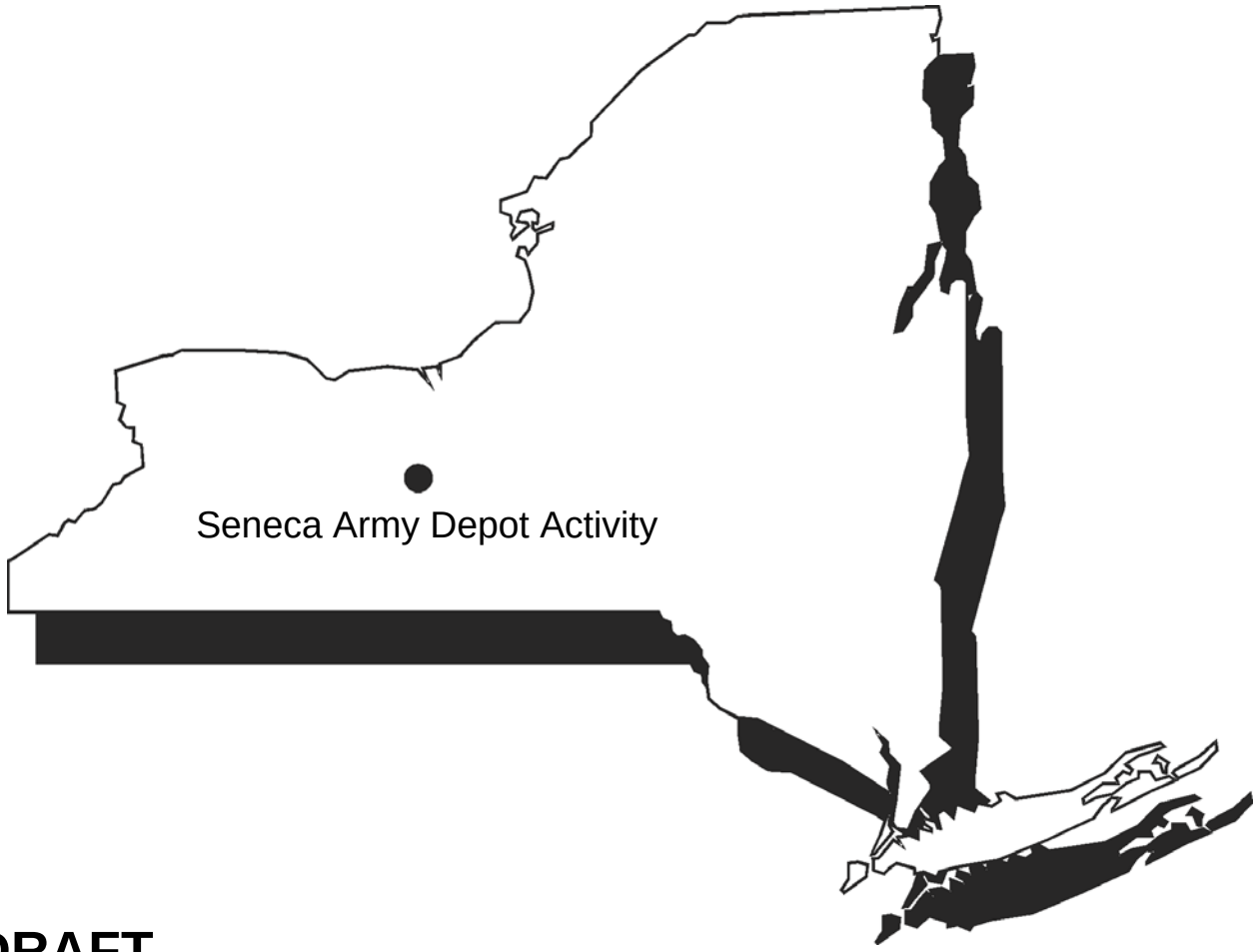
Seneca Army Depot Activity
Romulus, NY



DRAFT
WORK PLAN
REMOVAL ACTION AT THE WASTE
BURIAL RADIOLOGICAL SITES (SEAD-12)
SENECA ARMY DEPOT ACTIVITY

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

PARSONS
May 2009

DRAFT

WORK PLAN

REMOVAL ACTION AT THE WASTE BURIAL RADIOLOGICAL SITES (SEAD-12)
SENECA ARMY DEPOT ACTIVITY, ROMULUS, NY

Prepared for:

U.S. ARMY CORPS OF ENGINEERS, ENGINEERING AND SUPPORT CENTER
HUNTSVILLE, ALABAMA
and
SENECA ARMY DEPOT ACTIVITY
ROMULUS, NEW YORK

Prepared by:

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Boston, MA 02110

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

May 2009

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1.0 INTRODUCTION

1.1 Document Objectives

This removal action (RA) work plan describes and documents the U.S. Army's (Army's) planned approach for removing military-related materials and other debris from three historic disposal pits that are located at the Radiological Waste Burial Sites (SEAD-12) within the former Seneca Army Depot Activity (SEDA or the Depot) in Seneca County, New York. The RA work plan provides guidance and identifies the steps that will be initiated and completed during this removal action to: excavate, segregate, screen, characterize, secure, manage, treat (if needed), transport, and dispose of identified wastes in accordance with prevailing solid, hazardous, and radioactive waste regulations. Additionally, at the completion of the removal action, the disposal pits will be backfilled and restored in a manner that is consistent with their planned future unrestricted use. This RA is a removal action that will be completed just prior to or concurrent with the finalization of the Record of Decision (ROD) for SEAD-12 that will be issued in accordance with requirements of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended, and Sections 300.430(f) and 300.435(c) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). The RA will be conducted under the oversight of the U.S. Environmental Protection Agency (EPA), the New York State Department of Environmental Conservation (NYSDEC), and the New York State Department of Health (NYSDOH).

The planned RA is intended to provide the Army with access to materials that were placed in burial pits so they can be inspected to assess if classified military-related items are intermingled with other forms of debris. If classified military-related items are identified, they will be recovered and turned over to the Army for subsequent handling, storage, and potential destruction and disposal in accordance with Army, national security, and applicable solid, hazardous, and radiological requirements. The RA will also provide the Army access to other buried debris, so if it is determined to be necessary, it can be recovered, characterized, and subsequently transported off-site to licensed landfills for disposal. If during the recovery of the classified military-related items and debris, hazardous chemical or radiological substances are identified, and are determined to represent or pose a previously unidentified potential threat to human health or the environment, the RA will also include characterization, treatment as necessary, and transportation and disposal off-site at licensed landfills in accordance with solid, hazardous, and/or radiological waste regulations. The goal of the planned RA is to verify that the area of Disposal Pits A/B and C are free of classified military-related items and other forms of debris so that they can be released for unrestricted use subsequent to the completion of the removal action and the finalization of the ROD for SEAD-12.

This document has been prepared by Parsons Infrastructure & Technology Group Inc. (Parsons) on behalf of the U.S. Army Corp of Engineers (USACE) and the Army's Base Realignment and Closure (BRAC) Office under Contract No.: W912DY-08-D-0003, Task Order No. 0003.

1.2 Background

SEDA previously occupied approximately 10,600 acres of land located in the Towns of Romulus and Varick, New York. The property was acquired by the United States Government in 1941, and was operated by the Department of the Army from that time until approximately September 2000 when the installation closed. Prior to the acquisition of the land and the construction of the Depot, the land was used for agriculture, farming, and residential purposes. A location map for SEDA is shown in **Figure 1-1**. SEDA is located in an uplands area, which forms a divide that separates two of New York's Finger Lakes; Cayuga Lake on the east and Seneca Lake on the west. The former Depot is partially bordered by New York State Highway 96 on the east, New York State Highway 96A on the west, and sparsely populated farmland on the north and south.

SEDA's historic military mission included receipt, storage, distribution, maintenance, and demilitarization of conventional ammunition, explosives, and special weapons. In 1995, SEDA was designated for closure under the Department of Defense's (DoD's) BRAC process. With SEDA's inclusion on the BRAC list, the Army's emphasis expanded from expediting necessary investigations and remedial actions at prioritized solid waste management units (SWMUs) to including the release of non-affected portions of the Depot to the surrounding community for beneficial reuses (i.e., industrial, municipal, and residential). Since the closure of SEDA, more than 8,000 acres have been released to the community. An additional 270 acres of land have been transferred to the U.S. Coast Guard for continued operation of a LORAN Station.

SEAD-12 Location

SEAD-12 is located in the north central portion of SEDA within the former Weapons Storage Area (WSA), which is also known as the "Q" Area. As shown on **Figure 1-2**, SEAD-12 originally was comprised of two separate areas designated as SEAD-12A located in the northeast corner of the WSA, and SEAD-12B located northeast of Buildings 803, 804, and 805, near the north central border of the Depot. SEAD-12A encompassed an area measuring approximately 1,000 feet long by 1,000 feet wide, and contains Disposal Pits A/B and C. SEAD-12B encompassed an area measuring approximately 300 feet long by 300 feet wide, and was suspected to have contained a buried 5,000 gallon underground storage tank and a small dry waste pit.

The bounds of SEAD-12 were increased to include approximately 360 acres of land after the completion of the Expanded Site Inspections (ESI) in 1995. This decision was based on the similarity of the chemicals found at SEAD-12A and SEAD-12B, and the Army's knowledge of the general history of the Q Area, which suggested similar constituents, could exist throughout the larger area.

The portion of SEAD-12 located north of Service Road Number (No.) 2 was used for disposal of laboratory and maintenance wastes, and military components. This portion of SEAD-12 also includes Buildings 802 through 807, 810, 812 and 825 which were part of the WSA facility at SEDA. The eastern, western, and southern portions of SEAD-12 are primarily open fields and include Buildings 813 through 817, 819, and 823. These buildings were also part of the former WSA facility at SEDA.

The area designated as SEAD-12 excludes the area of SEAD-63, the Miscellaneous Components Burial Site, which is located along the western boundary of the former Q Area (see **Figure 1-2**). A Non-Time Critical Removal Action (NTCRA) was performed for SEAD-63 in 2004, resulting in the removal of 5,100 tons of soil and debris. A ROD for No Further Action (NFA) at SEAD-63 was submitted by the Army in September 2006, approved by the EPA with concurrence from the NYSDEC, and the SWMU is closed under CERCLA.

SEAD-12 Site Features

SEAD-12 encompasses the northern 360 acres of the former WSA, exclusive of the land that is associated with SEAD-63. The entire WSA is enclosed by a triple strand chain link security fence, and access into the WSA and SEAD-12 is limited to one point of egress through a remotely operated gate located in the south-eastern corner of the Q Area. Patrol roads bound the perimeter of SEAD-12 and the former WSA. Additional service and patrol roads cross the site in several places, providing access to the buildings in SEAD-12. Railroad tracks run from the southeast corner, along the eastern perimeter, and turn west, ending at a loading dock south of Building 816.

The remaining area at SEAD-12 is predominantly open fields, with randomly scattered small evergreen and deciduous trees, an eastern grove of hardwood trees, and a small grove of mixed soft and hardwood trees in the north. A seasonal stream (known as unnamed Creek) flows north along the eastern side of Service Road No. 1, turning west in the northern half of SEAD-12, exiting SEAD-12 and the WSA to the west of Building 812, where it drains into the headwaters of Reeder Creek. Reeder Creek discharges into Seneca Lake.

Underground and overhead utilities provided water, electrical, and sanitary sewer services to all of the SEAD-12 buildings, as well as electrical service to the perimeter for lighting, cameras, and electrified fences. Most of the utilities are now defunct, the exceptions being electrical and water services are still provided to many of the buildings.

1.2.1 Future Land Use

A Land Reuse Plan was prepared and approved by the Local Redevelopment Authority (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 SEAD-12 was designated as “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, SEAD-12 is located in the Planned Institutional Training parcel of the former Depot (see **Figure 1-3**).

1.2.2 Geological Setting

A detailed discussion of the geological setting for SEDA and SEAD-12 is presented in the Parsons (2002) Remedial Investigation (RI) Report (**Sections 1.4.1 and 3.2**). Below is a brief summary.

The SEDA is located within a distinct unit of glacial till that covers the entire area between the western shore of Lake Cayuga and the eastern shore of Lake Seneca. The till is consistent across the entire Depot although it ranges in thickness from less than 2 feet to as much as 15 feet, with the average being a few feet thick. The average till thickness in SEAD-12 is 5.3 feet with approximately 1 to 2 feet of fill above the till in the immediate vicinity of the buildings and roads, and less than 5 feet thick in the disposal pit areas.

Fill deposits overlying the till consist of fine to coarse sand and gravel, with variable amount of silt and clay. 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. The glacial tills underlying SEDA has a high percentage of silt and clay with trace amounts of fine gravel. A zone of gray weathered shale of variable thickness is present below the till in almost all locations at SEDA.

1.2.3 Hydrogeology

A detailed discussion of the hydrogeologic setting for SEDA and SEAD-12 is presented in the Parsons (2002) RI report (**Sections 1.4.2 and 3.4**). Below is a brief summary.

The saturated thickness of the till/weathered shale overburden aquifer at SEDA ranges between 1 and 8.5 feet below ground surface (bgs). The aquifer's thickness appears to be influenced by the hydrologic cycle based on review of available data. The variations of the water table elevations at SEDA are attributed to the seasonal phenomenon since some monitoring wells dry up completely during certain times of the year. It has been observed that the overburden aquifer is thickest during the spring recharge months, thinnest during the summer and early fall, and during late fall and winter the saturated thickness of the aquifer increases. Depth to groundwater, which varies by season and location, ranges from 1 foot to 10 feet bgs.

Historical groundwater data for SEAD-12 indicates that groundwater flow is predominantly to the west and northwest across the majority of the site. In the northeast corner of SEAD-12 in the vicinity of Disposal Pits A/B, and C regional ground water flow appears to be to the north and northwest. Local ground water flow in the immediate vicinity of a relative high near Disposal Pit C is to the north, northeast, and northwest. Groundwater elevations range from a high of approximately 5.48 feet bgs (MW12-2) in the east, to a low of approximately 4.80 feet bgs (MW12-23) on the western side of the site. The horizontal groundwater gradient is steepest in the southern and central portions of the site at approximately 0.015 feet per foot (ft/ft). The horizontal groundwater gradient is flattest in the northern portion of the site at 0.007 ft/ft.

Surface drainage from SEDA flows to five primary creeks. In the southern portion of the Depot, the surface drainage flows through ditches and streams into Indian and Silver Creeks. These creeks then flow into Seneca Lake just south of the SEDA Airfield. The central part and administration area of SEDA drain into Kendaia Creek. Kendaia Creek discharges into Seneca Lake near the former Lake Housing Area and Sampson State Park. The majority of the northwestern and north-central portion of SEDA drains into Reeder Creek. The northeastern portion of the Depot, which includes a marshy

area called the Duck Ponds, drains into Kendig Creek and then flows north into the Cayuga-Seneca Canal and to Cayuga Lake.

Surface topography at SEAD-12 is relatively flat-lying, sloping gently to the west and northwest. Surface water within SEAD-12 occurs as seasonal flow within drainage ditches and seasonal streams. Surface water flow is generally to the west. In the northeast portion of SEAD-12, the unnamed creek flows to the northwest across the area of concern (AOC). East of Service Road No. 1, this unnamed creek exists as a natural seasonal stream which flows into Reeder Creek west of SEAD-12 and eventually discharges into Seneca Lake. Reeder Creek also accumulates the surface water flow from the southern portion of SEAD-12.

1.2.4 Previous Investigations and Activities

1.2.4.1 SWMU Classification

The SWMU Classification Report (Parsons, 1994) describes and evaluated 72 of the SWMUs originally listed at SEDA and provided recommendations for future action at these SWMUs. This report describes SEAD-12 (Building 804 and Associated Radioactive Waste Sites), its physical make-up, the waste characteristics associated with it, as well as other information related to migration pathways and exposure potential. The report recommends that a CERCLA Site Inspection (SI) be performed at SEAD-12 as part of the investigation of fifteen solid waste management units at SEDA. At the time of the preparation of the SWMU Classification Report, SEAD-12 was classified as a Moderately Low Priority AOC.

1.2.4.2 Expanded Site Inspection

An Expanded Site Inspection (ESI) was performed at SEAD-12A and SEAD-12B in 1994. This investigation included sampling of surface and subsurface soils, groundwater, surface water, and sediment to identify hazardous substances or wastes that may have been released to the environment. Samples were analyzed for Target Compound List (TCL) volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), pesticides/polychlorinated biphenyls (PCBs); Target Analyte List (TAL) metals and cyanide; and radiochemical analysis. The sampling data were compared to Federal and State guidance values and standards to determine whether this AOC posed a potential threat or risk to human health and the environment and the results were documented in the ESI Report (Parsons 1995). This determination contributed to expanding the size of SEAD-12 to 360 acres, as describe above.

1.2.4.3 Remedial Investigations

A remedial investigation was initiated at the expanded SEAD-12 in 1997 and the results were documented in the *Final RI Report* (Parsons 2002). The RI investigation consisted of: geophysical, radiological, and soil gas surveys; sampling and analysis of subsurface and surface soils, groundwater, surface water, and sediment; and performance of a baseline human health (BRA) and screening level ecological risk assessments (SLERA). Samples were analyzed for target compound list (TCL) VOCs, SVOCs, pesticides/PCBs; TAL metals, and radiological analytes. The location of the

groundwater monitoring wells installed during the ESI and RI investigations for the disposal pits are shown on **Figure 1-2.**

As part of the radiological survey performed under the RI, buildings and anomalies within SEAD-12 were classified as Class I, Class II, or Class III in accordance with the Multi-Agency Radiological Survey and Site Investigation Manual (MARSSIM; EPA, 1997b). The Class designations are described below.

- Class I areas are areas that have, or had prior to remediation, a potential for radioactive contamination (based on site operating history) or known contamination (based on previous radiological surveys).
- Class II areas are areas that have, or had prior to remediation, a potential for radioactive contamination or known contamination, but are not expected to exceed the Derived Concentration Guideline Levels (DCGLs) that correspond to allowable radiation dose standards.
- Class III areas are impacted areas that are not expected to contain any residual radioactivity, or are expected to contain levels of residual radioactivity at a small fraction of the DCGL.

Nine potential release areas (PRA) were identified in the RI and only the four PRAs identified below required the development of remedial action alternatives during the initial Feasibility Study (FS) conducted for SEAD-12:

- Disposal Pit A/B – removal of remaining "military" debris associated with electromagnetic (EM) anomalies;
- Disposal Pit C – removal of remaining "military" debris associated with EM anomalies;
- EM-5 – investigation and debris removal address Lead-210 (Pb-210) contamination issues; and,
- Class III area – additional groundwater monitoring to define source and extent of trichloroethylene (TCE) in groundwater north of Buildings 813/814.

Further investigations were performed to address the Pb-210 contaminant issues at EM-5, and further investigations and a focused soil removal action were conducted in the area north of Buildings 813/814 to address the identified TCE plume. Results for both of these investigations/actions are presented in the *Supplement Remedial Investigation (SRI) Report, Radioactive Waste Burial Sites* (SEAD-12) (Parsons, 2006).

Excavation and examination of debris located within Disposal Pits A/B and C is still required. With classified military-related items present within the burial pits, it is the Army's intention to recover and secure the items, pending final decisions regarding any necessary decontamination, disassembly, declassification, and disposal.

Since completion of the RI and SRI, the New York State Environmental Board approved Subparts 375-1 through 375-4 and Subpart 375-6 under 6 New York Code of Rules and Regulations (NYCRR)

Part 375 - Environmental Remediation Programs. Soil cleanup objectives (SCO) effective December, 2006 were developed for five categories of future land use (i.e., unrestricted use, residential, restricted-residential, commercial, and industrial) and are included in 6 NYCRR Subpart 375-6.

The following discussion provides information on the quality of soil, groundwater, surface water and sediment conditions based on samples collected in proximity to the Disposal Pits A/B and C. (Refer to the RI report for the analytical results of the samples collected from other AOCs located at SEAD-12.)

1.3 Disposal Pit A/B Soil Analytical Summary

Fifteen surface soil samples (0 to 0.2' bgs) and 29 subsurface samples were collected from Disposal Pit A/B and submitted for TCL VOCs, SVOCs, pesticides/PCBs, TAL metals and radiological analysis. The locations of the samples collected at Disposal Pit A/B from the soil borings, monitoring wells and test pits are shown on **Figure 1-4.** A summary of the compounds detected in soil for Disposal Pit A/B including the EPA Regional Screening Levels (RSLs) for residential soils and New York's unrestricted use SCO are provided in **Tables 1-1** and **1-2**.

Surfical Soil Analytical Summary

A comparison of the concentrations found in the surfical soils to the EPA residential soil RSLs shows that the exceedances are limited to two SVOCs [dibenz(a,h)anthracene and benzo(a)pyrene], one PCB (aroclor-1254), and one metal (arsenic). One volatile, four pesticides/PCBs, and two metals were found in the surface soil at concentrations in excess of New York's unrestricted use SCOs. No SVOC was found at a concentration in the surface soil that was above its unrestricted use SCO.

The two SVOCs were found in the same sample and the concentrations were at or slightly above the residential soil RSL value of 15 μg/kg for each compound. Arsenic was found in all fifteen surface samples ranging from 2.8 μg/kg to 4.9 μg/kg, which are above the RSL value of 0.39 μg/kg. No VOCs were above their respective residential soil RSL values.

Cadmium and nickel were the only metals found in three samples above their respective New York's unrestricted use SCO values of 2.5 μg/kg, and 30 μg/kg. Exceedances of 4,4'-DDE, 4,4'-DDT, and dieldrin were found in only two samples (SB12-3 and SB12-17), which are located next to each other. The highest concentration detected of each compound is found in sample SB12-17 (4,4'-DDE at 15 μg/kg, 4,4'-DDT at 42 μg/kg, and dieldrin at 14 μg/kg). Only one compound (aroclor1254) exceeds both the EPA's residential soil RSL and New York's unrestricted use SCO values of 220 μg/kg and 100 μg/kg respectively. Aroclor-1254 was found in the same two samples (SB12-3 and SB12-17) as were the pesticide compounds. The highest concentrations for pesticides/PCBs were found in sample compounds SB12-17.

One VOC, acetone was found above New York's unrestricted use SCO value of 50 μg/kg but is typically a common laboratory contaminant and can be potentially attributed to the laboratory and not to site conditions.

Subsurface Soil Analytical Summary

In the subsurface soils for Disposal Pit A/B, concentrations of four SVOCs [benzo(a)anthracene, benzo(a)pyrene, benzo(b)flouroanthene, and dibenz(a,h)anthracene] were detected above their respective EPA residential soil RSL values. None of the detected SVOCs concentrations were found at levels above New York's unrestricted use SCO. The SVOCs that exceeded the residential soil RSLs were found in three test pit samples (TP12-2C, TP12A-1-1, and TP12A-1-2) collected from depths of 2.5' to 6' bgs. All four SVOCs including the highest estimated concentrations were found in one sample, TP12A-1-2, collected at a depth of 3' bgs. The benzo(a)anthracene and benzo(b)flouroanthene concentrations detected in this sample were only slightly above their respective RSL values of 150 μg/kg for each compound. The concentrations of benzo(a)pyrene (200 μg/kg) and dibenz(a,h)anthracene (56 μg/kg) exceed their RSL value of 15 μg/kg for each compound respectively.

Arsenic and cobalt were the only two metals found above their respective residential soil RSL values in the subsurface soils at Pit A/B. Arsenic was found in all 28 samples ranging in concentrations from 2.5 μg/kg to 5.9 μg/kg which are above the RSL value of 0.39 μg/kg. Cobalt was found in only one sample (SB12-2) and above the residential soil RSL value of 23 μg/kg.

Total xylenes was found in two test pit samples collected from 3.5' and 6' bgs and concentrations were above the New York's unrestricted use SCO of 260 μg/kg. The concentrations range from 260 μg/kg to 520 μg/kg and the lowest concentration is found in the deeper sample depth (e.g., 6'bgs). VOC concentrations in the soils are below the EPA Regions RSL values.

Seven metals (cadmium, chromium, copper, lead, nickel, silver, and zinc) are above their respective New York's unrestricted use SCO values. Cadmium, found in one sample, was the only metal to exceed both the EPA residential soil RSL and the New York unrestricted use SCO values of 7μg/kg and 2.5 μg/kg respectively. The average number of metal samples found with concentrations above their respective New York unrestricted use SCO values is four samples. Exceedances for 4,4'-DDE, arolclor-1254, aroclor-1260, dieldrin, and endrin were above their respective New York's unrestricted use SCO values and were limited to two subsurface sample locations, SB12-3 (similar to the surfical soils location) and TP-12A-2. The concentration of Aroclor-1254 and dieldrin found in one sample (SB12-3 at 1' to 4'bgs) also exceeded the EPA residential soil RSL values of 220 μg/kg, and 30 μg/kg respectively. Four (4,4'-DDE, aroclor-1254, dieldrin, and endrin) of the five SVOCs were found at both SB12-3 sampling locations (1'to 4' bgs and 10' to 11.9'bgs) and the highest concentrations were found in the shallow soils. Aroclor-1254, aroclor-1260, and endrin were found in one sample collected from TP12A-2-1 at a depth of 6'bgs. Aroclor-1254 was also found in the same test pit and at a depth of 5'bgs.

Alpha BHC was found in only one sample (TP12-2C at a depth of 6' bgs), at a concentration of 24 μg/kg which is above New York's unrestricted use SCO value of 20 μg/kg.

Radiological Soil Summary

Seventy-seven (77) surface and subsurface soil samples were analyzed for radionuclides in the Disposal Pit A/B area, with 17 re-sampled to clarify the reported detection of Plutonium-239/240 in the samples. Radiological soil sampling detected six isotopes [Bismuth-214 (Bi-214), Lead-210 (Pb-210), Lead-214 (Pb-214), Radium-223 (Ra-223), Radium-228 (Ra-228), and Tritium] at levels that statistically exceeded background; however no isotopes exceed the background plus worker DCGL level. The re-sampling confirmed that the levels of the Pu-239/240 detections observed during the initial sampling event were a function of the detection limit and not actual levels present.

Disposal Pit A/B Surface Water, Sediment and Groundwater Analytical Summary

Six monitoring wells are located in the vicinity of Disposal Pit A/B and include: MW12-2A, MW12-8, MW12-10, MW12-11, MW12-12, and MW12-13. The locations of the groundwater monitoring wells are shown on **Figure 1-2.** Two groundwater sampling rounds were conducted in 1999, and samples were analyzed for the same analysis as listed for the soils. Groundwater exceedance was limited to iron detected in only three wells. No surface water or sediment samples are proximal to the Disposal Pit A/B potential release area. A summary of the compounds detected in the groundwater including the NYSDEC Class GA Ambient Water Quality Standards (AWQS) are provided in **Table 1-5**.

Disposal Pit C Soil Analytical Summary

Nine surface soil samples (from 0 to 0.2' bgs) and 42 subsurface samples were collected from Pit C and submitted for the same analysis as listed for Disposal Pit A/B. The locations of the samples collected at Disposal Pit C from the soil borings, monitoring wells and test pits are shown on **Figure 1-4.** A summary of the compounds detected in soils for Disposal Pit C including the EPA residential soil RSL and New York's unrestricted use SCO values are provided in **Tables 1-3** and **1-4**.

Surfical Soil Analytical Summary

VOCs, SVOCs and pesticides/PCBs concentrations in the surfical soils at Pit C were below their respective EPA residential soil RSL values. Arsenic was the only compound found above its RSL value of 0.39 µg/kg. Concentrations of arsenic in the nine samples ranged from 2.9 µg/kg to 4.3 µg/kg. In comparison to the New York's unrestricted use SCOs, VOCs, SVOCs, PCBs, and metals in the surfical soils were below their respective unrestricted use SCO values. Only one pesticide (4,4'-DDD) found at a concentration of 8.6 µg/kg was above the New York's unrestricted use SCO value of 3.3 µg/kg.

Subsurface Soil Analytical Summary

In the subsurface soils for Disposal Pit C, concentrations of four SVOC [benzo(a)anthracene, benzo(a)pyrene, benzo(b)flouroanthene, and dibenz(a,h)anthracene] and two metals (arsenic and lead) were above their respective EPA residential soil RSL values. VOCs and pesticides/PCBs concentrations in the subsurface soils were below their respective RSL values. All four SVOCs were found in the shallow soils collected at two locations, TP12-8A and TP12A-7-1, and the highest

concentrations of the SVOCs were found at location TP12A-7-1. Overall concentrations of benzo(a)anthracene and benzo(a)pyrene exceeded their residential soil RSL values by a factor of 1 or less whereas benzo(b)flouroanthene, and dibenz(a, h)anthracene exceeded their RSL values.

Arsenic was found in all 39 samples above the residential soil RSL value of 0.39 µg/kg, and concentrations ranged from 1.9 µg/kg to 11.1 µg/kg. Lead was the only metal that exceeds both the EPA residential soil RSL and New York's unrestricted use SCO values of 400 µg/kg and 63 µg/kg respectively. The lead concentration of 431 µg/kg was found in only one sample collected at a depth of 7' bgs.

Two VOCs, acetone and methylene chloride, were found in the same sample (TP12-3A) and above the New York's unrestricted use SCO values of 50 µg/kg for each VOC. Both VOCs are considered common laboratory contaminants.

Three pesticides (4,4'-DDD, 4,4'-DDE, and 4,4'-DDT) and four metals (cadmium, lead, nickel, and zinc) were found in the subsurface soils at Disposal Pit C above their respective New York unrestricted use SCO values. Concentrations of SVOCs and PCBs in the subsurface soils were below their respective unrestricted use SCO values.

The concentrations of 4,4'-DDD, 4,4'-DDE, and 4,4'-DDT above their respective New York unrestricted use SCO values were generally found in the shallow soils collected from the test pits. The highest concentrations of the three pesticides were found at location TP12A-6-1 collected from 1'bgs.

Similar to the pesticides concentrations, cadmium, nickel, and zinc found above their respective New York's unrestricted use SCO values were generally located in the shallow soils (e.g., 1' to 4' bgs) collected from the test pits. Overall, the metal concentrations exceed their New York's unrestricted use SCO values by a factor of one to three or more.

Radiological Soil Summary

Ninety-eight (98) surface and subsurface soil samples were analyzed for radionuclides in the Disposal Pit C area with 13 re-sampled to clarify the reported detection of Plutonium-239/240 in samples. Radiological soil sampling detected six isotopes (Bi-214, Pb-210, Ra-223, Radium-226 (Ra-226), Ra-228, and Tritium) at levels that statistically exceeded background; however no isotopes exceed the background plus worker DCGL. The re-sampling confirmed that the levels of the Pu-239/240 detections observed during the initial sampling event were a function of the detection limit and not actual levels present.

Disposal Pit C Surface Water, Sediment and Groundwater Analytical Summary

Seven monitoring wells are located in the vicinity of Disposal Pit C including MW12A-1, MW12A-3, MW12-7, MW12-14, MW12-15, MW12-33, and MW12-34. The locations of the monitoring wells at Disposal Pit C are shown on **Figure 1-2.** Groundwater exceedance was limited to iron detected in the samples. No surface water or sediment samples are proximal to the Disposal Pit A/B potential release

area. A summary of the compounds detected in groundwater including the NYDEC Class GA AWQSs are provided in **Table 1-5**.

1.4 Nature and Extent of Impacts

A human health and ecological baseline risk assessment was conducted for Disposal Pit A/B and Disposal Pit C as part of the RI. These locations were selected based on documented activity associated with the WSA activities, areas where the RI investigations confirmed significant "military" activity and proximity to buildings associated with activities of potential concern.

The Army's determination is that no further action is warranted based on the human health and ecological risk assessment for Disposal Pit A/B and C. However, it is in the Army's interest to prevent public access to the classified military-related items and debris potentially contained in both disposal pits by removing and securing these items, pending future dismantling, destruction, and disposal determinations.

1.5 Document Organization

The first section of this report provides an introduction to the RA work plan and includes a site description and a summary of site background conditions. **Section 2** consists of the removal action objectives. **Section 3** presents the removal action elements. **Section 4** presents a Field Sampling Plan (FSP). **Section 5** is the Construction Quality Plan (CQP) and **Section 6** includes the Post-Construction Monitoring and Maintenance Plan. **Section 7** is the Waste Management Plan and **Section 8** includes the removal action schedule. References are provided in **Section 9**.

2.0 OBJECTIVES

Parsons was tasked under USACE Contract Number W912DY-08-D-0003, Task Order No. 0003, to perform the SEAD-12 RA at Disposal Pits A/B and C. The primary objective of the RA is to:

- Excavate, segregate, and secure military-related materials from other debris and soil that are present in Disposal Pit A/B and Disposal Pit C at SEAD-12 to prevent public access to the classified or sensitive military material.

The results of the BRA completed for the disposal pits during the RI indicate that no further action is required for the contents of the pits as there is no indication that hazardous substances exist at levels that pose unacceptable levels of risk or potential hazard to human health or ecological populations.

The Army assumes that there is a continuing potential that some of the buried material/debris/fill contained in Pits A/B and C could contain hazardous substances based on the nature of work historically conducted at SEAD-12.

If classified military-related materials are recovered from the former disposal pit locations, it will be turned over to the Army for subsequent handling, storage, dismantling or potential destruction, and disposal in accordance with national security, and applicable solid, hazardous, and radiological requirements. Other forms of non-military-related debris that are identified, will be recovered from the excavations, characterized, treated (as necessary), and disposed off-site at licensed landfills in accordance with prevailing solid, hazardous, and radiological waste regulations. Excavated fill or soil that are identified to contain hazardous substances at concentrations that do not allow for its reuse as backfill, will be segregated, characterized, and transported off site for disposal in accordance with the disposal facility's permit requirements and applicable solid, hazardous, and radiological regulations. The fill and/or soil not found to be contaminated will be used as backfill in the open excavations at Pits A/B and C.

2.1 Cleanup Goals

The remedial action at SEAD-12 is guided by the cleanup goal of removing all classified military-related debris encountered at Disposal Pits A/B and C, and if encountered, the removal of soil found to indicate that hazardous substances, are present within the confines of the disposal pits, it will also be excavated, characterized, treated (as necessary) and disposed off-site at licensed off-site landfills.

2.2 Summary of Removal Action

The remedial activities for SEAD-12 addressed in this work plan are the following:

- Excavating and segregate classified military-related materials from other debris and soil that are present in Disposal Pits A/B and C.
- Dewatering excavations, if warranted, by pumping the water into a holding tank.
- Provide contingencies if hazardous substances are found in the excavated material.

- Stabilize soil exceeding the waste characterization criteria, if found, in order to render it non-hazardous.
- Disposing of the classified military-related items and debris and soil/fill containing hazardous substances above concentrations that allow for unrestricted use in off-site landfills.
- Backfill excavations with the existing non-contaminated soil/fill (not debris) removed from excavations and clean fill as necessary.
- Submitting a Completion Report after completion of the remedial action.

Debris previously found in the test pits excavated at Disposal Pit A/B contained a significant portion of military-related components. The contents found in the test pits are summarized in **Table 2-1**. The volume of material to be excavated from Disposal Pit A/B is anticipated to be approximately 5,000 cubic yards (cy) with approximately 10 percent (%) of that volume comprised of debris. The volume of material expected to be removed from Disposal Pit A/B is based on an average depth of 6 feet bgs in the excavation. The approximate excavation limits for Disposal Pit A/B are shown on **Figure 2-1** and are based on test pits and areas where electromagnetic (EM) anomalies were detected during the geophysical survey conducted as part of the RI which is presented on **Figure 2-2**.

Disposal Pit C was divided into two separate areas (e.g., Area 1 north and Area 2 south) based on the test pit contents which are summarized on **Table 2-1**. The anticipated volume of material to be excavated from the two areas is estimated at approximately 9,000 cy, including roughly 2,000 cy from Area 1 and 7,000 cy from Area 2. The estimated volume of debris contained in Disposal Pit C excavated material is approximately 16%. The volume of material expected to be removed from Disposal Pit C Area 1 is based on an average depth of 4 feet bgs and for Area 2 based on an average depth of 7 feet bgs. The approximate excavation limits for Disposal Pit C are shown on **Figure 2-3** and are based on test pits records and geophysical survey results which are presented on **Figure 2-4**.

The volume of material (e.g., military-related materials, debris, and soil/fill) that may be removed from the pits and disposed off site or secured by the Army is estimated at approximately 5,800 cy of material. This volume may vary (i.e., increase or decrease) based on field determinations and observations. The volume estimates to be removed from the disposal pits is summarized on **Table 2-2**.

2.3 Basis of Document

This work plan is based on data and information that is documented and reported in the following reports:

- Expanded Site Inspection, Eight Moderately Low Priority AOCs, SEADs 5, 9, 12(A and B, (43, 56, 69), 44 (A and B), 50, 58, and 59, Draft Final, December 1995.
- Final Remedial Investigation (RI) Report, at the Radioactive Waste Burial Sites (SEAD-12), Revised August 2002.
- Final Radiological Survey Report, SEAD-12, Phase I and Phase II Surveys, March 2003.

- Final Supplemental Remedial Investigation Report, Radioactive Waste Burial Sites (SEAD-12), October 2006.
- Final Feasibility Study (FS) Report, for the Radioactive Waste Burial Sites (SEAD-12), January 2008.

2.4 Remediation Requirements and Criteria

2.4.1 Applicable and Relevant and Appropriate Requirements (ARARs)

Excavation and off-site disposal requirements and criteria include regulatory and disposal facilities permit requirements.

2.4.1.1 Chemical-Specific Requirements

These requirements include the following:

- Transport and disposal of excavated debris and soil/fill to meet Federal and State of New York Department of Transportation requirements and also the permit requirements of the selected disposal location(s).
- Discharge requirements based on the Seneca County Sewer District No. 2 discharge permit to receive site groundwater from excavation dewatering, and decontamination water in compliance with New York State's State Pollutant Discharge Elimination System (SPDES).

2.4.1.2 Location-Specific Requirements

These requirements are associated with protecting existing resources potentially impacted by site remediation activities.

Based on information obtained from the Unites States Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI), wetlands are present within the bounds of SEAD-12 and located several hundred feet south of Pits A/B and C. These wetlands are categorized as part of the Palustrine System (swampy or marshy) and are dominated by the presence of trees, shrubs, emergents, mosses or lichens, and may contain small shallow or intermittent streams. The wetlands located south of the AOC are characterized as forested wetlands due to the presence of deciduous tress and shrubs. Additionally, the seasonal un-named creek flows through the forested wetlands to the northwest and across SEAD-12. A natural seasonal marsh area occurs near the eastern portion of the unnamed creek, and tends to remain wet throughout the year, drying out during dry summer months.

Floodplain information was reviewed from the Federal Emergency Management Agency (FEMA) confirming that SEAD-12 is not within the floodplain of a 100-year or 500-year flood. Flood insurance rate maps indicate the entire Depot is outside the 100-year floodplain.

USFWS indicated that no federally listed or proposed endangered or threatened species under their jurisdiction are known to exist in the area of SEAD-12. The NYSDEC Natural Heritage Program Biological and Conservation Data System identified no known species of special concern living within the Depot property.

2.4.1.3 Action-Specific Requirements

A water quality certification under Section 401 of the Federal Clean Water Act is not needed for this remediation project.

2.4.2 Notification Requirements and Status

While formal permits are not needed for a CERCLA site remediation, applicable state or local regulatory permit requirements will be met. Such requirements include disposal requirements for off-site disposal operations. No special local Town of Romulus requirements have been identified that will need to be met other than SEDA security procedures.

2.4.3 Access Needs During Remediation

Access will be obtained from SEDA in order for the remediation work to be completed at Disposal Pits A/B and C located within SEAD-12. SEDA will provide Parsons and the subcontractor with keys to the necessary gates for access to and egress from SEAD-12.

3.0 REMOVAL ACTION ELEMENTS

This section provides a summary of the elements that comprise the RA. Performance of the planned removal action at SEAD-12 will require implementation and completion of numerous discrete tasks along a course that is generally sequential. Frequently, work tasks will be interlocked and overlapping, but generally the required work will follow a path that includes site preparation, site construction/excavation, verification of construction completion, site restoration, site demobilization, post completion actions, and documenting the results of the of the action. This document provides details pertinent to the planning for the action. Details of subsequent actions listed are provided below.

As discussed previously, the primary focus of this removal action is to excavate and segregate military-related materials from other debris and soil that may be present in the disposal pits at SEAD-12 to prevent public access to the classified or sensitive military material. Although it is believed that elevated levels of hazardous substances will not be identified during the excavations, this WP and the supporting documents provide for the contingent of managing contaminated soil, if such is found present.

3.1 Site Preparation

Site preparation will be required prior to the commencement of construction activities at SEAD-12. Site preparation activities are listed below and are discussed in more detail below:

- Site Health and Safety;
- Site Control and Security Requirements;
- Mobilization;
- Support and Staging Areas;
- Clearing and Grubbing Requirements;
- Identification of Obstructions and Utilities;
- Control of Run-On and Run-Off Waters;
- Erosion and Sediment Controls;
- Identification and Qualification of Off-site Disposal Facilities;
- Site Survey (Pre and Post Excavation);
- Establishing Background Conditions; and
- Off-Site Borrow Material.

3.1.1 Site Health and Safety

All field activities conducted during the removal action will be performed in general accordance with the site-specific health and safety plan (HSP), "Accident Prevention Plan and Generic Site Wide

Health and Safety Plan for Seneca Army Depot Activity" (Parsons, 2005) in accordance with Parsons' Safety, Health, and Risk Program (SHARP) Manual. Supplemental health and safety information necessary to complete the removal action at SEAD-12 is included in **Appendix A.**

All subcontractors will review Parsons' HSP and develop their own HSP written specifically for the removal action. The HSP will protect site workers through the identification, evaluation, and control of health and safety hazards.

3.1.2 Site Control and Security Requirements

SEAD-12 is located within the former WSA area which is surrounded by triple chain link fence with locked gates. The Army will provide site access to the field team prior to and during the performance of construction activities. Site security is necessary to prevent exposure of unauthorized, unprotected individuals to the work area. The area immediately surrounding the work zone will be clearly marked through the use of signs, barrier rope, tape, or fencing.

Site security will be enforced by the Site Health and Safety Officer (SHSO) or a designated alternate who will ensure that only authorized personnel are allowed in the work area. This person will also ensure that entry personnel have the required level of personal protective equipment (PPE), are trained under the requirements of Title 29 Code of Federal Regulations (CFR) 1910.120, and are on a current medical monitoring program.

All visitors to the work site are required to report to the Site Manager (SM) and/or the SHSO as soon as they arrive on site. The presence of visitors on site will be recorded in the field logbook, including the visitor's name, company, date, time, and activities performed while on-site. All visitors to the work site, and persons working at the work site will receive site-specific training prior to entering the work area.

3.1.3 Mobilization

The removal action subcontractor shall submit, for the project manager's/engineer's approval, the proposed plan for decontamination of personnel and equipment, as well as their plan for work/staging area arrangement, a minimum of five working days prior to commencement of work.

Field personnel, equipment, and materials needed to complete the work will be mobilized to the site. The subcontractor will bring all necessary equipment to the site, arrange for the necessary utilities, and obtain all permits needed.

Travel right-of-ways between the excavation site, support zones, and equipment/material staging areas will be established and marked. Access and egress routes within the Depot will be identified and posted to direct and enhance traffic flow and to minimize the impact that construction equipment movement has on other activities underway at the Depot.

As part of the mobilization task, Parsons will schedule and coordinate a kick-off meeting (e.g., pre-construction meeting) that will include participation of Parsons and subcontract personnel (i.e., the earthwork and radiation contractor) as well as appropriate Army representatives such as the SEDA Base Environmental Commander (BEC), the CENAN Project Manager, the USACE Project Manager,

and the SEDA Radiation Protection Officer. All parties will be advised of the scope of work, planned schedules, lines of communication and authorities of personnel, and procedures for resolving factors that could change the scope and impact field activities. Potential health and safety issues (radiological and chemical) will also be reviewed.

3.1.4 Support and Staging Areas

The perimeter of the excavation sites and its support zone will be marked using stakes. Entry/exit ways through the security fencing will be placed as required to support needed traffic flow. Parsons currently anticipates that the support area for the SEAD-12 activity will be established close to the identified disposal pits, and along Service Road No. 1. The work support zone will be arranged to facilitate free and logical equipment movement to and from the work area, which will enhance safety, security and minimize the likelihood that contaminants, if present, will be introduced to new areas of the overall site.

In addition, a 4-foot high orange construction fence will be installed around the perimeter of each excavation to prevent incursion of unauthorized individuals and wildlife into the pits. The fence will also separate the excavation sites from the materials staging areas.

A construction entrance to the work zone will be installed on the west side of the storage area off of Service Road No. 1. An engineered entrance that is at least 25 feet wide and consisting of a 24" culvert pipe backfilled with crushed stone over fabric will be constructed to stabilize the entrance.

Available data from soil borings and test pit operations performed at the disposal pits indicates that the top 2.5 feet at Pit A/B, the top 0.5 feet at Pit C Area 1 north, and the top 3 feet at Pit C Area 2 north contains clean overburden material overlying the disposal pits. An unlined soil staging area for the "clean" overburden soil removed from the disposal pits will be located north of Pit A/B, and east of Pit C. At the conclusion of the excavation activities, this material will be reused as backfill or cover material at the disposal pits.

A materials handling area will be located between the construction entrance and the disposal pit excavations. This area will be lined with 6 millimeter (mil) polyethylene sheeting or equivalent material, and will be used for temporary staging areas of excavated material pending processing (e.g., scanning or characterization sampling, screening, etc.) for disposal. Each of the stockpile areas will be located adjacent to eastern shoulder of Service Road No. 1 so that eventual truck load out activities can be completed while the over-the-road trucks remain on the Service Road. This eliminates the need to construct temporary roads into the staging area and site. If necessary, the area along the shoulder of Service Road No. 1 where loading will take place will be stabilized with 12" of gravel placed over fabric.

A lined screening area will be set up directly east of the storage stockpiles, between the staging areas and the excavation pits. The screening area will have a lined, mixed soil and debris stockpile area that is approximately 150 square feet and located adjacent to the screen plant.

The debris storage area will be approximately 150 square feet. The soil mixed with debris (<4") storage area will be approximately 100' wide x 300' long. Both of these areas will be parallel and adjacent to the east side of Service Road No. 1.

Silt fences will be installed around the storage piles and along the road side ditches. Ditch checks will be installed on the down stream end of the road-side ditches.

The anticipated location of the material handling and staging areas for this removal action are shown on **Figure 1-2**.

Temporary, impermeable pads will be constructed for the screen plant, handling of drummed material and other debris, and equipment decontamination. The pads will be bermed to prevent contaminated water run-off to impact clean areas. The impermeable pads will consist of 40-millimeter polyethylene sheeting placed over several inches of clean sand on the existing ground surface, and covered with several more inches of sand to protect the plastic sheeting. Pads will be sloped to allow for the collection of runoff either back into the disposal pits and/or into sumps. The collected water will be pumped to the frac tank.

3.1.5 Clearing and Grubbing Requirements

Disposal Pits A/B and C are located in the northeast portion of SEAD-12 between Service Road No. 1 and Patrol Roads, and the surrounding high security perimeter fence that encompasses the former WSA. The land between Service Road No. 1 and Patrol Roads are currently covered with grass and sporadic small trees. All of this area will be cleared as part of site mobilization effort.

3.1.6 Identification of Obstructions and Utilities

The subcontractor will contact Underground Facilities Protective Organization (UFPO) and work with Parsons and the Army to locate and mark utilities and other obstructions in the immediate areas of the excavation site and the supporting work/staging areas. All identified utilities within work/staging areas will either be terminated and disconnected, or if necessary, rerouted to ensure that service is not disrupted during site operations.

3.1.7 Control of Run-On and Run-Off Waters

Run-on waters into the excavation areas will be controlled by installing berms and/or ditches to divert storm waters around the areas of excavation at the disposal pits. Berms and/or ditches will be placed up gradient of open excavation areas as work proceeds. Berms will be constructed of clean soil or hay bales. The location of berms will be determined in the field after assessing conditions.

Storm event water and groundwater entering the excavations and materials staging areas will be captured and pumped into a tank for temporary storage pending determination of final disposition.

All run-on, run-off, and erosion control measures will be inspected daily and repaired as necessary. Water management and control measures will be constructed throughout the project duration and will be adjusted as field conditions warrant.

3.1.8 Erosion and Sedimentation Controls

Temporary erosion and sedimentation controls, such as silt fencing or hay bales, will be installed as required during operations to prevent migration of sediments and erosion. Prior to beginning excavation work, temporary silt fencing will be erected at a minimum at the following locations:

- along all temporary storage piles locations;
- along the down stream end of the road-side ditches; and
- along the down gradient sides of disturbed areas of the excavations to prevent contaminated sediment transport into the forested wetlands located south of the disposal pits.

The temporary silt fencing will be maintained throughout the project and will not be removed until permanent vegetation has been re-established. In addition, storm water from up-gradient locations will be routed away from exposed materials, and storm water contact of exposed material will be minimized to the extent practical. Any temporary erosion control measures will be removed following remediation so as to return drainage patterns to their general conditions prior to remediation. The final grade will be based on site drainage restoration.

3.1.9 Identification and Qualification of Off-Site Disposal Facilities

Samples of the excavated soil and debris will be collected and submitted for radiological and hazardous waste characterization analysis prior to disposal. The analytical results will be submitted to the potential off-site disposal facility for approval prior to the initiation of load out activities. Samples of soil or debris will be collected at a rate of 1 per every 200 cy or less for radiological constituents, and 1 per every 700 cy or less for hazardous waste characteristics analyses. The sampling requirement is based on the potential disposal facility's requirements as shown on **Table 3-1**. Sample container requirements are summarized in **Table 3-2**. However, the number of samples and analyses may vary from this WP depending on the requirements of the selected landfill. Additionally, it is assumed that the excavated soil or debris will not contain radioactive constituents at levels that necessitate disposal at a low level radiological disposal facility.

Soil

The soil disposal samples will be tested for contaminant leaching using the Toxicity Characteristic Leaching Procedure (TCLP) for designated metals, VOCs, SVOCs, and pesticides/PCBs constituents, as well as other characteristics of hazardous waste (e.g., ignitability, corrosivity [i.e., pH], reactivity, total solids, and the paint filter test). Based on the available historic data, it is not expected that excavated soil will contain contaminants that exceed the TCLP limits listed in Title 40 CFR Part 261.24. In the event that excavated soil does exceed the TCLP limits, the soil will be stabilized on-site, and then disposed as non-hazardous waste. Radiological analyses of the soil will include Gross Alpha, Gross Beta, Gamma Spectroscopy, and Tritium. It is assumed that the majority, if not all, of this material will be disposed at a New York State landfill, (e.g., Seneca Meadows Landfill, Waterloo, NY; Ontario County Landfill, Flint, NY, etc). There are currently no expectations that excavated

soils will need to be disposed of either as hazardous waste, or as low level radiological wastes. Refer to the FSP for detailed information on the required analysis for disposal.

Debris

Excavated non-military-related debris that is identified will be sampled and analyzed for TCLP metals content, and for the radiological constituents including Gross Alpha, Gross Beta, Gamma Spectroscopy, and Tritium. It is assumed that the majority, if not all, of this material will be disposed at one of the identified New York State licensed landfills as construction and demolition (C&D) debris. Refer to the FSP for detailed information on the required analysis for disposal.

If radioactive-contaminated debris is detected, then it will be packaged and transported for off-site disposal as Low Level Radioactive Waste (LLRW) or Mixed Waste depending on chemical characteristics. The radioactive sources will likely be removed from the miscellaneous components and placed in 55-gallon steel drums for transport to a licensed radioactive waste landfill. Debris with surface radiological contamination will be placed in drums, B-25 containers and/or inter-modals for off-site disposal. Transport will be directly to the disposal sites or via a licensed broker who may consolidate wastes. Debris with surface radiological contamination may be sized prior to packaging to meet disposal facility requirements. As discussed previously, this WP is based on that the excavated soil or debris will not require disposal at a low level radiological disposal facility.

Water

The water collected from decontamination operations, excavation dewatering, and run-on/run-off control methods will be stored in a frac tank. A sample of the water will be collected from the tank at the end of the project or when it's full, and submitted for off-site laboratory analysis for disposal at the Seneca County Sewer District No. 2 facility. All waters will be appropriately tested and the analytical data will be submitted and reviewed by the Seneca County Sewer District (the District) for acceptance. Solids collected from holding tank will be disposed with other contaminated soil. Refer to the FSP for detailed information on the required analysis for disposal.

In general, the water has to be non-hazardous according to 6 NYCRR Part 371 in order to receive the District approval. This WP is based on the water generated during this removal action will be disposed as non-hazardous since there is no historic data to suggest that water from SEAD-12 would be characterized as hazardous and would require treatment prior to disposal.

3.1.10 Site Survey (Pre and Post Excavation)

Prior to the initiation of the excavation activities, the anticipated lateral extents of the excavations for Pits A/B and C (refer to **Figure 2-1** and **Figure 2-3**), and the existing surface elevations present within the areas will be surveyed. A sampling grid system will also be surveyed at each disposal pit and is shown on **Figure 3-1**. (Refer to the FSP for additional information on the sampling grid.) Whenever possible, 20 feet will be cleared on either side of the work area. If this is not possible, the maximum path will be cleared and work will be coordinated to ensure constructability. All utilities will be clearly marked following the clearing. The survey will be conducted with a global positioning system (GPS) or by a land surveyor. (Licensed or stamped survey drawings will not be provided.)

A post excavation survey will also be conducted at each area to determine in-place materials volumes excavated as a result of the remedial action.

3.1.11 Establishing Background Conditions

A background site located within the WSA and approximately 1 to 2 miles away from Disposal Pits A/B and C has been previously established for background radiological levels as part of the NTCRA performed for SEAD-63. These background levels will be compared to the data collected from the excavations in SEAD-12. If additional radiological background data is necessary then another background site (approximately 50 feet by 300 feet in size) will be established and surveyed. Gamma radiation walkover survey will be performed for this additional site and the results will be documented prior to the initiation of the excavation work at SEAD-12. It is anticipated that 19 discrete near surface soil samples will be collected if an additional background site is necessary and submitted to an off-site contract laboratory for analyses of Gross Alpha and Gross Beta levels.

Air monitoring will be performed prior to beginning earthwork to establish background conditions for comparing field measurements collected during the removal action. Air monitoring will be performed as described in **Section 3.2** (Dust Control and Air Monitoring Measures).

3.1.12 Off-Site Borrow Material

Clean overburden soil removed from each excavation will be stockpiled and used for subsequent backfill material in the excavations. If off-site borrow material is required for additional backfill material, a source will be identified and data will be provided certifying that the material is suitable for use as clean fill. The backfill from off-site sources will be clean and free of undesirable substances including debris, rubble, wood, chemicals, and stones larger than three inches. The borrow material will be sized so that less than 25% of the material passes through a 200 count sieve. The procedure to show acceptability of a borrow source for use as backfill at the disposal pits, is consistent with NYSDEC's Draft DER-10 Technical Guidance for Site Investigation and Remediation (December 2002), and is as follows:

1. Subcontractor identifies a potential borrow source for the SEAD-12 RA project. Subcontractor provides the name of the site owner, the location where the fill was obtained, and a brief history of the site which is the source of the fill.
2. Subcontractor collects one representative sample from the borrow source and submits for the analysis of TAL Metals, TCL VOCs, TCL SVOCs, PCBs, pesticides and radiological contaminants. The results are provided to Parsons, Army, EPA and NYSDEC.
3. Analytical results compared to the NYSDEC part 375 SCOs for unrestricted use to determine whether the backfill is clean, and suitable for use, as backfill.
4. If all results meet the requirements, the material is acceptable for use as backfill. If the results are not acceptable, a new borrow source will be located and the process will be repeated. The Army will provide the comparison of backfill results to the acceptability criteria to NYSDEC and EPA

for review prior to accepting the material onsite. The Army will consider the material approved if it meets all of the requirements as discussed above.

5. No additional borrow source samples will be required once the source is approved. The Army, or their designee, will monitor the incoming loads of backfill to document that the fill is free of extraneous debris or solid waste.

3.2 Excavation and Segregation of Debris from Soil

The principal objective of this removal action is to excavate and segregate classified military-related materials from other debris and soil that are present in Disposal Pit A/B and Disposal Pit C in SEAD-12. Although radioactive materials are not expected to be present with the buried debris, Radiation Awareness Training will be provided to all site personnel (excluding waste haulers) prior to their first day of fieldwork. The training will be conducted by a senior radiation technician (RAD TECH), who will be considered an "Authorized User," with qualifications as described in *Engineer Manual 385-1-80, Radiation Protection Manual* (USACE, 1997). If radioactive material is encountered, all site work will temporarily cease, and an additional day of radiation worker safety training will be immediately provided to all site personnel in accordance with the USACE's EM 385-1-80.

Excavation and Segregation of Soil and Debris

Disposal Pits A/B and C will be excavated to the anticipated limits of the historic disposal pits, to the extent of the identified military-related items and buried debris, or as directed by the Army and the Project Manager/Site Manager. As discussed in **Section 2.2,** an estimated volume of 14,000 cy of soil and debris are expected to be excavated for inspection and evaluation from the three disposal pits during this RA. This quantity may change based on field observations and results of confirmatory radiological screening and soil sampling, as appropriate.

The work plan is based on the expectation that the excavated soil or debris will not be contaminated with hazardous substances or constituents that require the material to be disposed as a hazardous waste. It is also presumed that real-time radiological scanning will not indicate that radiation is present in the soils, debris, or excavations at levels that are above the background. For this work plan, it is assumed that the soil or debris will not require disposal off-site at low level radiological disposal facility. Additionally, it is assumed that a MARSSIM Class III Final Status Survey will not be required for the completed excavations, as post-excavation scanning will show that radiation levels are consistent with background.

Site excavations will be conducted using a hydraulic excavator and two articulated off-road trucks. Shallow overburden soils overlying the disposal pits will initially be stripped from the top of the anticipated excavation areas, screened for radiological and volatile organic constituents, and visually inspected for indications of debris or hazardous substance content. If no debris or hazardous substances are indicated, and if radiation levels are found to be consistent with background levels, the excavated shallow overburden will be placed in the unlined overburden material staging area located to the east and north of the disposal pit excavations for future reuse as backfill material.

Groundwater monitoring wells located within the excavation and the associated staging, sorting, and support areas will be removed, and the resulting debris (e.g., well casing and screen materials, concrete pads, bollards, etc.) will be disposed as part of the removal action waste streams. Replacement wells will not be re-installed subsequent to the completion of the RA as groundwater in the area of the disposal pits does not pose risks to either human health or the environment, and no long-term groundwater monitoring at these locations is required or anticipated.

If radiological scanning of the shallow overburden indicates readings in excess of pre-defined background levels, site work will temporally cease as previously discussed and an additional day of radiation worker safety training will be provided to site personnel. The radioactive shallow overburden material will be segregated from non-affected shallow overburden soil and staged in a lined area. As discussed in **Section 3.1.9** and further in the FSP, discrete soil samples will be collected at a frequency of 1 per every 200 cy, and submitted to the laboratory for Gross Alpha, Gross Beta, and Gamma Spectroscopy analysis. Each of the 200 cy piles will be uniquely identified and separated pending the review of radiological results. Similarly, if the shallow overburden soil is excavated and found to contain hazardous chemical substances based on screening levels and/or field observations, it will be segregated from other non-affected soils, and staged in a lined storage area, separated from soil containing radiological contaminants. Samples of the chemically contaminated soil will be collected at a rate of 1 sample per 700 cy and submitted for hazardous waste characterization analysis as described further in the FSP.

Once the shallow overburden has been removed, the remaining soil and debris will be excavated, scanned for the presence of radioactive or hazardous substances, and moved to the materials handling area for temporary stockpile pending further laboratory characterization for off-site disposal. Excavated soil and debris that exhibits evidence of elevated levels of radioactive or chemical substance contamination will be segregated from other soil and debris that does not exhibit such conditions.

Samples of soil and/or debris potentially contaminated with radioactive materials above background levels will be collected at the same rate as described above for radiological materials and will be analyzed for the same parameters plus Tritium. Samples of the chemically contaminated material will also be collected at the same rate and analysis as described above for the hazardous waste disposal. (Refer to the FSP for additional information.)

Additional samples of the potentially radioactive debris will be collected and includes surface scans and swipes samples to assess the level of surface radiological contamination. The swipe samples will be submitted for off-site laboratory analysis for disposal characterization.

Debris that is not radioactive and/or hazardous will be placed in the lined staging area that is located adjacent to the screening plant pending subsequent processing and further separations into greater than and less than 4-inch cuts. Large debris will be removed from the items to be processed by the screening plant and segregated for possible recycle or disposal as C&D debris.

Stockpiled materials sampled for radioactive and hazardous waste will not be processed through the screening plant until the analytical results are obtained, evaluated, and proved to be acceptable. Processing of the contaminated stockpiled materials will be completed separately from the processing of non-contaminated materials. The screening plant will be decontaminated after processing contaminated materials to ensure that subsequent process of the non-contaminated material is not cross contaminated with either radiological or chemical constituents.

All separated debris will be inspected by Army personnel to determine if classified military-related parts or components are present. Any identified classified military-items will be recovered, placed into containers, transported to an Army approved location on the installation, and turned over to the Army for final, handling, processing and disposition.

Drum Handling (if required)

Given the significant time elapsed since materials were disposed in Disposal Pits A/B and C at SEAD-12, it is unlikely that intact drums will be recovered. However, if found, intact drums will be removed and placed directly into an overpack or salvage drum. Any deteriorated drums containing liquids will either have the liquids removed using an explosion-proof electric pump, or be overpacked as they are encountered to minimize the likelihood of any possible release of hazardous substances. Drums exhibiting signs of internal pressurization will be isolated to the fullest extent possible in the excavation, pierced with a bronze punch mounted on the backhoe bucket to relieve pressure, and overpacked separately from other drums. Similarly, any container encountered that exhibits signs of reaction (e.g., smoking) will be allowed to fully react before they are removed and handled.

Drums found during the removal action will be transferred to a temporary drum staging area and placed in rows so each drum is readily accessible on all sides. The drum staging area will be bermed and lined to contain drum contents in case of a spill or leak. Drums will be labeled and inventoried at the staging area and removed from SEDA as soon as reasonably possible following excavation and sampling. As needed, drum contents will be sampled with a drum sampler or other appropriate methods depending on the characteristics of the contents. If drum contents cannot be determined in advance, Level B or C personal protection (as determined by the SHSO) will be implemented as a safety precaution. Drums will be transferred to a temporary drum staging area and placed in two rows separated so each drum is readily accessible. The drum staging area will be bermed and lined to contain drum contents in case of a spill or leak. Drums will be labeled and inventoried at the staging area and removed from SEDA as soon as reasonably possible following sampling.

Soil and Debris Staging and Disposal

Soils will be temporarily placed in piles lined with 6 mil polyethylene sheeting or equivalent material within the designated material handling and staging area. Each individual pile will be covered with 6-mil polyethylene sheeting to prevent erosion by wind or rain until the material is ready to be loaded for off-site disposal. A pump will be placed in the stockpile area as necessary to remove ponded water. The water will be pumped to a holding tank and the water will be disposed as discussed in **Section 3.1.9**.

The excavated soil will then be directly loaded from the staging area into the dump trucks for transportation to the off-site waste management facility selected as described in **Section 3.1.9**. The anticipated truck route consists of the trucks entering the site through the western truck gate and travel east to the North-South Baseline Road. They will then turn north onto North-South Baseline Road, and then turn east onto Igloo Road No. 5 until it intersects with Fayette Road (Igloo Roads 6, 7 and 8 will not be used for the truck route). They will then turn north onto Fayette Road, and enter the former WSA through the access gate that is located in the southeast corner of the WSA. Trucks will then proceed north on Service Road No. 1, pass the area where Buildings 813 to 817 are located, and then approach the work area from the south along Service Road No. 1.

Trucks will be staged to the south of the work zone access point pending loadout of material. Once loaded, trucks will proceed north-northwest along Service Road No. 1, then will turn south onto the Patrol Road, then turning east onto Service Road No. 2, and then will turn south on Service Road No. 1, and proceed to the same access gate which was used to enter the WSA area to exit the area. Trucks will then travel south on Fayette Road, turn west onto Igloo Road No. 5, and then south onto the North-South Baseline Road, before exiting SEDA to the west through the western truck gate where it intersects State Route 96A. The anticipated traveling route by the trucks areas are shown in **Figure 3-2** and will be evaluated prior to the start of construction.

Dust Control and Air Monitoring Measures

Conventional methods will be used to suppress dust generated during the removal action, including:

- Wetting equipment and excavation faces as needed with water;
- Applying water on buckets during excavation and loading/unloading;
- Covering temporary stockpiles with polyethylene sheeting to prevent wind blown particulates;
- Using tarps or other methods to cover containers or trucks;
- Keeping driving speeds to below 10 miles per hour; and,
- Applying a water spray during soil handling activities and to vehicle haul roads at the site, as needed.

An air monitoring plan has been developed to protect the workers involved in the construction at SEAD-12. Public health and safety will be ensured by monitoring within the work zone and creating an exclusion zone surrounding the construction area. Refer to the site specific HSP and **Appendix A** for information regarding the air monitoring plan to be implemented during the RA.

Confirmatory Sampling (if required)

After the excavation is completed for Disposal Pits A/B and C and before backfilling operations commence, confirmatory field screening for radiological constituents and soil sampling, if required, will be conducted to verify that the identified contamination or debris has been removed, and that concentrations of contaminants remaining are acceptable. Field screening will include field

determination of radiation levels using field instrumentation. If evidence of residual radiation in excess of background levels is observed, discrete soil samples will be collected and submitted to the laboratory for determination of radiological constituents. Comparably, if unexpected chemical releases are observed within close proximity of the disposal pits' excavation limits, confirmatory samples will also be collected and characterized for TCL and TAL hazardous constituents. The Army does not plan to collect gridded excavation base, sidewall, or perimeter samples from the excavation sites because the BRA did not indicate the presence of unacceptable levels of risk.

Confirmatory samples will be collected as grab samples in accordance with the FSP included as **Section 4**, which specifies the frequency and layout of the confirmatory samples.

3.3 Transport of Non Hazardous Excavated Material

Non-hazardous soil and debris will be loaded into DOT approved dump trucks or dump trailers for transportation to the disposal facility.

Representatives of the transportation companies will be required to attend an orientation prior to hauling the excavated soil off-site. The orientation will cover:

- Traffic Patterns
- Project Safety Issues
- Communication Issues
- Haul and Disposal Procedures
- Documentation Issues
- SEDA Specific Issues

The orientation will be summarized in a handout that will be passed along to each driver involved with the hauling activities. The transportation company will be required to document that pertinent information is delivered to each driver, or drivers will not be loaded.

Coordination of the off-site disposal activities will be done by the Site Manager. Each load will be tracked utilizing a worksheet provided to them as they arrive at SEDA. The worksheet will record:

- Transportation Company
- Trailer No.
- Site Name/Excavation No.
- Tarped – Yes/No
- BOL/Manifest No
- Arrival Time/Date
- Driver's Name
- Time Loaded
- Release Time
- Truck No.
- Material to be Loaded
- Decon – Yes/No
- Destination

All shipments to off-site facilities will be tracked utilizing the worksheet and a Parsons-developed database. The database allows for easy cross-referencing, reporting, and quantifying.

Prior to leaving an area, each truck will be inspected. Gross levels of contamination to the outside of the vehicle and tires will be swept or removed using other methods. Loads exhibiting signs of leaking materials will be held at the site until the nature of the leakage is confirmed and stopped. As necessary, waste loads will be off-loaded and allowed to "dewater" wither within the excavation site or on a staging pad constructed to capture liquids. Once the load is dewatered, it will be reloaded for subsequent inspection and transport.

Copies of permits and supporting information on waste transporters and off-site disposal facilities will be submitted to the USACE Contracting Officer (KO) and the Installation along with waste profile sheets and disposal characterization laboratory results for review and approval prior to waste shipments. Waste manifests and other shipping documents/bills of lading will be prepared in accordance with regulatory requirements for signature by the Parsons Site Manager or his authorized representative prior to scheduling transport and off-site disposal of excavated material and tank water.

3.4 Backfilling and Site Restoration

The excavation areas will be backfilled and machine compacted in one foot thick lifts to restore the excavated areas to their original conditions. The excavation will be backfilled with overburden soils initially removed from the excavations followed by certified, clean backfill from off-site sources as required to make up for volume losses during excavation.

The excavation site will be re-vegetated using a hay seed mix upon completion of the backfill operations. Other work areas in which site work disturbed vegetation will be also be seeded and mulched to promote re-vegetation. The temporary silt fencing will be maintained and will not be removed until permanent vegetation has been re-established.

Silt fence and ditch checks will be replaced or repaired, as required. Other drainage control features, such as berms, disturbed by site operations will be restored to functioning condition.

3.5 Progress Reports

Weekly reports will be prepared documenting the progress during the fieldwork phase of the project. The contents of the weekly reports are provided in **Section 5.4.2** of the CQP.

3.6 Demobilization

Demobilization activities include the following:

- All equipment and materials, including the decontamination pad, the tank, and site trailers, will be demobilized;
- A final inspection and housekeeping sweep of the work areas will be completed. All trash and waste materials will be removed; and
- All field personnel will be demobilized from the site. The shoulders of the road will be dressed and the adjacent roads will be returned to the condition as existed prior to the commencement of construction. Final topography will be recorded so as-built drawings can be produced.

3.7 Removal Action Completion Report

Results and records of the removal action will be documented in a Completion Report for submittal to USACE, NYSDEC and EPA. The contents of the completion report are provided in **Section 5.4.7** of the CQP.

4.0 FIELD SAMPLING PLAN

4.1 Introduction

This Field Sampling Plan (FSP) describes the approach to complete the soil and debris sampling necessary to complete the removal action at SEAD-12. The sampling proposed in this FSP has been designed to provide the information necessary for:

- Confirm that military-related materials has been excavated and classified material segregated from non-military debris and soil that are present in Disposal Pits A/B and C located within SEAD-12;
- Characterize excavated soil and debris for off-site disposal; and
- Characterize waste water generated during the excavation activity for disposal.

Project specific data quality objectives (DQOs) for sampling are described throughout this section. For each type of work, this FSP specifies the following:

- Types of sampling required;
- Number of required samples;
- List of required analyses;
- Acceptance criteria for analytical results; and
- Sample labeling and recording system.

This FSP is supplemented by the *Revised Final Generic Site-Wide Sampling and Analysis Plan for Seneca Army Depot Activity* (SAP) (Parsons, 2006), and the *Draft Radiological Field Sampling Plan* (RFSP) which is presented in **Appendix B**. The SAP was provided to the agencies under separate cover. The SAP specifies the following:

- Data quality objectives;
- Specific field sampling procedures;
- Sample preservation methods, container volumes, and holding times;
- Sample custody and management;
- QC sample collection;
- Analytical methods;
- Data validation;
- Laboratory analytical requirements;
- Data management and evaluation;
- Performance assessment and system audits;
- Preventative maintenance.

The RFSP describes procedures that will be used to collect and manage the radiological field samples, and document data collection activities in support of the RA since there maybe a potential that some of the buried debris/soil/fill contained in the three disposal pits could contain radioactive items or be radioactively-contaminated based on the nature of work historically conducted at SEAD-12. The

radiological subcontractor selected to perform field radioactivity scanning is Cabrera Services, Inc., (Cabrera) located in East Hartford, Connecticut.

The laboratories selected to analyze the radiological and chemical samples collected during the RA are:

- Radiological analysis by GEL Laboratories, of Charleston, South Carolina; and.
- Chemical analysis by Columbia Analytical Services, Inc., (CAS) of Rochester, New York.

4.2 Project Scope and Objectives

This project focuses on the excavation and segregation of classified military-related materials from other debris and soil that are present in Disposal Pits A/B and C. If classified military-related materials are recovered from the disposal pit locations, it will be turned over to the Army for subsequent handling, storage, potential dismantlement or destruction, and disposal in accordance with Army's national security, and applicable solid, hazardous, and radiological requirements. Other forms of debris that are identified will be recovered from the excavations, characterized, treated (as necessary), and disposed off-site at licensed landfills in accordance with prevailing solid, hazardous, and radiological waste regulations.

In order to accomplish this project, several different sampling tasks are required. These are outlined below and discussed in further detail in the SAP and RFSP.

4.2.1 Task Description

The tasks required to complete field sampling for SEAD-12 are presented in this section. Field sampling details are presented in **Section 4.3**.

4.2.1.1 Background Sampling for Radioactivity

As discussed in S**ection 3.1.11,** if additional radiological background data is necessary, another background site will be established within the limits of the WSA. , A gamma radiation survey will be performed at the additional background site (approximately 50 feet by 300 feet in size) prior to the initiation of the excavation work. Discrete near surface samples will be collected and submitted for Gross Alpha and Gross Beta radiation analyses. If samples are collected, the results of the analyses will also be used to determine background radiological levels. It is estimated that approximately 19 soil samples will be collected and submitted for background analyses of Gross Alpha, and Gross Beta levels. Samples will be submitted to GEL Laboratories on a 72-hour (three business days) turn-around time.

4.2.1.1 Confirmatory Sampling of Excavation

All military-related material will be excavated along with other debris and soils present in Disposal Pits A/B and C. Prior to commencement of excavation, the lateral extents of the three proposed excavation limits will be outlined by stakes placed by the engineer. After the excavation is completed and before backfilling operations commence, confirmatory field screening for radiological constituents and soil sampling, if appropriate, will be conducted to verify that the identified

contamination or debris has been removed and that concentration of contaminants remaining are acceptable. The results of the confirmatory field screening and confirmatory sampling, if appropriate, will determine if the excavation is complete or if more soil must be removed. The anticipated turnaround time for confirmatory soil sampling if appropriate is three business days.

Confirmatory soil samples will only be collected and characterized for non-radiological hazardous substances (e.g., TCL and TAL Compounds) in areas where field observations or monitoring indicate that a possible release of chemical constituents may have occurred. The confirmatory samples will only be collected from the immediate area surrounding the potential release, and will be used to confirm that potentially affected soil has been fully removed. Comparably, if evidence of residual radiation in excess of background levels is detected, discrete soil samples will be collected and submitted to the laboratory for determination of radiological levels and constituents

The Army does not anticipate that the full extent of the completed excavations will be verified via the collection of excavation base, perimeter, and sidewall samples since the BRA completed for the three disposal pits indicated that hazardous substances do not exist at levels that pose risk or potential hazard to human health or the environment.

4.2.1.2 Disposal Characterization Sampling for Soil and Debris

The disposal facility requires disposal characterization samples for analyses prior to the acceptance of waste materials. Samples of the excavated soil and debris will be collected and submitted to GEL Laboratories for radiological and CAS for hazardous waste characterization analysis prior to disposal. Samples will be collected and analyzed to satisfy the waste management facility requirements to characterize the waste material for disposal prior to its acceptance at any qualified disposal facility. The disposal facility will pre-approve acceptance of the soil and debris based on the review of the radiological and chemical analytical data.

4.2.1.3 Sampling of Excavation Water

During the site work, any excavation water (run-on and run-off) will be collected in a frac tank. Water and soapy water from the decontamination of various pieces of equipment or any other water generated during construction will also be collected in the frac tank. A sample of the water will be collected from the tank and analyzed for parameters requested by the District wastewater treatment facility that will be receiving the water. If the analytical results meet the District's discharge requirements, the water will be discharged to the main influent building of the waste water plant. Solids settled in the tank will be disposed off-site with the excavated soils.

If radiological contaminated soil and debris is found above the background levels during the excavation of the material from the disposal pits, then the water will also be analyzed for radiological constituents.

4.2.1.4 Drum Characterization Sampling

During the excavation, it is not anticipated that intact drums will be encountered. However, if they are recovered, the drums will be transferred to a temporary drum staging area and placed in rows so

each drum is readily accessible on all sides. As needed, the drum contents will be sampled with a drum sampler or other appropriate methods depending on the contents. The contents will be sampled to characterize their contents for off-site disposal. Based on the analytical results, the contents of the drum will be emptied and disposed appropriately.

4.2.1.5 Waste Residuals

Waste residuals generated during the field sampling activities, including disposable sampling tools, plastic sheeting, and disposable personnel protection equipment (PPE) will be bagged and disposed in an on-site trash dumpster.

4.2.1.6 Air Monitoring

An air monitoring plan has been developed to protect the workers involved in the construction at SEAD-12. Public health and safety will be ensured by monitoring within the work zone and creating an exclusion zone surrounding the construction area. Refer to the site specific HSP and **Appendix A** for supplemental information regarding the air monitoring plan to be implemented during the RA

4.3 Field Sampling Detail

This section provides a detailed description of the field activities that were outlined in the previous section. Refer to the SAP (Parsons, 2006) and the RFSP (Parsons, 2009) for a more detailed description of the analytical program, including sample custody, sample management, and data validation. QC samples will be collected in accordance with the SAP.

4.3.1 Confirmatory Sampling of Excavation

Confirmatory field screening for radiological constituents and soil sampling, if appropriate, will be performed to show that excavation is complete, site-specific cleanup goals (refer to **Section 2.1**) are met, and the formal disposal pit locations can be restored. The anticipated turnaround time for confirmatory sampling if appropriate is three business days.

4.3.1.1 Sample Collection

The surface of excavation side walls and bottoms will be scanned for elevated areas of gamma radiation using a sodium iodide (NaI) gamma scintillation detector coupled to a scaler meter (Ludlum Model 2221). The gamma scanning surveys will be performed by slowly moving the NaI detector in a serpentine motion as close as practical to the surface, at a rate of approximately 0.5 meter per second. The scaler will transfer the survey data to a GPS for concurrent survey data and location coordinate logging.

If evidence of residual radiation in excess of background levels is observed, discrete soil samples will be collected and submitted to the laboratory for determination of radiological constituents. Comparably, if unexpected chemical releases are observed within any of the disposal pits, confirmatory samples will also be collected and characterized for TCL and TAL hazardous constituents. One sample per every 2,500 sq. ft. of excavation bottom will be collected. If excavations are greater than 2 feet in depth, one sample per every 50 liner feet of sidewall will be collected. Each confirmatory sample will be collected as a grab sample from a unique location.

Figure 3-1 shows the sampling grid for confirmatory samples at the three disposal pits. If confirmatory sampling is required, samples we be identified based on their grid location. The number of confirmatory samples will be determined based on field conditions encountered.

QC samples will be collected in accordance with the SAP.

4.3.1.2 Sample Analysis

If evidence of residual radiation in excess of background levels is observed, then confirmatory grab soil samples will be collected within the excavation pits and maybe analyzed for

- Gross Alpha by EPA Method 900.0M,
- Gross Beta. by EPA Method 900.0M,
- Gamma Spectroscopy (with RN-222 Ingrowth) by EPA Method 901.0M, and
- Tritium by EPA Method 906.0M.

If confirmatory soil sampling is appropriate, grab soil samples will be collected within the excavation and maybe analyzed for

- TCL VOCs by EPA Method 8260B,
- TCL SVOCs by EPA Method 8270C,
- Pesticides/PCBs by EPA Method 8082/8081A, and
- TAL Metals by EPA Method 6010B/7471A.

The soil samples collected from the limits of excavation will be transported via an overnight delivery service to GEL Laboratories for radiological analysis and CAS for the chemical analysis. Refer to the SAP and RFSP for laboratory preparation and analysis methods.

4.3.1.3 Sample Numbering

Confirmatory samples from the three disposal pits will be labeled as follows:

S12EXFL-ZZ-XX (floor sample)

S12EXSW-ZZ-XX (sidewall sample)

The first two numbers note the AOC (i.e., SEAD-12). EX designates that the sample is from an excavation. FL denotes a sample collected from the floor of the excavation; SW denotes a sample collected from the sidewall of the excavation. ZZ is the grid name. XX is the sample number, assigned sequentially.

Every sampling label will be unique. In the field, the engineer will keep a log of the sample locations and sketch a diagram of sampling grids and the sample locations.

4.3.2 Disposal Characterization Sampling

Samples of stockpiled soil and debris will be submitted to the appropriate laboratories for disposal characterization analyses based on a 5-day turn-around time. These data will be used to segregate material for disposal at off-site landfill(s) and obtain landfills' approval for disposal. The disposal characterization will consist of collecting/analyzing samples of stockpiled material following excavation and segregation of debris (material greater than four inches in diameter) from soil, in accordance with the SAP and NYSDEC requirements. The characterization sampling/analysis will confirm that stockpiled wastes are properly segregated prior to loading for transport and off-site disposal.

4.3.2.1 Sample Collection

Samples of the excavated soil and debris will be collected from the stockpiles and submitted for radiological and hazardous waste characterization. Composite samples will be collected and submitted for off-site chemical and radiological analyses, except for VOCs. The VOCs samples will be collected as grab samples from the stockpiles based on field screening with a portable photoionization detector (PID) or equivalent air monitoring equipment.

Samples of soil and debris contaminated with radioactive material above background levels will be collected at a rate of 1 per every 200 cubic yards or less for radiological constituents. Soil samples will be collected as composite samples and the debris will be collected as grab samples for the radiological analysis. Composite samples of the soil and grab samples of the debris will be collected for hazardous waste characterization at a rate of 1 per every 700 cubic yards or less for hazardous waste constituents. This sampling requirement is based on the disposal facility's review of the historic sampling results at SEAD-12. Parsons currently estimates that approximately six samples will be analyzed for hazardous waste characteristics, and 19 samples will be analyzed for radiological constituents.

4.3.2.2 Sample Analysis

Soil samples will be collected for waste disposal characterization and analyzed for the following:

- TCLP VOCs by EPA Method 8260B,
- TCLP SVOCs by EPA Method 8270C,
- Pesticides/PCBs by EPA Method 8082/8081A ,
- TCLP Metals by EPA Method 6010B/7471A,
- Flashpoint by EPA Method 1010,
- pH by EPA Method 9045,
- Reactivity by SW846/Section 7.3.3 and 7.3.4,
- Total solids by EPA Method 160.3; and
- Paint Filter Test by EPA Method 9095.

Debris samples will be collected for waste disposal characterization and analyzed for:

- TCLP Metals by EPA Method 6010B/7471A

Soil and debris samples contaminated with radioactive material above background levels will be analyzed for the following radiological constituents including

- Gross Alpha by EPA Method 900.0M,
- Gross Beta. by EPA Method 900.0M,
- Gamma Spectroscopy (with RN-222 Ingrowth) by EPA Method 901.0M, and
- Tritium by EPA Method 906.0M.

The samples will be transported via an overnight delivery service to CAS for the chemical analysis and, if appropriate, to GEL Laboratories for radiological analysis.

4.3.2.3 Sample Numbering

The disposal samples will be numbered as follows:

S12DSZZ

The first two characters note the AOC (i.e., SEAD-12). DS designates the sample as a disposal characterization sample. ZZ is the sample number.

4.3.3 Sampling of Excavation Water

The water collected from decontamination operations, excavation dewatering, and run-on and run-off will be collected in a frac tank. A sample of the wastewater will be collected from the frac tank and submitted to CAS for chemical analysis, and if appropriate to GEL laboratories for radiological analysis (only if radiological contamination soil, and debris is encountered) for the disposal characterization. Sample analyses based on a 5-day turn-around time. The data will be used to secure approval to discharge the water to the District.

4.3.3.1 Sample Collection

A grab sample will be collected from the frac tank.

4.3.3.2 Sample Analysis

The waste water sample will be collected for waste disposal characterization and analyzed for:

- TCL VOCs by EPA Method 8260B,
- TCL SVOCs by EPA Method 8270C,
- Pesticide PCBs s/ by EPA Method 8082/8081A,
- TCL Metals by EPA Method 6000/7000, and
- pH by EPA Method 9045.

If radiological contamination is found in the soil and debris excavated from the disposal pits then the waste water will also be analyzed for the following radiological constituents:

- Gross Alpha by EPA Method 900.0M,
- Gross Beta. by EPA Method 900.0M,
- Radium - 226 by Emanation by EPA Method 903.1M,
- Radium - 228 by EPA Method 904.0M,
- Total Uranium by ICPMS 6020, and
- Tritium by EPA Method 906.0M.

If the analytical results are acceptable to the District, the contents of the frac tank will be emptied directly into the on-site sewer for disposal. For acceptance by the District, the waste stream must be non-hazardous according to 6 NYCRR Part 371. It is anticipated that all collected water will be suitable for discharge to the main influent building of the plant.

4.3.3.3 Sample Numbering

The water samples will be numbered as follows:

12WWMMDD

Twelve (12) is the SEAD number. WW designates that it is a water sample. MMDD is the month and the day that the sample is collected.

4.3.4 Drum Characterization Sampling

It is not expected that any intact drums will be encountered during the disposal pit excavations. However, in the event that intact drums are recovered from the disposal pits during construction activities, the drums contents will be sampled with a drum sampler or other appropriate methods. If drum contents cannot be determined in advance, Level B or C personal protection (as determined by the SHSO) will be implemented as a safety precaution since the contents are unknown. Based on the analytical results, the drums will be grouped together based on compatibility and disposed of at the appropriate disposal facilities either in bulk or as individual drums.

4.3.4.1 Sample Collection

The subcontractor will open each recovered intact drum and collect a composite sample from multiple grab samples within the same drum, and submit it to the selected laboratory for analysis.

4.3.4.2 Sample Analysis

The drum contents will be analyzed for

- TCL VOCs by EPA Method 8260B,
- TCL SVOCs by EPA Method 8270C,
- Pesticides/ PCBs by EPA Methods 1311/8082/8081A,

- Herbicides by EPA Methods 1311/8151,
- TCLP Metals by EPA Method 1311/6000/7000,
- Flashpoint by EPA Method 1010,
- pH by EPA Method 9045, and
- Reactivity by SW846/Section 7.3.3 and 7.3.4.

4.3.4.3 Sample Numbering

The drum characterization samples will be designated as follows:

12DRYY

The number 12 denotes that the drum was recovered from SEAD-12. Dr indicates that the sample is from a drum. YY is the sample number.

5.0 CONSTRUCTION QUALITY PLAN

The Construction Quality Plan (CQP) describes the construction quality assurance (QA) and quality control (QC) activities to be performed during the removal action at Disposal Pits A/B and C located at SEAD-12. This section addresses the quality assurance/quality control (QA/QC) procedures for site preparation, excavation, soil and debris loading, and restoration. This CQP has been developed to ensure that implementation of the remedial action is in compliance with the project documents. Remediation components include site preparation, excavation; soil, debris and water management; soils and debris disposal; backfilling, and site restoration. Inspections to verify compliance with the quality requirements will be performed during the various phases of construction.

The objective of this plan is to ensure that proper materials, construction techniques, methods, and procedures are implemented in accordance with project specifications. This plan provides a means to identify problems that may occur during construction and provides appropriate methods for resolution of these problems.

5.1 Construction Project Organization

The various tasks outlined herein are being implemented by the Army with Parsons as its remediation Contractor. Parsons will provide constant site oversight during the remedial action.

Parsons will use remedial action work plan herein to hire a construction subcontractor, two laboratory subcontractors, a radiological services subcontractor and a surveying subcontractor. The overall construction quality assurance program will be implemented directly by Parsons.

Parsons has dedicated, experienced, and competent personnel to manage the remediation. Senior management and staff personnel have been selected based on their knowledge and abilities in areas of remediation and civil construction; management and administration of environmental contracts; regulatory and technical expertise; and health, safety, and quality awareness.

Responsibilities of key personnel are described in the following subsections. The work effort at SEAD-12 is overseen and reviewed by the Army, EPA, NYSDEC, and NYSDOH. The project organization is summarized in the table below:

Name	Title	Phone/Fax Number	Address
John Nohrstedt COR	USACE Contracting Officer's Representative (COR)	Office: (256) 895-1639 Fax: (256) 895-1602	USACE, Engineering and Support Center, Huntsville 4820 University Square Huntsville, AL 35816 john.nohrtedt@usace.army.mil
Stephen Absolom	Seneca Army Depot Activity's Point of Contact (POC)	Office: (607) 869-1309 Fax: (607) 869-1362	SEDA Attn: SMASE-BEC Building 123 Romulus, NY 14541 stephen.m.absolom@us.army.mil
Randall Battaglia	USACE Project Manager (PM)	Office: (607) 869-1523 Fax: (607) 869-1362	SEDA Attn: Mr. Randall Battaglia Building 125 Romulus, NY 14541 randy.w.battaglia@nan02.usace.army.mil
Thomas Battaglia	USACE Project Manager (PM)	Office: (607) 869-1353 Fax: (607) 869-1251	SEDA Building 125 Romulus, NY 14541 thomas.c.battaglia@nan02.usace.army mil
Todd Heino	Parsons Program Manager (PM) and QA Manager	Office: (617) 449-1405 Fax: (617) 946-9777	Parsons 150 Federal St. 4th Floor Boston, MA 02110 todd.heino@parsons.com
Jeff Adams	Project Manager	Office: (617) 449-1570 Fax: (617) 946-9777	Parsons 150 Federal St. 4th Floor Boston, MA 02110 Jeff.adams@parsons.com
Tim Mustard	Program Health and Safety Officer (PHSO)	Office: (303) 764-8810 Fax: (303) 831-8208	Parsons 1700 Broadway, Suite 900 Denver, CO 80290 tim.mustard@parsons.com
Tom Andrews	Site Manager	Office: (716) 541-0730 Cell: (716) 998-7473 Fax: (716) 541-0760	Parsons 40 LaRiviere Drive, Suite 350 Buffalo, NY 14202 tom.andrews@parsons.com
Ben McAllister	QA/QC Manager and Site Health and Safety Officer (SHSO)	Office: (617) 449-1592 Cell: (207) 409-6151 Fax: (617) 946-9777	Parsons 150 Federal St. 4th Floor Boston, MA 02110 benedict.mcallister@ parsons.com

5.1.1 Program Manager

The Program Manager, Todd Heino, will oversee and provide technical and quality direction on the project from the Boston, Massachusetts office. Mr. Heino is the final decision authority, and will receive reports from the Project Manager. Mr. Heino will visit the work site, as necessary, to meet with the client and review work progress. Mr. Heino's responsibilities as PgmM are as follows:

- Serving as primary Army interface on all programmatic issues;
- Providing consistency in programmatic approaches to environmental issues at the SEDA;
- Resolving conflicts with Army or subcontractors;
- Reviewing project documentation.
- Resolve conflicts between Site Manager and QA/QC Manager.

5.1.2 Project Manager

The Project Manager, Jeff Adams, will manage the project from the Boston, Massachusetts office and will be on-site periodically during construction. Mr. Adams is the final decision authority, and will receive reports from the field from the Site Manager or the QC Officer. Mr. Adams will visit the work site, as necessary, to meet with the client and review work progress. Mr. Adams' responsibilities as PM are as follows:

- Managing project administration;
- Serving as primary Army interface on all project issues;
- Reviewing design issues;
- Modifying the design with the Army and regulators, as required;
- Reviewing analytical data to assess if results are satisfactory; and,
- Serving as primary Contractor interface with Army and regulators on project issues;
- Resolving conflicts with Army or subcontractors; and
- Preparing, reviewing, and submitting project documentation.

5.1.3 Site Manager

The Site Manager (SM), Tom Andrews, is directly responsible for all aspects of the contractor's performance including work assignments, approval of all contractor and subcontractor costs, and approval of all subcontracts and procurements. Mr. Andrews will be on-site one or two days a week during the construction phase of this project. Mr. Andrews shall also be responsible for the resolution of all QA issues that arise during construction. Other responsibilities of the SM include:

- Reviewing all construction documents to verify compliance with remedial action objectives;

- Developing a QA program to ensure that program objectives are met through a systematic process of QC and documentation;
- Ensuring that contractor personnel are experienced, competent, and qualified for their assigned tasks;
- Coordinating constructability review of project scoping documents;
- Coordinating with the Project Manager and the SHSO/QC Officer in developing work plan implementation procedures during pre-construction;
- Selecting the construction subcontractors, as needed, and administering the construction subcontracts;
- Coordinating all construction activities associated with subcontractors; and,
- Coordinating with the SHSO/QC Officer to ensure that inspections, tests, and records are developed and performed adequately.

5.1.4 QA/QC Manager and Site Health & Safety Officer

Ben McAllister will serve in the dual role as the QA/QC Manager and as the Site Health and Safety Officer. Mr. McAllister will be on-site full time and will be responsible for all daily operations. Mr. McAllister's key responsibilities are as follows:

- Implementing the QA program, including conducting audits and/or surveillance of project and construction activities, as needed, to verify that project personnel are performing their duties in accordance with this work plan. Scope audits will include verification that project and construction activities are being properly performed and documented, and that health and safety-related or quality-related concerns, nonconformances, and deficiencies are being resolved in a satisfactory manner;
- Implementing the work plan;
- Supervising and coordinating all activities relating to field remediation operations on a daily basis and serving as the subcontractors' primary point of contact for daily and routine operations;
- Completing daily reporting tasks and review of any daily or weekly reports;
- Requisitioning labor, materials, and equipment to perform construction activities;
- Making routine field decisions;
- Identifying problems that cannot be resolved in the field, and reporting them to the SM or PM, as appropriate;
- Communicating QA/QC policies, objectives, and procedures to project personnel and subcontractors during project meetings and informal discussions;

- Conducting sampling and QA testing;
- Monitoring, controlling, and documenting the quality of on-site construction activities;
- Verifying that QC personnel are properly qualified and trained in specified plans and testing procedures;
- Verifying and documenting that construction QC activities involving inspection, testing, and records are complete, accurate, and in accordance with site-specific documents;
- Enforcing site health and safety policies and procedures as defined in this document and in the site-specific HSP (Parsons, 2005);
- Conducting and documenting health and safety orientation and daily meetings, as required, prior to construction;
- Determining the appropriate levels of PPE for each construction activity; and,
- Overseeing construction QC operations performed by subcontractors.

Mr. McAllister will have the authority to stop work on any project activity due to nonconformance with this work plan. All on-site personnel will be encouraged to discuss any quality-related concerns with Mr. McAllister. In the event that Mr. McAllister detects or is informed of a potential nonconformance, he will investigate the matter, determine the corrective action required, document the incident, and report the incident to the SM or Project Engineer.

5.2 Inspection and Testing Requirements

A QC inspection and testing program has been developed for the remediation of the Disposal Pits A/B and C at SEAD-12 to verify that site preparation; excavation; soil, debris and water management; soils and debris disposal; backfilling, and site restoration meet the project quality requirements. As detailed in **Sections 5.2.1**, **5.2.2**, and **5.2.3**, the QC inspections and testing program includes three phases of inspections for work in progress: pre-construction inspections, construction inspections, and post-construction inspections. Upon substantial completion of the work (or significant portions of the work), completion inspections will be conducted. Completion inspections are also a three-step process, consisting of the QC completion inspection, the pre-final inspection, and the final acceptance inspection. The specific on-site inspection and testing requirements are addressed in **Section 5.2.2**.

The Site QC Officer, Mr. McAllister, will have primary responsibility for conducting and documenting the QC inspections and tests described herein. In the event that QC inspection or testing results indicate nonconformance with this work plan, the SM will be notified of the nonconformance. Corrective action will be coordinated through the SM, and resolution of the nonconformance will be verified by Mr. McAllister, as appropriate.

5.2.1 General Requirements

The general components of inspection activities are provided below and are scheduled in the following three major phases:

1. Pre-construction;
2. Construction;
    a. Construction: Startup;
    b. Construction: In-progress; and,
3. Post-construction.

Specific inspection requirements for each of the major components of the remedial action are discussed in **Sections 5.2.2** and **5.2.3**.

Pre-Construction Inspections

Preparatory inspections will be performed prior to initiation of specific activities or definable features of work. This phase of inspection is conducted prior to initiating actual construction and will generally consist of the following:

- Review contract with subcontractors, if appropriate, and verify conformance to project objectives;
- Verify that materials and equipment from off-site sources have been inspected and/or tested as required;
- Verify that conformance documentations such as test results for performance data are submitted and approved prior to construction;
- Verify that QA/QC inspection procedures are in place;
- Discuss procedures for conducting the work and discuss quality concerns with project personnel who will perform the work; and,
- Review potential safety and environmental hazards that may be associated with the planned activity, including the presence of buried and overhead utilities.

The results of the preparatory inspections will be documented and incorporated with the Daily QC Report.

Construction: Startup

Initial inspections will be performed during the startup of field work. This phase of inspection will generally consist of the following:

- Examine the work area to ensure that all preliminary work has been accomplished in compliance with the contract documents;
- Physically examine required materials, equipment, and storage areas to ensure conformance with contract documents;
- Observe and verify that the construction methods and quality of workmanship meet the requirements set forth in the scoping documents;

- Perform receiving inspections, if required (as described below);
- Check dimensional requirements relevant to the specific work activity and compatibility with subsequent or adjacent work; and,
- Verify that safety procedures are strictly enforced and in full compliance with the HSP.

The results of all initial inspections will be documented and incorporated into the daily QC report.

Construction: In-progress

During construction, receiving inspections, periodic follow-up inspections, and work plan compliance inspections will be conducted. *Receiving inspections* will be performed when materials or equipment arrive at the project site. The inspections will be performed to verify that the materials or equipment received meet project requirements and the work plan, are free of defects, have not been damaged in transport, and are being properly stored at the project site. Receiving inspections will be conducted by the Site QC Officer, Mr. McAllister, and will consist of the following:

- Verification of the quantities of the materials, supplies, or equipment received;
- Visual inspection of the materials, supplies, or equipment for damages, defects, or other quality aspects;
- Verification of truck and disposal weights using calibrated on-site truck scale.
- Acceptance of the transport manifests or other delivery documents;
- Coordination of material and equipment storage, if required, prior to construction or installation;
- Inspection and laboratory sampling of imported construction materials; and,
- Estimation of soil density by weighing a 5-gallon bucket of disposal soil on a daily basis.

A qualitative judgment based on visual inspection will be made by Mr. McAllister regarding the material conformance with specifications. Mr. McAllister will document the following information regarding the received materials and equipment in the daily QC report:

- Types and quantities of materials and equipment received;
- Visual description of the materials and equipment; and,
- Material and equipment storage details, including storage locations.

Follow-up inspections are conducted periodically during specific construction activities to verify that work in progress meets technical, contractual, and regulatory requirements. Follow-up inspections will be conducted no less frequently than indicated in **Sections 5.2.2** and **5.2.3**. Additional follow-up inspections may be performed to verify that any deficiencies noted have been corrected prior to the start of subsequent features of the work. Follow-up inspections will consist of the following types of inspection activities:

- Material quality testing to verify that materials being used conform with project requirements;
- Examination of the work area and QA/QC documentation to verify that all previous work has been accomplished in compliance with the project requirements;
- Placement testing to verify that materials are being placed and constructed in conformance with the plans and scoping documents; and,
- Final follow-up inspections to verify that final surface grades and completed work are in compliance with the project requirements.

The results of the follow-up inspections will be documented and incorporated into the daily QC report.

Regular construction inspections will be conducted to verify compliance with the work plan and design documents. These inspections will be performed by Mr. McAllister and/or Mr. Andrews and include the following:

- Overseeing earthwork to confirm that the excavation and removal of contaminated material is being performed in accordance with the design drawings and technical specifications;
- Documenting that the subcontractors are taking appropriate measures to control and minimize dust emissions and to control erosion at the site related to the subcontractors' work activities;
- Documenting that security measures are being followed, including entry by authorized persons only, use of appropriate PPE, protection of SEDA property, and use of locks and security measures to prevent unauthorized entry to the work site on non-business hours;
- Documenting the effective use of barricades and other temporary controls to prevent impacted storm water and construction-related runoff;
- Overseeing the collection and laboratory submission of all confirmatory sampling in the excavated areas and subsequent final survey of the excavated area before backfill;
- Documenting the sampling procedure and chain-of custody procedure for all samples; and,
- Overseeing the re-grading of the excavation areas.

For SEAD-12 remedial activities, the Program Health and Safety Officer (PHSO), Tim Mustard, or the SHSO, Mr. McAllister, will conduct periodic health and safety inspections in accordance with the project HSP.

Post-Construction

Post-construction completion inspections will be conducted when the contract work, or specific definable component of the contract work, is substantially complete. Completion inspections are conducted to verify that the work is properly completed and that all specified components of the work have been constructed or installed.

Three types of completion inspections will be performed to verify that site work activities performed meet the requirements of project specifications. These inspections include:

- QC completion inspection;
- Pre-final inspection; and,
- Final acceptance inspection.

The *QC completion* inspection will occur when the contract work is nearing substantial completion. Based on USACE's and the Army's concurrence that substantial completion is achieved, and at least five days prior to the pre-final inspection, the Site QC Officer will conduct a QC Completion Inspection. The Army POC, Mr. Steve Absolom and the USACE COR, Mr. John Nohrstedt will be notified of the inspection date so that they may participate. Upon completion of the inspection, an itemized list of work that is not properly completed, work that exhibits inferior workmanship, or work that does not conform to project requirements will be prepared. The list will also include outstanding deliverables and appropriate record documents.

The *Pre-Final Inspection* will be conducted immediately following completion and/or correction of all deficiencies noted during the quality control completion inspection, and following completion of all construction activities. The Site QC Officer will notify the Army POC and the USACE COR at least five days prior to conducting the Pre-Final Inspection. The notice will include assurance that all specific items previously identified in the Quality Control Completion Inspection, along with all remaining contract work, will be completed and/or corrected by the date scheduled for the Pre-Final Inspection. The Pre-Final Inspection will be conducted by the Site QC Officer, the Army POC, and the USACE COR.

The Site QC Officer will notify the Army POC and the USACE COR when the work is ready for the *Final Acceptance Inspection*. The notice will be given to both at least five days prior to the Final Acceptance Inspection and will include assurance that all specific items previously identified as being unacceptable, along with all remaining work performed under the contract, will be complete and acceptable by the date scheduled for the Final Acceptance Inspection. The Site QC Officer, the Army POC, and the USACE COR will conduct the Final Acceptance Inspection.

Meetings

A pre-construction meeting will be held at SEAD-12 prior to beginning construction activities. USACE COR, SEDA's POC and COR, the PM, the SM, the SHSO, appropriate subcontractors, EPA, and NYSDEC will attend the pre-construction meeting. This site-specific CQP will be reviewed, with specific focus on methods for documenting and reporting inspection data and methods for distributing and storing documents and reports. The responsibility of each party will be reviewed and clearly understood, and the work area security and safety protocols will be transmitted to all participants. This meeting will occur after the procurement for the remedial action implementation has begun.

Progress meetings will be held on a weekly basis and chaired by the SM. The primary subcontractors must send an authorized representative to each meeting. Issues at this meeting may include the progress of work, future scheduling issues, and related topics.

Base Cleanup Team (BCT) and Restoration Advisory Board (RAB) meetings will be held as required. Parsons will attend all BCT and RAB meetings during the course of this contract. Subcontractors will not be required to attend these meetings unless requested by USACE, regulatory agencies, Army personnel, or Parsons. The intent of the meetings will be to provide the regulatory agency with a progress update of the project and to address any regulatory issues that might delay the progress of the work.

5.2.2 Pre-Construction Requirements

Field inspections will be performed during on-site construction activities in order to verify that all work is in conformance with the work plan. The following subsections summarize the specific field testing and other QC requirements as components of the three phases of inspection for each of the primary work activities to be performed at SEAD-12. Specific pre-construction inspection activities for each of the primary work activities are summarized in **Table 5-1**.

Site Preparation

Site preparation activities are listed in **Table 5-1** and include visual observations to ensure that all site preparation activities are completed prior to beginning construction. Site preparation will include at a minimum finalizing the mark-out of the areas to be excavated, finalizing the mark-out of utility locations, clearing and grubbing the excavation area, confirming approval and location for site trailers, and confirming that all necessary roads are accessible and access gates are working properly.

Utility Locating and Management

SEDA and local utility suppliers will provide electrical service to the work area, and the subcontractor will be responsible for the electrical connections to the site trailer. In addition, the earthwork subcontractor will be responsible for obtaining potable water from either the Army or the Town of Romulus.

Prior to the start of construction, the subcontractor will call UFPO and work with Parsons and the Army to locate and mark utilities and other obstructions in the excavation areas and the supporting work/staging areas. All identified utilities within work/staging areas will either be terminated and disconnected, or if necessary, rerouted to ensure that service is not disrupted during the site remedial action operations.

Site Surveying, Staking, and Clearing

Site surveying will be accomplished by a combination of visual and instrument surveying of the site and construction features. Parsons will perform either a land survey or use a Trimble 5700 Real-Time Kinematic (RTK) GPS unit (or equivalent).

- Pre-construction excavation area survey; and,

- Post-excavation survey.

Stakes will be placed along the designed excavation boundary according to the drawings. Stakes shall be placed at the start and termination of each linear section, at 50-foot intervals along each linear segment, at 20-foot intervals along curves, and at any change in boundary direction not in a curve.

Whenever possible, 20 feet will be cleared on either side of the work area. If this is not possible, the maximum path will be cleared and work will be coordinated to ensure constructability. All utilities will be clearly marked following the clearing and grubbing.

5.2.3 Construction Requirements

The construction activities listed in **Table 5-2** include visual observations to ensure that equipment is operating properly and safely, site security is in place, erosion controls are maintained, health and safety monitoring is performed, and the as-built records of the excavated areas are maintained. These inspection activities will ensure that the excavation activities are performed in accordance with the work plan and all components of reporting can be fully met.

Excavation

The excavation areas at SEAD-12 will be excavated to the staked limits or as directed by the SM until the military-related material along with the other debris has been removed from the disposal pits. Site excavations will be conducted using a hydraulic excavator and two articulated off-road trucks. Clean overburden soils will be stockpiled to be used as subsequent backfill material. Military related material along with other forms of debris and soil will be segregated into discrete piles in the various staging areas for sampling for waste disposal characterization. If the material is found to be radioactive, it will be then be separated from the non- radioactive material.

Observation and Inspection

Mr. McAllister will be on-site during the excavation activities to confirm that the removal is conducted in accordance with the work plan. A photographic log will be performed throughout the removal of the sections to provide documentation of the process and procedure. In addition, a post-excavation survey will be performed. Mr. McAllister will visually observe the removal of the material to the designed depth of excavation, and he will estimate the volume of material excavated, based on the dimensions of the excavation.

Disposal Characterization

Samples of the excavated soil and the non-military debris will be collected and submitted for radiological and hazardous waste characterization analysis prior to disposal off-site. The disposal facility for hazardous waste constituents requires one composite sample to be collected for every 700 cy and the radiological disposal facility requires one composite sample to be collected for every 200 cy, as detailed in **Section 4**.

Each disposal sample collected for SEAD-12 will be a composite of multiple grab samples from the soil and debris stockpiles. The waste characterization sampling will be completed prior to the

disposal of the material off-site. The required analysis is detailed in **Section 4**. If the material is considered hazardous (i.e., soil that fails the waste characterization test) than it will be stabilized on-site before it is disposed off site as non-hazardous waste. If the disposal sample results indicate the material is not hazardous, then the soil will be loaded into dump trucks and transported to and disposed in an off-site Subtitle D landfill and debris will be loaded into dump trucks and transported to and disposed in an off-site C&D landfill.

If radioactive-contaminated debris is detected, then it will be packaged and transported for off-site disposal as LLRW or Mixed Waste depending on chemical characteristics. The radioactive sources will likely be removed from the miscellaneous components and placed in 55-gallon steel drums for transport to a licensed radioactive waste landfill. Debris with surface radiological contamination will be placed in drums, B-25 containers and/or inter-modals for off-site disposal.

Confirmation of Removal (if required)

After the excavation is completed for Pit A/B and Pit C and before backfilling operations commence, confirmatory field screening for radiological constituents will be conducted to verify that the identified contamination or debris has been removed, and that concentrations of contaminants remaining are acceptable.

Discrete confirmatory soil samples from the excavation will be collected and submitted for laboratory analysis for determination of radiological constituents if evidence of residual radiation is detected in excess of background levels during field screening sampling. Comparably, if unexpected chemical releases are observed within the disposal pits, discrete confirmatory soil samples will also be collected and characterized for TCL and TAL hazardous constituents.

The following is a summary of collection procedure only if confirmatory soil samples will be collected.

1. Soil will be removed to the staked limits of excavation.
2. Once Mr. Andrews or Mr. McAllister verifies that the excavation has reached the staked limits and appropriate depth, confirmatory samples will be collected according to the frequency described above for radiological and hazardous constituents.
3. Confirmatory samples will be collected and sent to the project laboratory by courier for analysis under chain-of-custody procedures. Samples will be submitted for a 72-hour turnaround time so the results can be approved by the Project Engineer and the excavation areas can be backfilled and/or graded as soon as possible. Soil samples will be collected, stored, preserved shipped and analyzed according to the procedures outlined in the SAP (Parsons, 2006a).
4. If the data from the confirmatory soil samples indicate the concentrations of radiological and hazardous contaminants remaining are not acceptable then additional soil will be excavated in the direction where the sample(s) was collected. The amount of additional soil excavation will be decided in the field by the SHSO/QC Officer or the SM in conjunction with the Army POC, based on their best professional judgment and visual observations.

5. If confirmatory soil samples indicate that the concentrations of radiological and hazardous contaminants remaining are acceptable, the excavation will be terminated and the regrading (or backfilling, if necessary) will start upon approval by the PM and Army POC. The excavation area will be blended into the surrounding grades.

Post-Excavation Survey

The post-excavation survey will be performed following verification that confirmatory samples indicate that the concentrations of radiological and hazardous contaminants remaining are acceptable, before the excavation area is blended into the surrounding grades. This survey will include the delineation of the excavated area. Survey measurements will be collected in North American Datum of 1983 (NAD83) - New York State Plane Central Coordinate System for horizontal control. Elevation measurements will be conducted using the North American Vertical Datum of 1988 (NAVD88) for depth of the excavation. The depth of excavation will be measured by Mr. McAllister.

Backfilling

The excavation will be backfilled with overburden soils initially removed from the excavations followed by certified, clean backfill from off-site sources as required to make up for volume losses during excavation. The backfill material will be machine compacted in one foot thick lifts to restore the excavated areas to their original conditions. Soil for backfilling will be obtained from an off-site borrow source. The Project Engineer will verify that the borrow soil documentation meets the meets the NYSDEC Unrestricted Soil Cleanup Objectives (Table 375-6.8(a)).

Mr. McAllister will observe the placement of backfill, if needed, and compaction of backfill. Soil compaction will be achieved by three passes of a dozer.

Material Disposal

Contaminated soil deemed non-hazardous will be loaded into dump trucks and transported to and disposed in an off-site Subtitle D landfill. Non-hazardous soil will be managed by the subcontractor and will be transported to either the Seneca Meadows Landfill, Waterloo, New York; Ontario County Landfill, Flint, New York; or an equivalent licensed off-site facility for disposal

Debris deemed non-hazardous will be loaded into dump trucks and transported to and disposed in an off-site C&D landfill. Non-hazardous debris will be managed by the subcontractor and will be transported to either the Seneca Meadows Landfill, Waterloo, NY; Ontario County Landfill, Flint, NY.

Water generated during this project (e.g., decon operations, excavation dewatering, and run-on/run-off control methods) is deemed non-hazardous it will be disposed at the Seneca County Sewer District No. 2 facility.

If hazardous soils are encountered, they will be treated on-site and then disposed off-site as non-hazardous materials.

If radioactive-contaminated debris is detected, then it will be packaged and transported for off-site disposal as LLRW or Mixed Waste depending on chemical characteristics. Debris with surface radiological contamination may be sized prior to packaging to meet disposal facility requirements.

Erosion Control Maintenance

Temporary erosion and sedimentation controls, such as silt fencing, hay bales, or soil berms, will be installed as required during operations to prevent migration of sediments and erosion. Prior to beginning any excavation work, temporary silt fencing will be erected, which will surround the downgradient sides of disturbed areas to prevent contaminated sediment transport. The temporary silt fencing will be maintained throughout the project and will not be removed until permanent vegetation has been re-established.

In addition, storm water from upgradient locations will be routed away from exposed materials, and storm water contact of exposed material will be minimized to the extent practical. A visual inspection of the site will be conducted daily and during and after significant rainfall to ensure that control measures are in good condition and that there is no migration of sediments or evidence of erosion.

Site Security

All visitors to the work site are required to report to Mr. McAllister or the SM upon arrival. SEAD-12 is located within the Depot which is surrounded by a fence with locked gates. SEAD-12 is enclosed by a triple chain link fence. The Army will provide access to the field team prior to and during construction activities. Site security is necessary to prevent exposure of unauthorized, unprotected individuals to the work area. The area immediately surrounding the work area will be clearly marked through the use of signs, barrier rope, tape, or fencing.

Site Restoration

Field inspection for site restoration activities is identified in **Table 5-3**. Inspection activities include observations to verify the final location of the excavation. Any vegetated areas disturbed as a result of remedial activities will be seeded.

5.3 Subcontractor Quality Control

All subcontractors and material suppliers involved with on-site construction activities shall comply with this plan. Subcontractor personnel qualifications, technical performance levels, QA/QC procedures, acceptability levels, and documentation and submittal requirements will be clearly defined in the subcontractor's scope of work and procurement documents. The PM will review the scope of work and procurement documents to verify that all of the relevant QA/QC requirements have been adequately communicated to the subcontractor.

Each subcontractor shall identify a qualified individual within their organization to be responsible for QC and performance of QC testing. Mr. McAllister will coordinate all QC functions with the designated subcontractor QC representative. Mr. McAllister has authority over all subcontractor QC requirements. These activities will be documented on inspection reports, checklists, audit reports, field logs, or other forms appropriate to the function performed.

5.4 Quality Control Documentation

An effective QA/QC program depends on thorough monitoring of all construction activities. This is most effectively accomplished by observation and documentation during all phases of construction. Documentation shall consist of project submittals, daily QC inspection reports, weekly QC summary reports, non-conformance and corrective action reports, design and specification clarifications or modifications, photographic records, observation and testing data sheets, as-built documentation, and a summary report. This section describes the requirements of each of these aspects of the QC documentation.

5.4.1 Daily QC Inspection Reports

Mr. McAllister will prepare a Daily QC Report and submit it to the SM, who will sign it to acknowledge non-conformances and observations, and place it in the project files or begin the corrective action request. The Daily QC Reports will be submitted (daily, or at some other agreeable interval) to the USACE and Army contact, and will also be included as part of the weekly progress reports submitted to USACE and the Army.

The Daily QC Report will include the following information:

- Project name, location, and date;
- Personnel and equipment used;
- Estimated volume of excavated material shipped off-site during the day;
- Weather conditions;
- Narrative description of inspections, tests, and sampling;
- Description of kinds and types of material delivered and used;
- Narrative description of work performed, problems encountered, and corrective measures taken; and,
- Record of any data or measurements collected.

5.4.2 Weekly Progress Reports

The Site QC Officer will draft the Weekly Progress Report and submit it to the SM. The SM will review the report, and then submit it to the USACE and Army contacts. The Weekly Report will include the following information:

- Date, project name, and location;
- Summary of construction-related activities;
- Minutes of all meetings;
- Summary of QC activities;
- Attached inspection reports;

- Test results;
- Volume of soil shipped for disposal;
- Volume of soil shipped for disposal to other locations (e.g., off-site, if necessary);
- Non-Conformance Reports (NCRs);
- Non-Conformance/Corrective Action Tracking Log;
- Corrective Action Report;
- Status Report on all milestones during the period including explanations for milestones not met during the preceding period and an assessment of milestones scheduled for the next reporting period;
- Permit status;
- Personnel staffing status; and
- Community relation activity update.

5.4.3 Non-Conformance Documents

As the Site QC Officer, Mr. McAllister will report each nonconforming item on a NCR form. The NCR form will include the information listed below:

- Name and job title of the individual who identified the non-conformance;
- Description of the non-conformance;
- Effect of non-conformance on suitability of the work for the intended purpose;
- Immediate corrective measures taken; and,
- Recommended corrective action or variance/field change to the project documents.

The Site QC Officer will describe the NCR in the Daily QC Report, and then log it on the Non-Conformance/Corrective Action Tracking Log. The Site QC Officer will include the revised log in the Weekly QC Report. The SM will review this list and initiate a Corrective Action Report (CAR) if a non-conformance is not satisfactorily corrected in a timely manner. The CAR will include the following and will be signed by all responsible parties:

- Summary of the affected project requirements;
- The nature of the non-conformance;
- The corrective action to be taken;
- Action items/responsibilities for each affected individual;
- A schedule for completion of the corrective action; and
- Recommendations for preventing recurrence of the problem.

The PM will review unresolved CARs and take appropriate measures to ensure that the corrective actions are completed on schedule. The Site QC Officer will conduct an inspection to verify that the CAR is resolved, update the Non-Conformance/Corrective Action Tracking Log, and document the resolution in the Daily and Weekly QC Reports.

5.4.4 Work Plan Clarifications or Modifications

The need to address work plan changes or scope changes may arise. In such cases, the PM will notify the Army POC and the USACE COR. A work plan or scope of field change that will impact the project or its cost must be approved by the PM, the Army POC, and the USACE COR before it is implemented. Approvals by these parties may be obtained concurrently, if possible. Approval of EPA/NYSDEC may be necessary if the proposed change affects the project's ability to achieve the performance objectives or impact the project goals. To approve a change, a Field Change/Modification Request (FC/MR) form will first be completed by the PM and then submitted to USACE. A standard FC/MR form will be completed which includes the following information:

- Date of request/order;
- FC/MR number;
- Name of originator of request/order;
- Summary of existing requirements;
- Description of requested/ordered changes in the affected requirements in sufficient detail for cost, schedule, and technical evaluation;
- Description of estimated cost impact of change; and,
- Approval signatures of the PM, the Army POC, and the USACE COR.

The PM will establish and maintain an FC/MR Log to track dates of requests, approvals, and completions.

5.4.5 Photographic Documentation

All phases of construction will be documented with photographs taken by QA/QC personnel. All photographs will be identified as to location, time, date, and initials of the person taking the photograph.

5.4.6 As-Built Drawings

The Site QC Officer will establish and maintain a set of project drawings in the project office for the purpose of noting changes. Changes will be noted in red ink or pencil and referenced to the approved FC/MRs. New drawings will be added if required for major or extensive changes. Copies of all FC/MRs, change orders, notes, sketches, and memoranda will be available for reference in the project field office. As-built drawings will be available for review in the project field office at all times.

5.4.7 Removal Action Summary Report

At the completion of construction, a Removal Action Completion Report will be issued. This report will include:

- Description of the work performed including final cost of the project;
- Variations from the Work Plan and associated project plans, if any;
- Quantities of segregated debris components and soil/fill material;
- Field scanning results and laboratory data for excavated materials, the limits of excavation, and backfill materials;
- Survey results documenting the final limits of excavation, location of sampling points at the limit of excavation;
- Waste manifests and bills of lading/shipping documents;
- Air monitoring results;
- Other relevant data, and;
- Certification by the Project Professional Engineer.

The subcontractor will prepare a stand-alone report that will be an appendix to completion report will provide the details of the radiological evaluations that were performed and completed as part of the removal action work.

6.0 POST-CONSTRUCTION MONITORING AND MAINTENANCE PLAN

This section presents a post construction monitoring and maintenance plan (PCMMP) for the post-remediation monitoring and maintenance activities to be performed at the former disposal pits located at SEAD-12. As discussed in **Section 2.0,** groundwater at SEAD-12 does not pose significant risks to either human health or the environment and no action is warranted for groundwater at SEAD-12. As such, groundwater long-term monitoring is not included as an element of the remedial action. Therefore, post-construction maintenance consists of routine inspections of the site security and access and ensuring that the site re-vegetate.

Only the former disposal pits (Pits A/B and C) located at SEAD-12 will be inspected no less frequently than semi-annually to ensure site post-remedial action integrity. The following will be inspected:

- Establishment of re-vegetation of disturbed areas to prevent erosion.

A checklist of maintenance inspection elements to be used in the field is provided in **Table 6-1**. Any problems identified during the routine inspections should be noted in the field notebook. These problems should be corrected or disclosed to the SEDA POC as soon as possible.

7.0 WASTE MANAGEMENT PLAN

Investigation-derived waste (IDW) will include equipment decontamination rinseate, and PPE. Soils from the excavation areas, run-on, or run-off are managed independently from IDW, as discussed in **Section 3.0**.

Since it is not anticipated that hazardous material will be encountered during the construction activities, any water used for decontamination can be collected in a tank.

Expendable sampling equipment, if needed and materials that may be generated during field activities (e.g., PPE) will be bagged and disposed of in a trash dumpster located on-site. Miscellaneous trash generated during field activities (e.g., empty sand bags) will also be placed in the dumpster.

8.0 REMEDIAL ACTION SCHEDULE

A schedule for the removal action is presented as **Figure 8-1**. The schedule allows 30 days for the Army, NYSDEC, and EPA to review and provide comments on the Work Plan. It also allows 14 days for Parsons to incorporate comments into the Final RA Work Plan. The current schedule projects the commencement of construction activities in June/July 2009 which would allow for construction during favorable drier weather conditions. This schedule will be updated on a continuing basis during the project based on field conditions, weather and other factors.

If at any time field activities at the Disposal Pits A/B and C are required to be temporarily halted to unexpected conditions (i.e., radiological contamination) for more than two consecutive days, Parsons will try and deploy the subcontractor and Parsons personnel to other areas of SEDA that may require maintenance and or construction repairs at the other AOC. In such cases, the PM will notify the Army POC and the USACE COR prior to demobilization from disposal pit excavation areas located at SEAD-12 to remobilize to another area of SEDA as identified and agreed upon with the Army.

9.0 REFERENCES

Environmental Protection Agency (EPA), 1997b. Multi-Agency Radiological Site and Survey Investigation Manual, (MARSSIM, NUREG-1575, EPA 402-R-97-016). December 1997.

New York State Department of Environmental Conservation (NYSDEC), 1994. Technical and Administrative Guidance Memorandum (TAGM) 4046 - Determination of Soil Cleanup Objectives and Cleanup Levels. HWR-94-4046. January 1994.

New York State Department of Environmental Conservation (NYSDEC), 1999. Technical Guidance for Screening Contaminated Sediments. Division of Fish, Wildlife, and Marine Resources.

New York State Department of Environmental Conservation (NYSDEC), 2004. Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations. Division of Water Technical and Operational Guidance Series (1.1.1).

New York State Department of Environmental Conservation (NYSDEC), 2005. Cleanup Guidelines for Soils Contaminated with Radioactive Materials. DSHM-RAD-05-01.

Parsons, 1994. Parsons Engineering Science, Inc. SWMU Classification Report. September 1994.

Parsons, 1995. Expanded Site Inspection, Eight Moderately Low Priority AOCs, SEADs 5, 9, 12(A and B, (43, 56, 69), 44 (A and B), 50, 58, and 59. December 1995.

Parsons, 2002. Final Remedial Investigation at the Radiological Waste Burial Sites (SEAD-12). Revised August 2002.

Parsons, 2003. Final Radiological Survey Report – SEAD-12 Phase I and Phase II Surveys. March 2003.

Parsons, 2006. Final Supplemental Remedial Investigation Report, Radiological Waste Burial Sites (SEAD-12). October 2006.

Parsons, 2008 Final Feasibility Study Report For the Radiological Waste Burial Sites (SEAD-12), Seneca Army Depot Activity. January 2008.

Plexus Scientific Corporation, 2006. Removal Action Completion Report, Non-Time Critical Removal Action, Miscellaneous Components Burial Site (SEAD-63), Seneca Army Depot Activity, Romulus, New York. February 2005.

TABLES

TABLE 1-1
DISPOSAL PIT A/B SURFACE SOIL ANALYTICAL DATA SUMMARY
SEAD-12 REMOVAL ACTION WORK PLAN
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY											SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID											MW12-10		MW12-11		MW12-12		MW12-13		MW12-8		SB12-1		SB12-1		SB12-2		SB12-2B	
MATRIX											SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE ID											123007		123010		123013		123016		123183		12209		12534		123112		123064	
SAMPLE DEPTH TO TOP OF SAMPLE											0		0		0		0		0		0		0		0		0	
SAMPLE DEPTH TO BOTTOM OF SAMPLE											0.2		0.2		0.2		0.2		0.2		0.2		0.2		0.2		0.2	
SAMPLE DATE											29-Sep-98		29-Sep-98		30-Sep-98		01-Oct-98		28-Oct-98		11-Nov-97		11-Nov-97		14-Oct-98		04-Oct-98	
QC CODE											SA		SA		SA		SA		SA		DU		SA		SA		SA	
STUDY ID			FREQUENCY	EPA	NYDEC	NO. ABOVE	NO. ABOVE	NUMBER	NUMBER		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1	
			OF	RSL [2]	UNRESTRICTED	EPA RSL	UNRESTRICTED	OF	OF																			
PARAMETER	UNIT	MAXIMUM	DETECTION	RESIDENTIAL	USE SCO [2]	RESIDENTIAL	USE SCO	DETECTS	ANALYSES		N		N		N		N		N		N		N		N		N	
VOLATILE ORGANICS																												
Acetone	UG/KG	52	47%	61,000,000	50	0	1	7	15		11	U	11	U	12	U	12	UJ	**52**		3	J	10	J	12	U	12	UJ
Methyl butyl ketone	UG/KG	1	7%			0	0	1	15		11	U	11	U	12	U	12	U	13	U	12	U	12	U	11	U	12	U
Methylene chloride	UG/KG	1	7%	11,000	50	0	0	1	15		11	U	11	U	1	J	12	U	13	U	12	U	12	U	11	U	12	U
Toluene	UG/KG	4	27%	5,000,000	700	0	0	4	15		11	U	11	U	12	U	12	U	13	U	12	U	12	U	11	U	12	U
SEMI VOLATILE ORGANICS																												
Benzo(a)anthracene	UG/KG	27	33%	150	1,000	0	0	5	15		77	U	72	U	80	U	4.5	J	6.4	J	11	J	78	U	75	U	4	J
Benzo(a)pyrene	UG/KG	18	33%	15	1,000	2	0	5	15		77	UJ	72	UJ	80	UJ	5	J	8	J	**15**	**J**	78	U	75	U	5.7	J
Benzo(b)fluoranthene	UG/KG	36	40%	150	1,000	0	0	6	15		77	U	72	U	80	U	5.9	J	9.7	J	30	J	78	U	75	U	6.2	J
Benzo(ghi)perylene	UG/KG	23	33%		100,000	0	0	5	15		77	U	72	U	80	U	4	J	6.6	J	23	J	78	U	75	UJ	4.6	J
Benzo(k)fluoranthene	UG/KG	26	27%	1,500	800	0	0	4	15		77	U	72	U	80	U	7.6	J	7.4	J	78	U	78	U	75	U	7	J
Bis(2-Ethylhexyl)phthalate	UG/KG	210	20%	35,000		0	0	3	15		77	U	72	U	210		11	J	83	U	78	U	78	U	75	U	73	UJ
Butylbenzylphthalate	UG/KG	6.7	7%	260,000		0	0	1	15		77	U	72	U	80	U	78	U	83	U	6.7	J	78	U	75	U	73	UJ
Carbazole	UG/KG	16	7%			0	0	1	15		77	UJ	72	UJ	80	UJ	78	UJ	83	U	16	J	78	U	75	UJ	73	UJ
Chrysene	UG/KG	51	47%	15,000	1,000	0	0	7	15		4.3	J	72	UJ	80	UJ	6.8	J	9.1	J	17	J	78	U	75	U	7	J
Di-n-butylphthalate	UG/KG	68	20%			0	0	3	15		77	UJ	72	UJ	80	UJ	78	UJ	83	U	68	J	78	U	75	U	73	U
Di-n-octylphthalate	UG/KG	7.8	13%			0	0	2	15		77	U	72	U	80	U	78	U	83	U	7.8	J	78	U	6	J	73	UJ
Dibenz(a,h)anthracene	UG/KG	16	13%	15	330	1	0	2	15		77	U	72	U	80	U	78	U	83	U	**16**	**J**	78	U	75	UJ	73	U
Dibenzofuran	UG/KG	5.6	7%			0	0	1	15		77	UJ	72	UJ	80	UJ	78	U	83	U	5.6	J	78	U	75	U	73	U
Fluoranthene	UG/KG	24	53%	2,300,000	100,000	0	0	8	15		5.5	J	72	UJ	80	UJ	9.1	J	14	J	9.7	J	78	U	75	U	8.2	J
Fluorene	UG/KG	5.4	7%	2,300,000	30,000	0	0	1	15		77	U	72	U	80	U	78	U	83	U	5.4	J	78	U	75	U	73	U
Indeno(1,2,3-cd)pyrene	UG/KG	18	27%	150	500	0	0	4	15		77	U	72	U	80	U	78	U	6.1	J	18	J	78	U	75	UJ	4.3	J
Phenanthrene	UG/KG	8.5	33%	1,700,000	100,000	0	0	5	15		77	U	72	U	80	U	6.5	J	7.8	J	8.5	J	78	U	75	U	5.8	J
Pyrene	UG/KG	22	53%	1,700,000	100,000	0	0	8	15		4.2	J	72	U	80	U	9.1	J	22	J	10	J	4.5	J	75	U	10	J
PESTICIDES/PCBS																												
4,4'-DDE	UG/KG	15	13%	1,400	3.3	0	2	2	15		3.8	U	3.6	U	4	U	4	U	4.2	U	3.9	U	3.9	U	3.8	U	4.1	U
4,4'-DDT	UG/KG	42	13%	1,700	3.3	0	1	2	15		3.8	U	3.6	U	4	U	4	U	4.2	U	3.9	U	1.8	J	3.8	U	4.1	U
Aroclor-1254	UG/KG	670	20%	220	100	2	2	3	15		38	U	36	U	40	U	40	U	42	U	39	U	39	U	38	U	41	U
Dieldrin	UG/KG	14	13%	30	5	0	2	2	15		3.8	U	3.6	U	4	U	4	U	4.2	U	3.9	U	3.9	U	3.8	U	4.1	U
Endosulfan I	UG/KG	1.8	7%		2,400	0	0	1	15		2	U	1.9	U	2	U	2	U	2.2	U	2	U	2	U	1.9	U	2.1	U
Endosulfan II	UG/KG	2.7	7%		2,400	0	0	1	15		3.8	U	3.6	U	4	U	4	U	4.2	U	3.9	U	3.9	U	3.8	U	4.1	U
Endrin	UG/KG	4.2	13%	18,000	14	0	0	2	15		3.8	U	3.6	U	4	U	4	U	4.2	U	3.9	U	3.9	U	3.8	U	4.1	U
Endrin aldehyde	UG/KG	5.6	13%			0	0	2	15		3.8	U	3.6	U	4	U	4	U	4.2	U	3.9	U	3.9	U	3.8	U	4.1	U
Gamma-Chlordane	UG/KG	11	20%			0	0	3	15		2	U	1.9	U	2	U	2	U	2.2	U	3.2		2	U	1.9	U	2.1	U
Heptachlor epoxide	UG/KG	4.6	13%	53		0	0	2	15		2	U	1.9	U	2	U	2	U	2.2	U	2	U	2	U	1.9	U	2.1	U
METALS																												
Aluminum	MG/KG	15800	100%	77,000		0	0	15	15		10,100		10,600		11,800		9,960		11,700		10,200		8,590		7,160	J	15,800	
Antimony	MG/KG	0.87	13%	31		0	0	2	15		1.1	UR	1.1	UR	1.3	UR	1.2	UR	1.5	UR	0.81	J	0.87	J	0.96	UR	1.4	UR
Arsenic	MG/KG	4.9	100%	0.39	13	15	0	15	15		**3.5**		**4**		**3.3**		**3.2**		**3.1**		**4.9**		**3.9**		**4**	**J**	**4.9**	
Barium	MG/KG	89.2	100%	15,000	350	0	0	15	15		64.5		50.3		58.9		78.6		76.1		89.2		74.2		75.2		86.2	
Beryllium	MG/KG	0.59	100%	160	7.2	0	0	15	15		0.38	J	0.39	J	0.44	J	0.32	J	0.58	J	0.38		0.38		0.25	J	0.43	J
Cadmium	MG/KG	3.2	20%	70	2.5	0	1	3	15		0.06	U	0.05	U	0.06	U	0.06	U	0.43	U	1.1		0.86		**3.2**		0.07	U
Calcium	MG/KG	77600	100%			0	0	15	15		46500		1230		11800		1640	J	4240		30600		52700		77600	J	3140	
Chromium	MG/KG	23.3	100%	280 [3]	30 [3]	0	0	15	15		15.2		14.4		21.5		13		15.1	J	22.8		16.7		18.2		23.3	
Cobalt	MG/KG	17.5	100%	23		0	0	15	15		8.9	J	8.2	J	13.1		8	J	8.6	J	9.5		8.3		9.2		17.5	
Copper	MG/KG	32.5	100%	3,100	50	0	0	15	15		20.1		14.9		32.5		13.4		15.1		27.5		21.3		23.6		13.4	
Cyanide	MG/KG	1.6	13%	1,600	27	0	0	2	15		0.58	U	0.56	U	0.64	U	1.2	J	1.6		0.66	UJ	0.67	UJ	0.56	U	0.63	UJ
Iron	MG/KG	27100	100%			0	0	15	15		20800	J	19700	J	27100	J	16300		19500		22700		17900		16400		26900	
Lead	MG/KG	22.2	100%	400	63	0	0	15	15		11.4		13.1		15.5		15.2	J	15.7	J	16.3	J	13.4	J	12	J	22.2	
Magnesium	MG/KG	21500	100%			0	0	15	15		9420		3150		6460		2340		3120		7050		7270		21500	J	3820	J
Manganese	MG/KG	1420	100%		1,600	0	0	15	15		478		327		501		783		701		536		499		417		1420	
Mercury	MG/KG	0.11	20%	6.7	0.18	0	0	3	15		0.11	J	0.05	UJ	0.06	UJ	0.09	J	0.06	U	0.05	U	0.05	U	0.06	U	0.06	U
Nickel	MG/KG	39.9	93%		30	0	2	14	15		24		17.6		**39.9**		16.2		16.3	UJ	**30.4**		22.7		24.4	J	27.1	
Potassium	MG/KG	1740	100%			0	0	15	15		1190		925		1270		806	J	1170	J	1320		993		1540		1020	J
Selenium	MG/KG	2.5	13%	390	3.9	0	0	2	15		0.86	U	0.83	U	0.94	U	0.89	UJ	0.55	U	2.1		2.5		0.72	U	1.1	U
Silver	MG/KG	0.2	7%	390	2	0	0	1	15		0.22	U	0.22	U	0.25	U	0.23	U	0.29	U	0.48	U	0.49	U	0.2	J	0.28	U
Sodium	MG/KG	207	27%			0	0	4	15		47	U	45.7	U	51.7	U	48.9	U	60	U	115		207		56.1	J	59.8	U
Thallium	MG/KG	1.8	33%	5.1		0	0	5	15		0.97	U	0.94	U	1.1	U	1.6	U	1.8	J	1.5		1.5	U	1.2	J	1.2	U
Vanadium	MG/KG	24	100%	550		0	0	15	15		17.6		18.3		17.7		17.6		20.8		17.6		14.7		13.6		23.4	
Zinc	MG/KG	83.7	100%	23,000	109	0	0	15	15		50.1		45		81.4		46.1		53.6	J	64.2		60.7		83.7	J	66.5	

Notes:

1.Only compounds detected are shown on table.

2. Compounds detected in samples were compared to the USEPA 2008 Regional Risk Based Screening Levels and 6 New York Code of Rules and Regulations (NYCRR) Part 375-6Unrestricted Use Soil Cleanup Objectives (SCO).

3. Chromium value is total forUSEPA RBSL and the trivalent form for NYDEC SCO.

4. Shading indicates a concentration above groundwater standard.

5. A blank in the action level column indicates no EPA RBSL and/or NYDEC SCO for unrestricted use.

U = compound was not detected

J = the reported value is and estimated concentration

R = the compound was rejected

TABLE 1-1
DISPOSAL PIT A/B SURFACE SOIL ANALYTICAL DATA SUMMARY
SEAD-12 REMOVAL ACTION WORK PLAN
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY										SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID										SB12-3		SB12-4		SS12-15		SS12-16		SS12-17		SS12-183	
MATRIX										SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE ID										12524		12530		123211		123102		123212		123377	
SAMPLE DEPTH TO TOP OF SAMPLE										0		0		0		0		0		0	
SAMPLE DEPTH TO BOTTOM OF SAMPLE										0.2		0.2		0.2		0.2		0.2		0.2	
SAMPLE DATE										09-Nov-97		10-Nov-97		03-Nov-98		13-Oct-98		03-Nov-98		17-Nov-98	
QC CODE										SA		SA		SA		SA		SA		SA	
STUDY ID			FREQUENCY	EPA	NYDEC	NO. ABOVE	NO. ABOVE	NUMBER	NUMBER	RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1	
			OF	RSL [2]	UNRESTRICTED	EPA RSL	UNRESTRICTED	OF	OF												
PARAMETER	UNIT	MAXIMUM	DETECTION	RESIDENTIAL	USE SCO [2]	RESIDENTIAL	USE SCO	DETECTS	ANALYSES	N		N		N		N		N		N	
VOLATILE ORGANICS																					
Acetone	UG/KG	52	47%	61,000,000	50	0	1	7	15	4	J	5	J	12	U	12	U	9	J	7	J
Methyl butyl ketone	UG/KG	1	7%			0	0	1	15	12	U	1	J	12	U	12	U	12	U	12	U
Methylene chloride	UG/KG	1	7%	11,000	50	0	0	1	15	12	U	12	U	12	U	12	U	12	U	12	U
Toluene	UG/KG	4	27%	5,000,000	700	0	0	4	15	3	J	4	J	12	U	1	J	12	U	2	J
SEMI VOLATILE ORGANICS																					
Benzo(a)anthracene	UG/KG	27	33%	150	1,000	0	0	5	15	82	U	84	U	80	UJ	80	U	80	UJ	27	J
Benzo(a)pyrene	UG/KG	18	33%	15	1,000	2	0	5	15	82	U	84	U	80	UJ	80	UJ	80	UJ	**18**	**J**
Benzo(b)fluoranthene	UG/KG	36	40%	150	1,000	0	0	6	15	82	U	84	U	4.2	J	80	U	80	U	36	J
Benzo(ghi)perylene	UG/KG	23	33%		100,000	0	0	5	15	82	U	84	U	80	U	80	U	80	U	14	J
Benzo(k)fluoranthene	UG/KG	26	27%	1,500	800	0	0	4	15	82	U	84	U	80	U	80	U	80	U	26	J
Bis(2-Ethylhexyl)phthalate	UG/KG	210	20%	35,000		0	0	3	15	82	U	84	U	80	UJ	80	U	10	J	82	UJ
Butylbenzylphthalate	UG/KG	6.7	7%	260,000		0	0	1	15	82	U	84	U	80	UJ	80	U	80	UJ	82	UJ
Carbazole	UG/KG	16	7%			0	0	1	15	82	U	84	U	80	UJ	80	U	80	UJ	82	U
Chrysene	UG/KG	51	47%	15,000	1,000	0	0	7	15	82	U	5.1	J	80	UJ	80	U	80	UJ	51	J
Di-n-butylphthalate	UG/KG	68	20%			0	0	3	15	82	U	84	U	7.2	J	80	U	6	J	82	U
Di-n-octylphthalate	UG/KG	7.8	13%			0	0	2	15	82	U	84	U	80	U	80	U	80	U	82	U
Dibenz(a,h)anthracene	UG/KG	16	13%	15	330	1	0	2	15	82	U	84	U	80	U	80	U	80	U	6.3	J
Dibenzofuran	UG/KG	5.6	7%			0	0	1	15	82	U	84	U	80	UJ	80	U	80	UJ	82	U
Fluoranthene	UG/KG	24	53%	2,300,000	100,000	0	0	8	15	82	U	7	J	80	UJ	80	U	4.1	J	24	J
Fluorene	UG/KG	5.4	7%	2,300,000	30,000	0	0	1	15	82	U	84	U	80	U	80	U	80	U	82	U
Indeno(1,2,3-cd)pyrene	UG/KG	18	27%	150	500	0	0	4	15	82	U	84	U	80	U	80	U	80	UJ	12	J
Phenanthrene	UG/KG	8.5	33%	1,700,000	100,000	0	0	5	15	82	U	84	U	80	UJ	80	U	80	U	5.1	J
Pyrene	UG/KG	22	53%	1,700,000	100,000	0	0	8	15	82	U	6.1	J	80	U	80	U	80	U	21	J
PESTICIDES/PCBS																					
4,4'-DDE	UG/KG	15	13%	1,400	3.3	0	2	2	15	**4.8**	**J**	4.2	U	4	U	4	U	**15**		4.1	U
4,4'-DDT	UG/KG	42	13%	1,700	3.3	0	1	2	15	4.1	U	4.2	U	4	U	4	U	**42**		4.1	U
Aroclor-1254	UG/KG	670	20%	220	100	2	2	3	15	**440**		24	J	40	U	40	U	**670**	**J**	41	U
Dieldrin	UG/KG	14	13%	30	5	0	2	2	15	**5.8**	**J**	4.2	U	4	U	4	U	**14**	**J**	4.1	U
Endosulfan I	UG/KG	1.8	7%		2,400	0	0	1	15	2.1	U	2.2	U	2.1	U	2	U	1.8	J	2.1	U
Endosulfan II	UG/KG	2.7	7%		2,400	0	0	1	15	2.7	J	4.2	U	4	U	4	U	4	U	4.1	U
Endrin	UG/KG	4.2	13%	18,000	14	0	0	2	15	2.6	J	4.2	U	4	U	4	U	4.2	J	4.1	U
Endrin aldehyde	UG/KG	5.6	13%			0	0	2	15	3.5	J	4.2	U	4	U	4	U	5.6	J	4.1	U
Gamma-Chlordane	UG/KG	11	20%			0	0	3	15	9	J	2.2	U	2.1	U	2	U	11	J	2.1	U
Heptachlor epoxide	UG/KG	4.6	13%	53		0	0	2	15	3.3	J	2.2	U	2.1	U	2	U	4.6	J	2.1	U
METALS																					
Aluminum	MG/KG	15800	100%	77,000		0	0	15	15	10,500		14,400		10,200		11,900		10,500		13,900	J
Antimony	MG/KG	0.87	13%	31		0	0	2	15	0.83	UJ	0.86	UJ	1.2	UJ	1.4	UR	1.1	UJ	1.4	UR
Arsenic	MG/KG	4.9	100%	0.39	13	15	0	15	15	**3.6**		**4.2**		**3.5**		**3.8**		**2.8**		**3.9**	**J**
Barium	MG/KG	89.2	100%	15,000	350	0	0	15	15	67.4		84		67.5		85.9		70.8		86.2	
Beryllium	MG/KG	0.59	100%	160	7.2	0	0	15	15	0.35	J	0.38		0.44	J	0.44	J	0.4	J	0.59	J
Cadmium	MG/KG	3.2	20%	70	2.5	0	1	3	15	0.07	U	0.07	U	0.06	U	0.07	U	0.05	U	0.4	U
Calcium	MG/KG	77600	100%			0	0	15	15	32300		12800		30700		15200	J	23600		16200	
Chromium	MG/KG	23.3	100%	280 [3]	30 [3]	0	0	15	15	16.9		18.7		15.8		17.5		15.6		19.4	
Cobalt	MG/KG	17.5	100%	23		0	0	15	15	9.5		10.7		9.1	J	9.8	J	10.7		15	
Copper	MG/KG	32.5	100%	3,100	50	0	0	15	15	19.3		16.7		22.3		19.6		21.4		23.7	
Cyanide	MG/KG	1.6	13%	1,600	27	0	0	2	15	0.75	U	0.68	U	0.62	U	0.62	U	0.6	U	0.66	U
Iron	MG/KG	27100	100%			0	0	15	15	18400		20900		20500	J	21700	J	19900	J	26000	J
Lead	MG/KG	22.2	100%	400	63	0	0	15	15	11.3		15.9		13.2		14.6		13.6		13.6	
Magnesium	MG/KG	21500	100%			0	0	15	15	6950		5420		7330		5160		7070		5780	
Manganese	MG/KG	1420	100%		1,600	0	0	15	15	584		781		555	J	641		607	J	663	
Mercury	MG/KG	0.11	20%	6.7	0.18	0	0	3	15	0.06	U	0.06	U	0.06	U	0.07	J	0.06	U	0.06	U
Nickel	MG/KG	39.9	93%		30	0	2	14	15	25.4		23.2		27.2		24.7		26.3		29.2	J
Potassium	MG/KG	1740	100%			0	0	15	15	1660	J	1740	J	1210		1250		1260		1310	
Selenium	MG/KG	2.5	13%	390	3.9	0	0	2	15	1.1	U	1.2	U	0.89	U	1	U	0.82	U	0.52	UJ
Silver	MG/KG	0.2	7%	390	2	0	0	1	15	0.5	U	0.52	U	0.23	U	0.27	U	0.21	U	0.27	U
Sodium	MG/KG	207	27%			0	0	4	15	144	U	150	U	48.5	U	60.2	J	44.8	U	56.6	U
Thallium	MG/KG	1.8	33%	5.1		0	0	5	15	1.5	U	1.6	U	1.2	J	1.2	U	1.4	J	1.2	U
Vanadium	MG/KG	24	100%	550		0	0	15	15	17.7		24		18.3		20.2		18.1		21.2	
Zinc	MG/KG	83.7	100%	23,000	109	0	0	15	15	61.9	J	63.5	J	54.3	J	57	J	58	J	63.8	J

Notes:

1.Only compounds detected are shown on table.

2. Compounds detected in samples were compared to the USEPA 2008 Regional Risk Based Screening Levels and 6 New York Code of Rules and Regulations (NYCRR) Part 375-6Unrestricted Use Soil Cleanup Objectives (SCO).

3. Chromium value is total forUSEPA RBSL and the trivalent form for NYDEC SCO.

4. Shading indicates a concentration above groundwater standard.

5. A blank in the action level column indicates no EPA RBSL and/or NYDEC SCO for unrestricted use.

U = compound was not detected

J = the reported value is and estimated concentration

R = the compound was rejected

TABLE 1-2
DISPOSAL PIT A/B SUBSURFACE SOIL ANALYTICAL DATA SUMMARY
SEAD-12 REMOVAL ACTION WORK PLAN
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY										SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID										MW12-10		MW12-10		MW12-11		MW12-11		MW12-12		MW12-12		MW12-13		MW12-8		MW12-8	
MATRIX										SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE ID										123008		123009		123011		123012		123014		123015		123017		123018		123184		123185	
SAMPLE DEPTH TO TOP OF SAMPLE										4		8		4		8		4		9		4		8		4		8	
SAMPLE DEPTH TO BOTTOM OF SAMPLE										5.7		9.8		5.6		10		6		11		6		9.6		6		10	
SAMPLE DATE										9/29/1998		9/29/1998		9/29/1998		9/29/1998		9/30/1998		9/30/1998		10/1/1998		10/1/1998		10/28/1998		10/28/1998	
QC CODE										SA		SA		SA		SA		SA		SA		SA		SA		SA		SA	
STUDY ID			FREQUENCY	EPA	NYDEC	NO. ABOVE	NO. ABOVE	NUMBER	NUMBER	RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1	
			OF	RSL [2]	UNRESTRICTED	EPA RSL	UNRESTRICTED	OF	OF																				
PARAMETER	UNIT	MAXIMUM	DETECTION	RESIDENTIAL	USE SCO [2]	RESIDENTIAL	USE SCO	DETECTS	ANALYSES	N		N		N		N		N		N		N		N		N		N	
VOLATILE ORGANICS																													
Acetone	UG/KG	34	41%	61,000,000	50	0	0	12	29	3	J	4	J	4	J	4	J	12	U	12	U	11	UJ	12	UJ	11	U	12	
Benzene	UG/KG	6	3%	1,100	60	0	0	1	29	11	U	12	U	11	U	11	U	12	U	12	U	11	U	12	U	11	U	11	U
Ethyl benzene	UG/KG	66	10%	5,700	1,000	0	0	3	29	11	U	12	U	11	U	11	U	12	U	12	U	11	U	12	U	11	U	11	U
Methylene chloride	UG/KG	3	7%	11,000	50	0	0	2	29	11	U	12	U	11	U	11	U	12	U	12	U	11	U	12	U	11	U	11	U
Styrene	UG/KG	33	3%	6,500,000		0	0	1	29	11	U	12	U	11	U	11	U	12	U	12	U	11	U	12	U	11	U	11	U
Toluene	UG/KG	15	34%	5,000,000	700	0	0	10	29	11	U	12	U	11	U	11	U	12	U	12	U	8	J	14		11	U	11	U
Total Xylenes	UG/KG	520	10%	600,000	260	0	2	3	29	11	U	12	U	11	U	11	U	12	U	12	U	11	U	12	U	11	U	11	U
Trichloroethene	UG/KG	26	14%	2,800	470	0	0	4	29	11	U	12	U	11	U	11	U	12	U	12	U	11	U	12	U	11	U	11	U
SEMI VOLATILE ORGANICS																													
2,4-Dimethylphenol	UG/KG	25	4%	1,200,000		0	0	1	28	73	UJ	74	UJ	72	UJ	70	UJ	81	UJ	81	UJ	73	UJ	76	UJ	73	U	72	U
2-Methylnaphthalene	UG/KG	56	11%	310,000		0	0	3	28	73	UJ	74	UJ	72	UJ	70	UJ	81	UJ	81	UJ	73	UJ	76	UJ	73	U	72	U
4-Methylphenol	UG/KG	140	4%		330	0	0	1	28	73	U	74	U	72	U	70	U	81	U	81	U	73	U	76	U	73	U	72	U
Acenaphthene	UG/KG	23	4%	3,400,000	20,000	0	0	1	28	73	UJ	74	UJ	72	UJ	70	UJ	81	UJ	81	UJ	73	U	76	U	73	U	72	U
Acenaphthylene	UG/KG	33	4%		100,000	0	0	1	28	73	UJ	74	UJ	72	UJ	70	UJ	81	UJ	81	UJ	73	UJ	76	UJ	73	U	72	U
Anthracene	UG/KG	96	11%	17,000,000	100,000	0	0	3	28	73	UJ	74	UJ	72	UJ	70	UJ	81	UJ	81	UJ	73	U	76	U	73	U	72	U
Benzo(a)anthracene	UG/KG	180	14%	150	1,000	1	0	4	28	73	UJ	74	U	72	U	70	U	81	U	81	U	73	U	76	U	73	U	72	U
Benzo(a)pyrene	UG/KG	200	14%	15	1,000	3	0	4	28	73	U	74	UJ	72	UJ	70	UJ	81	UJ	81	UJ	73	U	76	U	73	U	72	U
Benzo(b)fluoranthene	UG/KG	190	14%	150	1,000	1	0	4	28	73	UJ	74	U	72	U	70	U	81	U	81	U	73	U	76	U	73	U	72	U
Benzo(ghi)perylene	UG/KG	120	7%		100,000	0	0	2	28	73	U	74	U	72	U	70	U	81	U	81	U	73	U	76	U	73	U	72	U
Benzo(k)fluoranthene	UG/KG	160	11%	1,500	800	0	0	3	28	73	U	74	U	72	U	70	U	81	U	81	U	73	U	76	U	73	U	72	U
Bis(2-Ethylhexyl)phthalate	UG/KG	930	25%	35,000		0	0	7	28	73	U	74	U	72	U	180		81	U	81	U	83		11	J	73	U	72	U
Butylbenzylphthalate	UG/KG	5.1	4%	260,000		0	0	1	28	73	U	74	U	72	U	70	U	81	U	81	U	73	U	76	U	73	U	72	U
Chrysene	UG/KG	240	14%	15,000	1,000	0	0	4	28	73	UJ	74	UJ	72	UJ	70	UJ	81	UJ	81	UJ	73	U	76	U	73	U	72	U
Di-n-butylphthalate	UG/KG	1700	11%			0	0	3	28	73	UJ	74	UJ	72	UJ	70	UJ	81	UJ	81	UJ	73	UJ	4	J	73	U	72	U
Di-n-octylphthalate	UG/KG	54	43%			0	0	12	28	73	U	74	U	72	U	13	J	81	U	4.9	J	12	J	6.9	J	19	J	45	J
Dibenz(a,h)anthracene	UG/KG	57	7%	15	330	1	0	2	28	73	U	74	U	72	U	70	U	81	U	81	U	73	U	76	U	73	U	72	U
Fluoranthene	UG/KG	420	21%	2,300,000	100,000	0	0	6	28	73	UJ	74	UJ	72	UJ	70	UJ	81	UJ	81	UJ	73	U	76	U	73	U	72	U
Fluorene	UG/KG	52	7%	2,300,000	30,000	0	0	2	28	73	U	74	U	72	U	70	U	81	U	81	U	73	U	76	U	73	U	72	U
Indeno(1,2,3-cd)pyrene	UG/KG	120	7%	150	500	0	0	2	28	73	U	74	U	72	U	70	U	81	U	81	U	73	U	76	U	73	U	72	U
Naphthalene	UG/KG	600	7%	3,900	12,000	0	0	2	28	73	UJ	74	UJ	72	UJ	70	UJ	81	UJ	81	UJ	73	U	76	U	73	U	72	U
Phenanthrene	UG/KG	340	18%	1,700,000	100,000	0	0	5	28	73	U	74	U	72	U	4.6	J	81	U	81	U	73	U	76	U	73	U	72	U
Phenol	UG/KG	300	7%		330	0	0	2	28	73	U	74	U	72	U	70	U	81	U	81	U	73	U	76	U	73	U	72	U
Pyrene	UG/KG	380	18%	1,700,000	100,000	0	0	5	28	73	U	74	U	72	U	70	U	81	U	81	U	73	U	76	U	73	U	72	U
PESTICIDES/PCBS																													
4,4'-DDE	UG/KG	42	11%	1,400	3.3	0	2	3	28	3.7	U	3.7	U	3.6	U	3.5	U	4.1	U	4.1	U	3.7	U	3.8	U	3.7	U	3.6	U
4,4'-DDT	UG/KG	2.1	4%	1,700	3.3	0	0	1	28	3.7	U	3.7	U	3.6	U	3.5	U	4.1	U	4.1	U	3.7	U	3.8	U	3.7	U	3.6	U
Aldrin	UG/KG	0.79	4%	29	5	0	0	1	28	1.9	U	1.9	U	1.9	U	1.8	U	2.1	U	2.1	U	1.9	U	2	U	1.9	U	1.9	U
Alpha-BHC	UG/KG	24	7%		20	0	1	2	28	1.9	U	1.9	U	1.9	U	1.8	U	2.1	U	2.1	U	1.9	U	2	U	1.9	U	1.9	U
Alpha-Chlordane	UG/KG	4.6	7%		94	0	0	2	28	1.9	U	1.9	U	1.9	U	1.8	U	2.1	U	2.1	U	1.9	U	2	U	1.9	U	1.9	U
Aroclor-1254	UG/KG	3000	21%	220	100	4	4	6	28	37	U	37	U	36	U	35	U	41	U	41	U	37	U	38	U	37	U	36	U
Aroclor-1260	UG/KG	150	7%	220	100	0	1	2	28	37	U	37	U	36	U	35	U	41	U	41	U	37	U	38	U	37	U	36	U
Beta-BHC	UG/KG	2.2	4%		36	0	0	1	28	1.9	U	1.9	U	1.9	U	1.8	U	2.1	U	2.1	U	1.9	U	2	U	1.9	U	1.9	U
Dieldrin	UG/KG	40	7%	30	5	1	2	2	28	3.7	U	3.7	U	3.6	U	3.5	U	4.1	U	4.1	U	3.7	U	3.8	U	3.7	U	3.6	U
Endosulfan II	UG/KG	19	7%		2,400	0	0	2	28	3.7	U	3.7	U	3.6	U	3.5	U	4.1	U	4.1	U	3.7	U	3.8	U	3.7	U	3.6	U
Endrin	UG/KG	20	14%	18,000	14	0	2	4	28	3.7	U	3.7	U	3.6	U	3.5	U	4.1	U	4.1	U	3.7	U	3.8	U	3.7	U	3.6	U
Gamma-Chlordane	UG/KG	58	11%			0	0	3	28	1.9	U	1.9	U	1.9	U	1.8	U	2.1	U	2.1	U	1.9	U	2	U	1.9	U	1.9	U
Heptachlor	UG/KG	13	7%	110	42	0	0	2	28	1.9	U	1.9	U	1.9	U	1.8	U	2.1	U	2.1	U	1.9	U	2	U	1.9	U	1.9	U
Heptachlor epoxide	UG/KG	22	7%	53		0	0	2	28	1.9	U	1.9	U	1.9	U	1.8	U	2.1	U	2.1	U	1.9	U	2	U	1.9	U	1.9	U
METALS																													
Aluminum	MG/KG	17100	100%	77,000		0	0	28	28	8370		7210		10900		4460		14200		11200		4820		11200		7440		7550	
Antimony	MG/KG	7.2	25%	31		0	0	7	28	1.3	UR	1.2	UR	1	UR	0.9	UR	1.5	UR	1.3	UR	1.2	UR	1.2	UR	1.2	UR	1.2	UR
Arsenic	MG/KG	5.9	100%	0.39	13	28	0	28	28	**3.5**		**3.4**		**2.9**		**0.88**	**J**	**5.9**		**5.8**		**2.5**		**3.9**		**3.1**		**3.3**	
Barium	MG/KG	125	100%	15,000	350	0	0	28	28	63.9		68.7		55		17	J	112		100		51.3		63.4		73.2		65.8	
Beryllium	MG/KG	0.74	100%	160	7.2	0	0	28	28	0.31	J	0.27	J	0.44	J	0.17	J	0.51	J	0.38	J	0.14	J	0.46	J	0.45	J	0.43	J
Cadmium	MG/KG	94.3	36%	70	2.5	1	7	10	28	0.06	U	0.06	U	0.05	U	0.04	U	0.07	U	0.06	U	0.06	U	0.06	U	0.36	U	0.35	U
Calcium	MG/KG	142000	100%			0	0	28	28	83200		73900		46100		6980		54600		42900		75600	J	43100	J	87500		64400	
Chromium	MG/KG	83.3	100%	280 [3]	30 [3]	0	4	28	28	13.9		12.4		20.4		8.5		21.1		16.2		8.2		20.5		12	J	13.3	J
Cobalt	MG/KG	26.5	100%	23		1	0	28	28	7.7	J	7	J	12.9		9.1		14.3		12.9		5.1	J	15.2		8.1	J	12.1	
Copper	MG/KG	215	100%	3,100	50	0	3	28	28	20.3		20.5		33.7		11.5		28.4		23.9		13.3		31.5		20		21.9	
Cyanide	MG/KG	1.5	7%	1,600	27	0	0	2	28	0.55	U	0.6	U	0.53	U	0.53	U	0.63	U	0.64	U	0.57	UJ	0.64	UJ	1.5		0.72	
Iron	MG/KG	35700	100%			0	0	28	28	19100	J	18100	J	27000	J	11000	J	27800	J	22800	J	10100		25500		16500		17300	
Lead	MG/KG	366	100%	400	63	0	2	28	28	7.3		6.6		16		9		11.9		9.1		3.4	J	11.5	J	5.9	J	7.6	J
Magnesium	MG/KG	34300	100%			0	0	28	28	13200		17200		9010		2090		13200		13700		34300		8350		16500		13400	
Manganese	MG/KG	631	100%		1,600	0	0	28	28	408		364		383		169		631		540		339		393		406		416	
Mercury	MG/KG	0.06	18%	6.7	0.18	0	0	5	28	0.05	UJ	0.06	UJ	0.05	UJ	0.06	J	0.06	UJ	0.06	UJ	0.05	U	0.06	U	0.05	U	0.05	U
Nickel	MG/KG	201	93%		30	0	9	26	28	23.2		20.3		**44**		20		**34.1**	**J**	25.8	J	12.1		**44.2**		22.9	UJ	27.6	UJ
Potassium	MG/KG	2090	100%			0	0	28	28	1270		1250		1240		397	J	1980		1770		760	J	1340		1300		1260	
Selenium	MG/KG	1.2	18%	390	3.9	0	0	5	28	0.95	U	0.92	U	0.76	U	0.68	U	1.1	U	0.97	U	0.94	UJ	0.92	UJ	0.46	U	0.57	J
Silver	MG/KG	11.9	14%	390	2	0	1	4	28	0.25	U	0.24	U	0.2	U	0.18	U	0.29	U	0.25	U	0.24	U	0.24	U	0.24	U	0.23	U
Sodium	MG/KG	134	57%			0	0	16	28	96.5	J	84.9	J	81.8	J	37.1	U	61.3	U	53	U	51.4	U	84	J	99	J	49.2	U
Thallium	MG/KG	1.7	25%	5.1		0	0	7	28	1.1	U	1	U	0.86	U	0.77	U	1.3	U	1.1	U	1.4	U	1.2	U	1.7	J	1.5	J
Vanadium	MG/KG	25.6	100%	550		0	0	28	28	14.7		13.1		16.5		5.8	J	25.6		21.3		10.5		17		13.9		13.5	
Zinc	MG/KG	424	100%	23,000	109	0	4	28	28	50.3		51.6		94.9		41.5		66.8		52.4		31.6		105		45.4	J	57.2	J

Notes:
1.Only compounds detected are shown on table.
2. Compounds detected in samples were compared to the USEPA 2008 Regional Risk Based Screening Levels and 6 New York Code of Rules and Regulations (NYCRR) Part 375-6Unrestricted Use Soil Cleanup Objectives (SCO).
3.Chromium value is total forUSEPA RBSL and the trivalent form for NYDEC SCO.
4. Shading indicates a concentration above groundwater standard.
5. A blank in the action level column indicates no EPA RBSL and/or NYDEC SCO for unrestricted use.

U = compound was not detected
J = the reported value is and estimated concentration
R = the compound was rejected

TABLE 1-2
DISPOSAL PIT A/B SUBSURFACE SOIL ANALYTICAL DATA SUMMARY
SEAD-12 REMOVAL ACTION WORK PLAN
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY										SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID										SB12-2		SB12-2		SB12-2		SB12-2		SB12-3		SB12-3		SB12-4		SB12-4	
MATRIX										SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE ID										12532		123113		12533		123114		12525		12527		12526		12528		12529	
SAMPLE DEPTH TO TOP OF SAMPLE										0.2		6		8		10		1		8		10		2		4	
SAMPLE DEPTH TO BOTTOM OF SAMPLE										2		8		10		12		4		10		11.9		4		6	
SAMPLE DATE										11/10/1997 10:55		10/14/1998		11/10/1997 12:15		10/14/1998		11/9/1997 11:10		11/9/1997 12:15		11/9/1997 12:55		11/9/1997 14:40		11/9/1997 15:50	
QC CODE										SA		SA		SA		SA		SA		SA		SA		SA		SA	
STUDY ID			FREQUENCY	EPA	NYDEC	NO. ABOVE	NO. ABOVE	NUMBER	NUMBER	RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1	
			OF	RSL [2]	UNRESTRICTED	EPA RSL	UNRESTRICTED	OF	OF																		
PARAMETER	UNIT	MAXIMUM	DETECTION	RESIDENTIAL	USE SCO [2]	RESIDENTIAL	USE SCO	DETECTS	ANALYSES	N		N		N		N		N		N		N		N		N	
VOLATILE ORGANICS																											
Acetone	UG/KG	34	41%	61,000,000	50	0	0	12	29	5	J	11	U	17	J	11	U	9	J	30	J	20	J	17	J	34	J
Benzene	UG/KG	6	3%	1,100	60	0	0	1	29	12	U	11	U	11	U	11	U	12	U	6	J	12	U	12	U	12	U
Ethyl benzene	UG/KG	66	10%	5,700	1,000	0	0	3	29	12	U	11	U	11	U	11	U	12	U	66		12	U	12	U	12	U
Methylene chloride	UG/KG	3	7%	11,000	50	0	0	2	29	12	U	11	U	1	J	11	U	12	U	3	J	12	U	12	U	12	U
Styrene	UG/KG	33	3%	6,500,000		0	0	1	29	12	U	11	U	11	U	11	U	12	U	33		12	U	12	U	12	U
Toluene	UG/KG	15	34%	5,000,000	700	0	0	10	29	15		11	U	10	J	11	U	12	U	2	J	6	J	6	J	2	J
Total Xylenes	UG/KG	520	10%	600,000	260	0	2	3	29	12	U	11	U	11	U	11	U	12	U	10	J	12	U	12	U	12	U
Trichloroethene	UG/KG	26	14%	2,800	470	0	0	4	29	12	U	11	U	11	U	11	U	12	U	16	U	12	U	12	U	1	J
SEMI VOLATILE ORGANICS																											
2,4-Dimethylphenol	UG/KG	25	4%	1,200,000		0	0	1	28	77	U	72	UJ	74	U	73	UJ	85	U			77	U	80	U	75	U
2-Methylnaphthalene	UG/KG	56	11%	310,000		0	0	3	28	77	U	72	U	74	U	73	U	85	U			77	U	80	U	75	U
4-Methylphenol	UG/KG	140	4%		330	0	0	1	28	77	U	72	UJ	74	U	73	U	85	U			77	U	80	U	75	U
Acenaphthene	UG/KG	23	4%	3,400,000	20,000	0	0	1	28	77	U	72	U	74	U	73	U	85	U			77	U	80	U	75	U
Acenaphthylene	UG/KG	33	4%		100,000	0	0	1	28	77	U	72	U	74	U	73	U	85	U			77	U	80	U	75	U
Anthracene	UG/KG	96	11%	17,000,000	100,000	0	0	3	28	77	U	72	U	74	U	73	U	85	U			77	U	80	U	4.4	J
Benzo(a)anthracene	UG/KG	180	14%	150	1,000	1	0	4	28	77	U	72	U	74	U	73	U	85	U			77	U	80	U	5.8	J
Benzo(a)pyrene	UG/KG	200	14%	15	1,000	3	0	4	28	77	U	72	U	74	U	73	U	85	U			77	U	80	U	7.1	J
Benzo(b)fluoranthene	UG/KG	190	14%	150	1,000	1	0	4	28	77	U	72	U	74	U	73	U	85	U			77	U	80	U	6	J
Benzo(ghi)perylene	UG/KG	120	7%		100,000	0	0	2	28	77	U	72	UJ	74	U	73	U	85	U			77	U	80	U	6.7	J
Benzo(k)fluoranthene	UG/KG	160	11%	1,500	800	0	0	3	28	77	U	72	U	74	U	73	U	85	U			77	U	80	U	6.4	J
Bis(2-Ethylhexyl)phthalate	UG/KG	930	25%	35,000		0	0	7	28	77	U	72	UJ	74	U	73	UJ	85	U			390		80	U	75	U
Butylbenzylphthalate	UG/KG	5.1	4%	260,000		0	0	1	28	77	U	72	UJ	74	U	73	UJ	85	U			77	U	80	U	5.1	J
Chrysene	UG/KG	240	14%	15,000	1,000	0	0	4	28	77	U	72	U	74	U	73	U	85	U			77	U	80	U	5.7	J
Di-n-butylphthalate	UG/KG	1700	11%			0	0	3	28	77	U	72	UJ	74	U	73	U	85	U			77	U	80	U	75	U
Di-n-octylphthalate	UG/KG	54	43%			0	0	12	28	77	U	6.2	J	74	U	10	J	7.9	J			54	J	5.2	J	7	J
Dibenz(a,h)anthracene	UG/KG	57	7%	15	330	1	0	2	28	77	U	72	UJ	74	U	73	U	85	U			77	U	80	U	6	J
Fluoranthene	UG/KG	420	21%	2,300,000	100,000	0	0	6	28	4	J	72	U	74	U	73	U	4.5	J			77	U	80	U	5.1	J
Fluorene	UG/KG	52	7%	2,300,000	30,000	0	0	2	28	77	U	72	U	74	U	73	U	85	U			77	U	80	U	75	U
Indeno(1,2,3-cd)pyrene	UG/KG	120	7%	150	500	0	0	2	28	77	U	72	UJ	74	U	73	U	85	U			77	U	80	U	5.7	J
Naphthalene	UG/KG	600	7%	3,900	12,000	0	0	2	28	77	U	72	U	74	U	73	U	85	U			77	U	80	U	75	U
Phenanthrene	UG/KG	340	18%	1,700,000	100,000	0	0	5	28	77	U	72	U	74	U	73	U	85	U			77	U	80	U	4.7	J
Phenol	UG/KG	300	7%		330	0	0	2	28	77	U	72	UJ	74	U	73	U	85	U			77	U	80	U	75	U
Pyrene	UG/KG	380	18%	1,700,000	100,000	0	0	5	28	77	U	72	U	74	U	73	U	4.6	J			77	U	80	U	4.4	J
PESTICIDES/PCBS																											
4,4'-DDE	UG/KG	42	11%	1,400	3.3	0	2	3	28	3.8	U	3.6	U	3.7	U	3.7	U	**42**	**J**			**26**	**J**	4	U	3.8	U
4,4'-DDT	UG/KG	2.1	4%	1,700	3.3	0	0	1	28	3.8	U	3.6	U	3.7	U	3.7	U	13	U			3.8	U	4	U	3.8	U
Aldrin	UG/KG	0.79	4%	29	5	0	0	1	28	2	U	1.9	U	1.9	U	1.9	U	6.5	U			2	U	2	U	1.9	U
Alpha-BHC	UG/KG	24	7%		20	0	1	2	28	2	U	1.9	U	1.9	U	1.9	U	6.5	U			2	U	2	U	1.9	U
Alpha-Chlordane	UG/KG	4.6	7%		94	0	0	2	28	2	U	1.9	U	1.9	U	1.9	U	6.5	U			4.6	J	2	U	1.9	U
Aroclor-1254	UG/KG	3000	21%	220	100	4	4	6	28	38	U	36	U	37	U	37	U	**3,000**				**1,900**		40	U	38	U
Aroclor-1260	UG/KG	150	7%	220	100	0	1	2	28	38	U	36	U	37	U	37	U	130	U			38	U	40	U	38	U
Beta-BHC	UG/KG	2.2	4%		36	0	0	1	28	2	U	1.9	U	1.9	U	1.9	U	6.5	U			2	U	2	U	1.9	U
Dieldrin	UG/KG	40	7%	30	5	1	2	2	28	3.8	U	3.6	U	3.7	U	3.7	U	**40**	**J**			**25**	**J**	4	U	3.8	U
Endosulfan II	UG/KG	19	7%		2,400	0	0	2	28	3.8	U	3.6	U	3.7	U	3.7	U	19	J			9.5	J	4	U	3.8	U
Endrin	UG/KG	20	14%	18,000	14	0	2	4	28	3.8	U	3.6	U	3.7	U	3.7	U	**16**	**J**			8.6	J	4	U	3.8	U
Gamma-Chlordane	UG/KG	58	11%			0	0	3	28	2	U	1.9	U	1.9	U	1.9	U	58	J			44	J	2	U	1.9	U
Heptachlor	UG/KG	13	7%	110	42	0	0	2	28	2	U	1.9	U	1.9	U	1.9	U	6.5	U			2	U	2	U	1.9	U
Heptachlor epoxide	UG/KG	22	7%	53		0	0	2	28	2	U	1.9	U	1.9	U	1.9	U	22	J			2	U	2	U	1.9	U
METALS																											
Aluminum	MG/KG	17100	100%	77,000		0	0	28	28	13200		7890	J	9570		7010	J	12900				15700		11900		13100	
Antimony	MG/KG	7.2	25%	31		0	0	7	28	0.73	J	1.1	UR	0.74	UJ	1.2	UR	1.3	J			0.76	UJ	0.75	UJ	0.81	J
Arsenic	MG/KG	5.9	100%	0.39	13	28	0	28	28	**4.3**		**3.8**	**J**	**4**		**3.7**	**J**	**4.3**				**3.6**		**5.5**		**3.8**	
Barium	MG/KG	125	100%	15,000	350	0	0	28	28	125		63.3		90.5		76.4		86.1				74.5		67.4		82.1	
Beryllium	MG/KG	0.74	100%	160	7.2	0	0	28	28	0.39		0.3	J	0.36		0.24	J	0.43	J			0.72	J	0.36		0.52	
Cadmium	MG/KG	94.3	36%	70	2.5	1	7	10	28	**3.9**		0.05	U	0.06	U	0.06	U	1.1				**6**		0.06	U	0.07	U
Calcium	MG/KG	142000	100%			0	0	28	28	46100		97000	J	90900		82100	J	37200				5510		35900		52000	
Chromium	MG/KG	83.3	100%	280 [3]	30 [3]	0	4	28	28	**53.5**		14.2		14.9		11.8		19.5				**30.2**		16.6		23.4	
Cobalt	MG/KG	26.5	100%	23		1	0	28	28	9.9		7.6	J	7.5		7.9	J	11				15.4		11.9		15	
Copper	MG/KG	215	100%	3,100	50	0	3	28	28	24.9		22.5		19.6		24.6		27.8				**63.2**		18.6		32.2	
Cyanide	MG/KG	1.5	7%	1,600	27	0	0	2	28	0.68	U	0.58	U	0.64	U	0.59	U	0.76	U			0.7	U	0.73	U	0.66	U
Iron	MG/KG	35700	100%			0	0	28	28	22300		16300		18400		16500		21900				35700		20500		27800	
Lead	MG/KG	366	100%	400	63	0	2	28	28	27.2		9.4	J	7.4		7.2	J	15				**63.9**		11.8		17.9	
Magnesium	MG/KG	34300	100%			0	0	28	28	12500		16400	J	18200		17100	J	8000				7120		8050		9610	
Manganese	MG/KG	631	100%		1,600	0	0	28	28	507		448		375		451		619				395		561		430	
Mercury	MG/KG	0.06	18%	6.7	0.18	0	0	5	28	0.06	U	0.05	U	0.05	U	0.05	U	0.06	U			0.05	U	0.06	U	0.04	U
Nickel	MG/KG	201	93%		30	0	9	26	28	**42.5**		22.7	J	21		24.4	J	29				**76.4**		23.6		**48.9**	
Potassium	MG/KG	2090	100%			0	0	28	28	1840	J	1120		2090	J	1220		1650	J			1740	J	1380	J	1740	J
Selenium	MG/KG	1.2	18%	390	3.9	0	0	5	28	0.94	U	0.84	U	1	U	0.89	U	1.1	U			1	U	1	U	1.1	U
Silver	MG/KG	11.9	14%	390	2	0	1	4	28	0.42	U	0.22	U	0.45	U	0.23	U	0.5	U			1.6		0.45	U	0.48	U
Sodium	MG/KG	134	57%			0	0	16	28	121	U	134	J	129	U	78.9	J	145	U			131	U	129	U	138	U
Thallium	MG/KG	1.7	25%	5.1		0	0	7	28	1.3	U	0.95	U	1.3	U	1.1	J	1.5	U			1.4	U	1.3	U	1.4	U
Vanadium	MG/KG	25.6	100%	550		0	0	28	28	22.4		13.5		18.2		12.7		21.2				21		20.3		19.5	
Zinc	MG/KG	424	100%	23,000	109	0	4	28	28	104	J	45.3	J	45.3	J	51.3	J	79.4	J			**160**	**J**	61.7	J	**110**	**J**

Notes:
1.Only compounds detected are shown on table.
2. Compounds detected in samples were compared to the USEPA 2008 Regional Risk Based Screening Levels and 6 New York Code of Rules and Regulations (NYCRR) Part 375-6Unrestricted Use Soil Cleanup Objectives (SCO).
3.Chromium value is total forUSEPA RBSL and the trivalent form for NYDEC SCO.
4. Shading indicates a concentration above groundwater standard.
5. A blank in the action level column indicates no EPA RBSL and/or NYDEC SCO for unrestricted use.

U = compound was not detected
J = the reported value is and estimated concentration
R = the compound was rejected

TABLE 1-2
DISPOSAL PIT A/B SUBSURFACE SOIL ANALYTICAL DATA SUMMARY
SEAD-12 REMOVAL ACTION WORK PLAN
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY										SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID										TP12-1A		TP12-1B		TP12-1C		TP12-2A		TP12-2B		TP12-2C		TP12A-1		TP12A-1		TP12A-2		TP12A-2	
MATRIX										SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE ID										123142		123143		123144		123145		123146		123147		TP12A-1-1		TP12A-1-2		TP12A-2-2		TP12A-2-1	
SAMPLE DEPTH TO TOP OF SAMPLE										0.5		3		6		3		3.5		6		2.5		3		5		6	
SAMPLE DEPTH TO BOTTOM OF SAMPLE										0.5		3		6		3		3.5		6		2.5		3		5		6	
SAMPLE DATE										10/16/1998		10/16/1998		10/16/1998		10/16/1998		10/16/1998		10/16/1998		6/24/1994		6/24/1994		6/22/1994		6/22/1994	
QC CODE										SA		SA		SA		SA		SA		SA		SA		SA		SA		SA	
STUDY ID			FREQUENCY	EPA	NYDEC	NO. ABOVE	NO. ABOVE	NUMBER	NUMBER	RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		ESI		ESI		ESI		ESI	
PARAMETER	UNIT	MAXIMUM	OF DETECTION	RSL [2] RESIDENTIAL	UNRESTRICTED USE SCO [2]	EPA RSL RESIDENTIAL	UNRESTRICTED USE SCO	OF DETECTS	OF ANALYSES	N		N		N		N		N		N		N		N		N		N	
VOLATILE ORGANICS																													
Acetone	UG/KG	34	41%	61,000,000	50	0	0	12	29	11	UJ	11	UJ	12	UJ	11	UJ	28	UJ	30	UJ	12	U	11	U	12	U	14	U
Benzene	UG/KG	6	3%	1,100	60	0	0	1	29	11	U	11	U	12	U	11	U	28	U	30	U	12	U	11	U	12	U	14	U
Ethyl benzene	UG/KG	66	10%	5,700	1,000	0	0	3	29	11	U	11	U	12	U	11	U	49		24	J	12	U	11	U	12	U	14	U
Methylene chloride	UG/KG	3	7%	11,000	50	0	0	2	29	11	U	11	U	12	U	11	U	28	U	30	U	12	U	11	U	12	U	14	U
Styrene	UG/KG	33	3%	6,500,000		0	0	1	29	11	U	11	U	12	U	11	U	28	U	30	U	12	U	11	U	12	U	14	U
Toluene	UG/KG	15	34%	5,000,000	700	0	0	10	29	11	U	11	U	12	U	11	U	15	J	6	J	12	U	11	U	12	U	14	U
Total Xylenes	UG/KG	520	10%	600,000	260	0	2	3	29	11	U	11	U	12	U	11	U	**520**		**260**		12	U	11	U	12	U	14	U
Trichloroethene	UG/KG	26	14%	2,800	470	0	0	4	29	11	U	11	U	12	U	11	U	11	J	30	U	3	J	26		12	U	14	U
SEMI VOLATILE ORGANICS																													
2,4-Dimethylphenol	UG/KG	25	4%	1,200,000		0	0	1	28	77	UJ	73	UJ	75	UJ	74	UJ	75	UJ	79	UJ	25	J	380	U	390	U	4500	U
2-Methylnaphthalene	UG/KG	56	11%	310,000		0	0	3	28	77	UJ	73	UJ	75	UJ	74	UJ	56	J	10	J	400	U	21	J	390	U	4500	U
4-Methylphenol	UG/KG	140	4%		330	0	0	1	28	77	U	73	U	75	U	74	U	75	U	79	U	140	J	380	U	390	U	4500	U
Acenaphthene	UG/KG	23	4%	3,400,000	20,000	0	0	1	28	77	U	73	U	75	U	74	U	75	U	23	J	400	U	380	U	390	U	4500	U
Acenaphthylene	UG/KG	33	4%		100,000	0	0	1	28	77	U	73	U	75	U	74	U	75	U	79	U	400	U	33	J	390	U	4500	U
Anthracene	UG/KG	96	11%	17,000,000	100,000	0	0	3	28	77	UJ	73	UJ	75	UJ	74	UJ	75	UJ	40	J	400	U	96	J	390	U	4500	U
Benzo(a)anthracene	UG/KG	180	14%	150	1,000	1	0	4	28	77	U	73	U	75	U	74	U	75	UJ	74	J	21	J	**180**	**J**	390	U	4500	U
Benzo(a)pyrene	UG/KG	200	14%	15	1,000	3	0	4	28	77	UJ	73	UJ	75	UJ	74	UJ	75	UJ	**41**	**J**	**30**	**J**	**200**	**J**	390	U	4500	U
Benzo(b)fluoranthene	UG/KG	190	14%	150	1,000	1	0	4	28	77	U	73	U	75	U	74	U	75	UJ	23	J	28	J	**190**	**J**	390	U	4500	U
Benzo(ghi)perylene	UG/KG	120	7%		100,000	0	0	2	28	77	U	73	U	75	U	74	U	75	UJ	79	U	400	U	120	J	390	U	4500	U
Benzo(k)fluoranthene	UG/KG	160	11%	1,500	800	0	0	3	28	77	U	73	U	75	U	74	U	75	UJ	79	U	32	J	160	J	390	U	4500	U
Bis(2-Ethylhexyl)phthalate	UG/KG	930	25%	35,000		0	0	7	28	77	U	73	U	75	U	74	U	930	J	79	U	230	J	860		390	U	4500	U
Butylbenzylphthalate	UG/KG	5.1	4%	260,000		0	0	1	28	77	U	73	U	75	U	74	U	75	UJ	79	U	400	U	380	U	390	U	4500	U
Chrysene	UG/KG	240	14%	15,000	1,000	0	0	4	28	77	U	73	U	75	U	74	U	75	UJ	98		28	J	240	J	390	U	4500	U
Di-n-butylphthalate	UG/KG	1700	11%			0	0	3	28	77	U	73	U	75	U	74	U	75	U	79	U	79	J	1700		390	U	4500	U
Di-n-octylphthalate	UG/KG	54	43%			0	0	12	28	77	UJ	73	UJ	75	UJ	74	UJ	75	UJ	79	U	400	U	380	U	390	U	4500	U
Dibenz(a,h)anthracene	UG/KG	57	7%	15	330	1	0	2	28	77	U	73	U	75	U	74	U	75	UJ	79	U	400	U	**57**	**J**	390	U	4500	U
Fluoranthene	UG/KG	420	21%	2,300,000	100,000	0	0	6	28	77	U	73	U	75	U	74	U	75	U	69	J	40	J	420		390	U	4500	U
Fluorene	UG/KG	52	7%	2,300,000	30,000	0	0	2	28	77	U	73	U	75	U	74	U	75	U	10	J	400	U	52	J	390	U	4500	U
Indeno(1,2,3-cd)pyrene	UG/KG	120	7%	150	500	0	0	2	28	77	U	73	U	75	U	74	U	75	UJ	79	U	400	U	120	J	390	U	4500	U
Naphthalene	UG/KG	600	7%	3,900	12,000	0	0	2	28	77	UJ	73	UJ	75	UJ	74	UJ	600	J	72	J	400	U	380	U	390	U	4500	U
Phenanthrene	UG/KG	340	18%	1,700,000	100,000	0	0	5	28	77	U	73	U	75	U	74	U	75	U	130		27	J	340	J	390	U	4500	U
Phenol	UG/KG	300	7%		330	0	0	2	28	77	U	73	U	75	U	74	U	75	U	79	U	300	J	48	J	390	U	4500	U
Pyrene	UG/KG	380	18%	1,700,000	100,000	0	0	5	28	77	UJ	73	UJ	75	UJ	74	UJ	75	UJ	260		37	J	380		390	U	4500	U
PESTICIDES/PCBS																													
4,4'-DDE	UG/KG	42	11%	1,400	3.3	0	2	3	28	3.8	U	3.6	U	3.7	U	3.7	U	3.8	U	4	U	4	U	2.2	J	3.9	U	9	U
4,4'-DDT	UG/KG	2.1	4%	1,700	3.3	0	0	1	28	3.8	U	3.6	U	3.7	U	3.7	U	3.8	U	4	U	4	U	3.8	U	2.1	J	9	U
Aldrin	UG/KG	0.79	4%	29	5	0	0	1	28	2	U	1.9	U	1.9	U	1.9	U	1.9	U	2	U	0.79	J	2	U	2	U	4.7	U
Alpha-BHC	UG/KG	24	7%		20	0	1	2	28	2	U	1.9	U	1.9	U	1.9	U	2.8		**24**		2.1	U	2	U	2	U	4.7	U
Alpha-Chlordane	UG/KG	4.6	7%		94	0	0	2	28	2	U	1.9	U	1.9	U	1.9	U	1.9	U	2	U	2.1	U	1.5	J	2	U	4.7	U
Aroclor-1254	UG/KG	3000	21%	220	100	4	4	6	28	38	U	36	U	37	U	37	U	38	U	40	U	49		73		**500**		**2,300**	
Aroclor-1260	UG/KG	150	7%	220	100	0	1	2	28	38	U	36	U	37	U	37	U	38	U	40	U	40	U	38	U	31	J	**150**	
Beta-BHC	UG/KG	2.2	4%		36	0	0	1	28	2	U	1.9	U	1.9	U	1.9	U	1.9	U	2.2	J	2.1	U	2	U	2	U	4.7	U
Dieldrin	UG/KG	40	7%	30	5	1	2	2	28	3.8	U	3.6	U	3.7	U	3.7	U	3.8	U	4	U	4	U	3.8	U	3.9	U	9	U
Endosulfan II	UG/KG	19	7%		2,400	0	0	2	28	3.8	U	3.6	U	3.7	U	3.7	U	3.8	U	4	U	4	U	3.8	U	3.9	U	9	U
Endrin	UG/KG	20	14%	18,000	14	0	2	4	28	3.8	U	3.6	U	3.7	U	3.7	U	3.8	U	4	U	4	U	3.8	U	3.8	J	**20**	**J**
Gamma-Chlordane	UG/KG	58	11%			0	0	3	28	2	U	1.9	U	1.9	U	1.9	U	1.9	U	2	U	2.1	U	2	U	2.1	J	4.7	U
Heptachlor	UG/KG	13	7%	110	42	0	0	2	28	2	U	1.9	U	1.9	U	1.9	U	2.6		13		2.1	U	2	U	2	U	4.7	U
Heptachlor epoxide	UG/KG	22	7%	53		0	0	2	28	2	U	1.9	U	1.9	U	1.9	U	1.9	U	1.7	J	2.1	U	2	U	2	U	4.7	U
METALS																													
Aluminum	MG/KG	17100	100%	77,000		0	0	28	28	8910	J	6100	J	6650	J	9100	J	7410	J	6500	J	11400		11400		17100		10900	
Antimony	MG/KG	7.2	25%	31		0	0	7	28	1.2	UR	1.2	UR	84	UR	1.2	UR	1.1	UR	1.3	UR	0.31	J	1.9	J	1.9	J	7.2	J
Arsenic	MG/KG	5.9	100%	0.39	13	28	0	28	28	**3.7**		**3.4**		**3.2**		**3.4**		**3**		**2.9**		**3.8**		**5.2**		**4.9**		**4.7**	
Barium	MG/KG	125	100%	15,000	350	0	0	28	28	65	J	79.2	J	58.2	J	70.7	J	65.3	J	55.3	J	96.3		93.3		73.6		81	
Beryllium	MG/KG	0.74	100%	160	7.2	0	0	28	28	0.33	J	0.24	J	0.29	J	0.37	J	0.3	J	0.26	J	0.5	J	0.62	J	0.74	J	0.74	J
Cadmium	MG/KG	94.3	36%	70	2.5	1	7	10	28	0.06	U	0.06	U	**3**		0.06	U	1.3		1.2		**7.8**		**94.3**		**37.3**		**27.3**	
Calcium	MG/KG	142000	100%			0	0	28	28	43000		102000		88400		59900		106000		142000		38900	J	81800	J	10900		77700	
Chromium	MG/KG	83.3	100%	280 [3]	30 [3]	0	4	28	28	13		9.5		10.9		13.8		15.7		12.5		27.5		**83.3**		**32.4**		16.5	
Cobalt	MG/KG	26.5	100%	23		1	0	28	28	9.4	J	7.5	J	8.6		7.8	J	8.4	J	8	J	9.9		9.4	J	**26.5**		13.1	
Copper	MG/KG	215	100%	3,100	50	0	3	28	28	20.2		21.4		31.5		18.1		22.6		16.9		25.7		**215**		**128**		43.6	
Cyanide	MG/KG	1.5	7%	1,600	27	0	0	2	28	0.59	U	0.57	U	0.57	U	0.56	U	0.57	U	0.65	U	0.48	U	0.54	U	0.48	U	0.63	U
Iron	MG/KG	35700	100%			0	0	28	28	19600	J	15800		17300	J	18000	J	26700	J	18300	J	20100		24200		27500		19000	
Lead	MG/KG	366	100%	400	63	0	2	28	28	11	J	6.9	J	12.8	J	9	J	8.9	J	8.7	J	18.9	J	**366**	**J**	20.2		20	
Magnesium	MG/KG	34300	100%			0	0	28	28	8410	J	14400	J	11700	J	11900	J	12400	J	11300	J	8390		9310		5290		5360	
Manganese	MG/KG	631	100%		1,600	0	0	28	28	569		358		427		402		411		394		518		495		428		502	
Mercury	MG/KG	0.06	18%	6.7	0.18	0	0	5	28	0.06	U	0.06	U	0.05	U	0.06	U	0.05	U	0.06	U	0.04	J	0.05	J	0.03	J	0.04	J
Nickel	MG/KG	201	93%		30	0	9	26	28	24.9	J	21.1	J	**34.1**	**J**	23.3	J	24.7	J	22.2	J	25.3		29.9		**201**		**39**	
Potassium	MG/KG	2090	100%			0	0	28	28	897	J	945	J	801		1010	J	951		887	J	1640	J	1490	J	1370	J	1530	J
Selenium	MG/KG	1.2	18%	390	3.9	0	0	5	28	0.88	UJ	0.94	UJ	0.63	UJ	0.93	UJ	0.81	UJ	0.98	UJ	1.1		0.6	J	1		1.2	
Silver	MG/KG	11.9	14%	390	2	0	1	4	28	0.23	U	0.25	U	0.17	U	0.24	U	0.21	U	0.25	U	0.1	U	**11.9**		0.33	J	0.49	J
Sodium	MG/KG	134	57%			0	0	16	28	48.4	U	70.1	J	70.2	J	69.9	J	107	J	108	J	45.2	J	101	J	66.8	J	46.2	J
Thallium	MG/KG	1.7	25%	5.1		0	0	7	28	1	U	1.1	U	0.94	J	1.1	U	0.91	U	1.1	U	0.37	U	0.44	J	0.59	J	0.98	J
Vanadium	MG/KG	25.6	100%	550		0	0	28	28	14.7		11.3		11.8		14.7		12.4		11.2		17.9		19.2		19.6		17.9	
Zinc	MG/KG	424	100%	23,000	109	0	4	28	28	50.9	J	42.4	J	54.5	J	51.9	J	56.6	J	58.6	J	95.4		**285**		**424**		93.3	

Notes:

1.Only compounds detected are shown on table.

2. Compounds detected in samples were compared to the USEPA 2008 Regional Risk Based Screening Levels and 6 New York Code of Rules and Regulations (NYCRR) Part 375-6Unrestricted Use Soil Cleanup Objectives (SCO).

3.Chromium value is total forUSEPA RBSL and the trivalent form for NYDEC SCO.

4. Shading indicates a concentration above groundwater standard.

5. A blank in the action level column indicates no EPA RBSL and/or NYDEC SCO for unrestricted use.

U = compound was not detected

J = the reported value is and estimated concentration

R = the compound was rejected

TABLE 1-3
DISPOSAL PIT C SURFACE SOIL ANALYTICAL DATA SUMMARY
SEAD-12 REMOVAL ACTION WORK PLAN
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY										SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID										MW12-14		MW12-15		MW12-33		MW12-34		MW12-7		SS12-150		SS12-155		SS12-155		SS12-155		SS12-18	
MATRIX										SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE ID										123099		123028		123195		123198		123180		123345		123350		123479		123103			
SAMPLE DEPTH TO TOP OF SAMPLE										0		0		0		0		0		0		0		0		0			
SAMPLE DEPTH TO BOTTOM OF SAMPLE										0.2		0.2		0.2		0.2		0.2		0.2		0.2		0.2		0.2			
SAMPLE DATE										14-Oct-98		01-Oct-98		31-Oct-98		31-Oct-98		28-Oct-98		17-Nov-98		17-Nov-98		17-Nov-98		13-Oct-98			
QC CODE										SA		SA		SA		SA		SA		SA		SA		SA		SA			
STUDY ID			FREQUENCY	EPA	NYDEC	NO. ABOVE	NO. ABOVE	NUMBER	NUMBER	RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1			
			OF	RSL [2]	UNRESTRICTED	EPA RSL	UNRESTRICTED	OF	OF																				
PARAMETER	UNIT	MAXIMUM	DETECTION	RESIDENTIAL	USE SCO [2]	RESIDENTIAL	USE SCO	DETECTS	ANALYSES	N		N		N		N		N		N		N		N		N			
VOLATILE ORGANICS																													
Acetone	UG/KG	15	56%	61,000,000	50	0	0	5	9	14	U	11	UJ	15		8	J	7	J	7	J	13	U	8	J	12	U		
SEMI VOLATILE ORGANICS																													
Anthracene	UG/KG	4.6	11%	17,000,000	100,000	0	0	1	9	85	U	73	U	4.6	J	81	U	85	U	84	U	82	U	81	U	75	U		
Benzo(a)anthracene	UG/KG	20	56%	150	1,000	0	0	5	9	85	U	73	U	20	J	9.8	J	5.4	J	9.5	J	82	U	11	J	75	U		
Benzo(a)pyrene	UG/KG	20	67%	15	1,000	0	0	6	9	85	U	73	U	20	J	10	J	6.7	J	9.7	J	4.2	J	13	J	75	UJ		
Benzo(b)fluoranthene	UG/KG	28	67%	150	1,000	0	0	6	9	85	U	73	U	28	J	12	J	7.4	J	12	J	9	J	12	J	75	U		
Benzo(ghi)perylene	UG/KG	18	44%		100,000	0	0	4	9	85	U	73	U	18	J	9	J	7.5	J	84	U	82	U	12	J	75	U		
Benzo(k)fluoranthene	UG/KG	19	56%	1,500	800	0	0	5	9	85	U	73	U	19	J	11	J	7.7	J	9.3	J	82	U	14	J	75	U		
Bis(2-Ethylhexyl)phthalate	UG/KG	5.8	11%	35,000		0	0	1	9	85	UJ	5.8	J	86	U	100	U	85	U	84	UJ	82	UJ	81	UJ	75	U		
Carbazole	UG/KG	6.4	11%			0	0	1	9	85	UJ	73	UJ	86	UJ	81	UJ	85	U	84	UJ	82	UJ	6.4	J	75	U		
Chrysene	UG/KG	27	89%	15,000	1,000	0	0	8	9	5.9	J	4.5	J	27	J	13	J	7.7	J	13	J	5.1	J	13	J	75	U		
Di-n-butylphthalate	UG/KG	4.5	22%			0	0	2	9	85	U	4.5	J	86	U	81	U	85	U	4.2	J	82	U	81	U	75	U		
Di-n-octylphthalate	UG/KG	7.3	11%			0	0	1	9	85	UJ	73	U	86	U	7.3	J	85	U	84	UJ	82	UJ	81	U	75	U		
Dibenz(a,h)anthracene	UG/KG	5.8	22%	15	330	0	0	2	9	85	U	73	U	5.8	J	81	U	85	U	84	U	82	U	5.6	J	75	U		
Fluoranthene	UG/KG	40	67%	2,300,000	100,000	0	0	6	9	85	U	73	U	40	J	19	J	11	J	22	J	7.2	J	20	J	75	U		
Indeno(1,2,3-cd)pyrene	UG/KG	15	44%	2,300,000	500	0	0	4	9	85	U	73	U	15	J	8.9	J	6	J	84	U	82	U	12	J	75	U		
Phenanthrene	UG/KG	21	78%	150	100,000	0	0	7	9	6	J	73	U	21	J	9.4	J	6.6	J	19	J	4.6	J	11	J	75	U		
Pyrene	UG/KG	40	67%		100,000	0	0	6	9	85	U	73	U	40	J	20	J	13	J	20	J	7.5	J	15	J	75	U		
PESTICIDES/PCBS																													
4,4'-DDD	UG/KG	8.6	11%	2,000	3.3	0	1	1	9	**8.6**		3.7	U	4.3	U	4.1	U	4.3	U	4.2	U	4.1	U	4.1	U	3.8	U		
4,4'-DDT	UG/KG	2.2	11%	1,700	3.3	0	0	1	9	4.2	U	3.7	U	2.2	J	4.1	U	4.3	U	4.2	U	4.1	U	4.1	U	3.8	U		
METALS																													
Aluminum	MG/KG	14100	100%	77,000		0	0	9	9	12000	J	6480		14100		10200		12400		12800	J	13900	J	11600	J	9760			
Arsenic	MG/KG	4.3	100%	0.39	13	9	0	9	9	**4.3**	J	**3.1**		**3.9**		**2.9**		**4.1**		**3.9**	**J**	**3.8**	**J**	**3.5**	**J**	**3.8**			
Barium	MG/KG	108	100%	15,000	350	0	0	9	9	90.7		58		94.6		93.8		81.6		102		108		96.8		90.2			
Beryllium	MG/KG	0.69	100%	160	7.2	0	0	9	9	0.51	J	0.26	J	0.69	J	0.47	J	0.63	J	0.52	J	0.47	J	0.45	J	0.46	J		
Calcium	MG/KG	75900	100%			0	0	9	9	2620	J	75900	J	7570		11000		3720		16200		4400		3960		35700	J		
Chromium	MG/KG	21.6	100%	280 [3]	30 [3]	0	0	9	9	16.5		11.2		21.6	J	15.1		16.5	J	16.4		17.7		15.4		15.6			
Cobalt	MG/KG	11	100%	23		0	0	9	9	11		7.7	J	10.7	J	9.5	J	9	J	7.7	J	8.6	J	8.2	J	8.9	J		
Copper	MG/KG	22.1	100%	3,100	50	0	0	9	9	14.6		17.2		20.8		15.8		15.7		16.1		15.8		15.2		22.1			
Iron	MG/KG	23200	100%			0	0	9	9	23200		15400		22700	J	20800	J	20300		20300	J	21700	J	20400	J	20200	J		
Lead	MG/KG	24.9	100%	400	63	0	0	9	9	18.6	J	6.7	J	24.9	J	16.3	J	16	J	15		14		14		9.8			
Magnesium	MG/KG	18600	100%			0	0	9	9	3070	J	18600		4570		4930		3200		5130		3640		3190		8070			
Manganese	MG/KG	700	100%		1,600	0	0	9	9	693		389		700		632	J	640		502		690		607		408			
Mercury	MG/KG	0.06	11%	6.7	0.18	0	0	1	9	0.06	U	0.05	U	0.06	U	0.06	J	0.06	U	0.05	U	0.06	U	0.06	U	0.05	U		
Nickel	MG/KG	27.6	78%		30	0	0	7	9	19.5	J	21.9		22.1	UJ	21.4		17.2	UJ	18.7		19.6		18.3	J	27.6			
Potassium	MG/KG	1980	100%			0	0	9	9	1110	J	891	J	1980		1010	J	1280		1500		1510		1030		989	J		
Selenium	MG/KG	0.95	56%	390	3.9	0	0	5	9	1	U	0.9	UJ	0.95	J	1.1	UJ	0.84	J	0.43	J	0.9	J	0.65	J	0.92	U		
Sodium	MG/KG	92.4	33%			0	0	3	9	57.5	U	92.4	J	53.8	U	58.5	U	64.2	U	72.3	J	50.6	U	43.8	U	91.6	J		
Thallium	MG/KG	1.7	33%	5		0	0	1	9	1.7	J	1.3	U	1.6	J	1.5	J	1.3	U	0.88	U	1	U	0.9	U	1	U		
Vanadium	MG/KG	24.6	100%	550		0	0	9	9	21.8		12.2		24.6		18.9		21.8		21.8		22.5		19.1		16.9			
Zinc	MG/KG	97.3	100%	23,000	109	0	0	9	9	57.6	J	43.5		97.3	J	55.6	J	54.2	J	52.5	J	58.2	J	51.4	J	54.1	J		

Notes:

1.Only compounds detected are shown on table.

2. Compounds detected in samples were compared to the USEPA 2008 Regional Risk Based Screening Levels and 6 New York Code of Rules and Regulations (NYCRR) Part 375-6Unrestricted Use Soil Cleanup Objectives (SCO).

3.Chromium value is total forUSEPA RBSL and the trivalent form for NYDEC SCO.

4. Shading indicates a concentration above groundwater standard.

5. A blank in the action level column indicates no EPA RBSL and/or NYDEC SCO for unrestricted use.

U = compound was not detected

J = the reported value is and estimated concentration

R = the compound was rejected

TABLE 1-4
DISPOSAL PIT C SUBSURFACE SOIL ANALYTICAL DATA SUMMARY
SEAD-12 REMOVAL ACTION WORK PLAN
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY										SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID										MW12-14		MW12-14		MW12-15		MW12-15		MW12-33		MW12-33		MW12-34		MW12-34		MW12-7		MW12-7		TP12-3A		TP12-3A	
MATRIX										SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE ID										123100		123101		123029		123030		123196		123197		123199		123200		123181		123182		123085		123082	
SAMPLE DEPTH TO TOP OF SAMPLE										8		10		6		8		6		10		4		10		4		8		0.8		0.8	
SAMPLE DEPTH TO BOTTOM OF SAMPLE										10		12		8		10		8		0		6		12		6		10		0.8		0.8	
SAMPLE DATE										14-Oct-98		14-Oct-98		01-Oct-98		01-Oct-98		31-Oct-98		31-Oct-98		31-Oct-98		31-Oct-98		28-Oct-98		28-Oct-98		07-Oct-98		07-Oct-98	
QC CODE										SA		SA		SA		SA		SA		SA		SA		SA		SA		SA		DU		SA	
STUDY ID			FREQUENCY	EPA	NYDEC	NO. ABOVE	NO. ABOVE	NUMBER	NUMBER	RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1	
			OF	RSL [2]	UNRESTRICTED	EPA RSL	UNRESTRICTED	OF	OF																							
PARAMETER	UNIT	MAXIMUM	DETECTION	RESIDENTIAL	USE SCO [2]	RESIDENTIAL	USE SCO	DETECTS	ANALYSES	N		N		N		N		N		N		N		N		N		N		N		N	
VOLATILE ORGANICS																																	
Acetone	UG/KG	61	21%	61,000,000	50	0	1	8	39	14	UJ	14	UJ	9	J	11	UJ	15		10	J	13		9	J	6	J	5	J	11	U	**61**	
Chlorobenzene	UG/KG	5	5%	310,000	1,100	0	0	2	39	11	UJ	11	UJ	11	UR	11	UJ	11	U	11	UJ	12	U	11	U	12	U	11	U	11	U	11	U
Methylene chloride	UG/KG	180	13%	11,000	50	0	1	5	39	11	U	11	UJ	11	U	11	U	11	U	11	UJ	12	U	11	U	12	U	11	U	2	J	**180**	
Tetrachloroethene	UG/KG	2	3%	570	1,300	0	0	1	39	11	UJ	11	UJ	11	UJ	11	U	11	U	11	UJ	12	U	11	U	12	U	11	U	11	U	11	U
Toluene	UG/KG	62	15%	5,000,000	700	0	0	6	39	11	UJ	7	J	10	J	62		11	U	11	UJ	12	U	11	U	12	U	11	U	6	J	11	U
Total Xylenes	UG/KG	14	3%	600,000	260	0	0	1	39	11	UJ	11	UJ	11	UR	11	UJ	11	U	11	UJ	12	U	11	U	12	U	11	U	11	U	11	U
Trichloroethene	UG/KG	2	3%	2,800	470	0	0	1	39	11	UJ	11	UJ	11	UJ	11	U	11	U	11	UJ	12	U	11	U	12	U	11	U	11	U	11	U
SEMI VOLATILE ORGANICS																																	
2-Methylnaphthalene	UG/KG	22	8%	310,000		0	0	3	39	72	U	73	U	72	UJ	72	UJ	74	U	72	U	74	U	72	U	76	U	72	U	72	U	72	U
Acenaphthene	UG/KG	44	13%	3,400,000		0	0	5	39	72	U	73	U	72	U	72	U	74	U	72	U	74	U	72	U	76	U	72	U	72	U	72	U
Anthracene	UG/KG	63	21%	17,000,000	100,000	0	0	8	39	72	U	73	U	72	U	72	U	74	U	72	U	74	U	72	U	76	U	72	U	72	U	72	U
Benzo(a)anthracene	UG/KG	200	44%	150	1,000	2	0	17	39	72	U	73	U	72	U	72	U	74	U	6.3	J	4.4	J	72	U	76	U	72	U	72	U	5.3	J
Benzo(a)pyrene	UG/KG	180	44%	15	1,000	10	0	17	39	72	U	73	U	72	U	72	U	74	U	8.8	J	5.1	J	72	U	76	U	72	U	72	U	4.8	J
Benzo(b)fluoranthene	UG/KG	320	46%	150	1,000	2	0	18	39	72	U	73	U	72	U	72	U	74	U	12	J	7	J	72	U	76	U	72	U	72	U	5	J
Benzo(ghi)perylene	UG/KG	98	41%		100,000	0	0	16	39	72	UJ	73	UJ	72	U	72	U	4.3	J	8.1	J	5.6	J	5	J	76	U	72	U	72	U	72	U
Benzo(k)fluoranthene	UG/KG	170	38%	1,500	800	0	0	15	39	72	U	73	U	72	U	72	U	74	U	10	J	4.2	J	72	U	76	U	72	U	72	U	5.1	J
Bis(2-Ethylhexyl)phthalate	UG/KG	16	13%	35,000		0	0	5	39	74	UJ	73	UJ	12	J	14	J	74	U	100	U	74	U	130	U	76	U	72	U	72	U	72	U
Butylbenzylphthalate	UG/KG	30	13%	260,000		0	0	5	39	72	UJ	73	UJ	72	U	72	U	74	U	72	U	74	U	72	U	76	U	72	U	4.1	J	72	U
Carbazole	UG/KG	40	13%			0	0	5	39	72	UJ	73	UJ	72	UJ	72	U	74	UJ	72	UJ	74	UJ	72	U	76	U	72	U	72	UJ	72	UJ
Chrysene	UG/KG	310	49%	15,000	1,000	0	0	19	39	72	U	73	U	72	U	72	UJ	74	U	13	J	8.4	J	9.2	J	76	U	72	U	72	U	6.6	J
Di-n-butylphthalate	UG/KG	52	21%			0	0	8	39	72	U	73	U	11	J	10	J	74	U	72	U	74	U	72	U	76	U	72	U	72	U	72	U
Di-n-octylphthalate	UG/KG	20	26%			0	0	10	39	11	J	9.1	J	3.8	J	8.4	J	74	U	15	J	6.1	J	20	J	14	J	6.9	J	72	U	72	U
Dibenz(a,h)anthracene	UG/KG	99	21%	15	330	4	0	8	39	72	UJ	73	UJ	72	U	72	U	74	U	72	U	74	U	72	U	76	U	72	U	72	U	72	U
Fluoranthene	UG/KG	320	44%	2,300,000	100,000	0	0	17	39	72	U	73	U	72	U	72	U	74	U	11	J	6.1	J	72	U	76	U	72	U	72	U	5.1	J
Fluorene	UG/KG	35	5%	2,300,000	30,000	0	0	2	39	72	U	73	U	72	U	72	U	74	U	72	U	74	U	72	U	76	U	72	U	72	U	72	U
Indeno(1,2,3-cd)pyrene	UG/KG	140	31%	150	500	0	0	12	39	72	UJ	73	UJ	72	U	72	U	74	U	6.3	J	74	U	72	U	76	U	72	U	72	U	72	U
N-Nitrosodiphenylamine	UG/KG	9500	3%			0	0	1	39	72	U	73	U	72	U	72	U	74	U	72	U	74	U	72	U	76	U	72	U	72	U	72	U
Naphthalene	UG/KG	13	3%	3,900	12,000	0	0	1	39	72	U	73	U	72	U	72	U	74	U	72	U	74	U	72	U	76	U	72	U	72	U	72	U
Phenanthrene	UG/KG	280	44%	1,700,000	100,000	0	0	17	39	72	U	73	U	72	U	72	U	74	U	6.8	J	74	U	4.6	J	76	U	72	U	72	U	6.6	J
Pyrene	UG/KG	310	46%	1,700,000	100,000	0	0	18	39	72	U	73	U	72	U	72	U	74	U	17	J	6.2	J	7	J	76	U	72	U	72	U	10	J
PESTICIDES/PCBS																																	
4,4'-DDD	UG/KG	25	10%	2,000	3.3	0	2	4	39	3.6	U	3.7	U	3.6	U	3.6	U	3.7	U	3.6	U	3.7	U	3.6	U	3.8	U	3.6	U	3.6	U	3.6	U
4,4'-DDE	UG/KG	6.4	18%	1,400	3.3	0	3	7	39	3.6	U	3.7	U	3.6	U	3.6	U	3.7	U	3.6	U	3.7	U	3.6	U	3.8	U	3.6	U	3.6	U	3.6	U
4,4'-DDT	UG/KG	4.9	21%	1,700	3.3	0	5	8	39	3.6	U	3.7	U	3.6	U	3.6	U	3.7	U	3.6	U	3.7	U	3.6	U	3.8	U	3.6	U	3.6	U	3.6	U
Alpha-BHC	UG/KG	5.8	3%		20	0	0	1	39	1.8	U	1.9	U	1.8	U	1.8	U	1.9	U	1.9	U	1.9	U	1.9	U	2	U	1.8	U	1.8	U	1.8	U
Alpha-Chlordane	UG/KG	2.6	3%		94	0	0	1	39	1.8	U	1.9	U	1.8	U	1.8	U	1.9	U	1.9	U	1.9	U	1.9	U	2	U	1.8	U	1.8	U	1.8	U
Aroclor-1254	UG/KG	28	3%	220	100	0	0	1	39	36	U	37	U	36	U	36	U	37	U	36	U	37	U	36	U	38	U	36	U	36	U	36	U
Aroclor-1260	UG/KG	25	3%	220	100	0	0	1	39	36	U	37	U	25	J	36	U	37	U	36	U	37	U	36	U	38	U	36	U	36	U	36	U
Beta-BHC	UG/KG	1.7	3%		36	0	0	1	39	1.8	U	1.9	U	1.8	U	1.8	U	1.9	U	1.9	U	1.9	U	1.9	U	2	U	1.8	U	1.8	U	1.8	U
Gamma-Chlordane	UG/KG	2.3	5%			0	0	2	39	1.8	U	1.9	U	1.8	U	1.8	U	1.9	U	1.9	U	1.9	U	1.9	U	2	U	1.8	U	1.8	U	1.8	U
Heptachlor	UG/KG	8.4	8%	110	42	0	0	3	39	1.8	U	1.9	U	1.8	U	1.8	U	1.9	U	1.9	U	1.9	U	1.9	U	2	U	1.8	U	1.1	J	1	J
Heptachlor epoxide	UG/KG	2	3%	53		0	0	1	39	1.8	U	1.9	U	1.8	U	1.8	U	1.9	U	1.9	U	1.9	U	1.9	U	2	U	1.8	U	1.8	U	1.8	U
METALS																																	
Aluminum	MG/KG	18600	100%	77,000		0	0	39	39	6380	J	5990	J	7220		5330		8690		6170		6380		6930		7400		7700		9100		8520	
Antimony	MG/KG	0.39	8%	31		0	0	3	39	1	UR	0.83	UR	1.2	UR	1.1	UR	1.1	UR	1.1	UJ	1	UJ	0.95	UJ	1.2	UR	0.89	UR	1.3	UR	1.1	UR
Arsenic	MG/KG	11.1	100%	0.39	13	39	0	39	39	**3.1**	**J**	**3.1**	**J**	**3.1**		**1.9**		**3.3**		**2.1**		**1.3**	**J**	**2.5**		**3**		**3.3**		**3.9**		**4**	
Barium	MG/KG	135	100%	15,000	350	0	0	39	39	69.8		76.7		71.8		63		74.7		90.8		51.9		76.8		62.7		68.2		73.6		71.9	
Beryllium	MG/KG	0.83	100%	160	7.2	0	0	39	39	0.23	J	0.23	J	0.28	J	0.18	J	0.47	J	0.32	J	0.32	J	0.29	J	0.39	J	0.38	J	0.33	J	0.35	J
Cadmium	MG/KG	6	26%	70	2.5	0	2	10	39	0.05	U	0.04	U	0.06	U	0.05	U	0.32	U	0.05	U	0.05	U	0.05	U	0.35	U	0.26	U	0.06	U	0.06	U
Calcium	MG/KG	224000	100%			0	0	39	39	96500	J	84000	J	66500	J	65000	J	94800		65100		16500		72700		72400		62500		46900	J	44300	J
Chromium	MG/KG	29.4	100%	280 [3]	30 [3]	0	0	39	39	11.4		11		12.5		9.1		14.2	J	10.7		12.5		13.4		12.4	J	13.3	J	13.6		12	
Cobalt	MG/KG	16.3	100%	23		0	0	39	39	7	J	8	J	7.6	J	6.1	J	10.5		6.8	J	5	J	9.8		8.2	J	8.4		7.7	J	7.4	J
Copper	MG/KG	38.4	100%	3,100	50	0	0	39	39	16.7		15.2		17.7		13.4		22.1		19		11		24.3		19.4		18.5		17.5		18	
Iron	MG/KG	34500	100%			0	0	39	39	15500		15300		16400		12400		17600	J	15400	J	14200	J	18100	J	16500		17200		17400	J	15500	J
Lead	MG/KG	431	100%	400	63	1	1	39	39	6.7	J	6	J	4.9	J	3.8	J	5.2	J	8	J	9.6	J	12.1	J	5	J	4.7	J	10.4		9.3	
Magnesium	MG/KG	36100	100%			0	0	39	39	21000	J	21200	J	14500		19700		20200		16800		3590		14200		15300		13800		6930		8790	
Manganese	MG/KG	857	100%		1,600	0	0	39	39	385		359		350		341		493		312	J	143	J	377	J	378		387		431		422	
Mercury	MG/KG	0.14	46%	6.7	0.18	0	0	18	39	0.05	U	0.05	U	0.05	U	0.05	U	0.06	U	0.06	U	0.05	U	0.05	U	0.05	U	0.05	U	0.14	J	0.06	J
Nickel	MG/KG	45.5	92%		30	0	5	36	39	19.3	J	21.4	J	23.2		15.6		23.3	UJ	20.9		21.4		29.3		21.7	UJ	21.3	UJ	22.5		20.7	
Potassium	MG/KG	3670	100%			0	0	39	39	1200		1110		1180		979		1830		1080		404	J	893		1160		1290		897	J	770	J
Selenium	MG/KG	1.9	28%	390	3.9	0	0	11	39	0.77	U	0.63	U	0.93	UJ	0.82	UJ	0.41	U	0.8	UJ	0.77	UJ	1.5	J	0.45	U	0.34	U	0.94	U	0.86	U
Silver	MG/KG	1.8	13%	390	2	0	0	5	39	0.23	J	0.16	U	0.24	U	0.21	U	0.21	U	0.21	U	0.2	U	0.19	U	0.23	U	0.18	U	0.34	J	0.26	J
Sodium	MG/KG	881	85%			0	0	33	39	113	J	113	J	73	J	93.4	J	79.7	J	43.8	U	42.5	U	64.9	J	75.1	J	103	J	67.5	J	61.5	J
Thallium	MG/KG	1.7	41%	5.1		0	0	16	39	1.2	J	0.92	J	1.3	U	1.2	U	0.98	J	1.3	J	0.88	U	1.3	J	1.2	J	1.3	J	1.1	U	0.97	U
Vanadium	MG/KG	36.4	100%	550		0	0	39	39	11.8		10.9		12.4		10.1		15.7		11.7		9.3		12.8		13.6		13.6		15.9		15.2	
Zinc	MG/KG	656	100%	23,000	109	0	7	39	39	33.5	J	38.9	J	53.2		29.6		51.1	J	41	J	37.7	J	85.4	J	49.6	J	50.5	J	46.3	J	44.2	J

Notes:

1.Only compounds detected are shown on table.

2. Compounds detected in samples were compared to the USEPA 2008 Regional Risk Based Screening Levels and 6 New York Code of Rules and Regulations (NYCRR) Part 375-6Unrestricted Use Soil Cleanup Objectives (SCO).

3.Chromium value is total forUSEPA RBSL and the trivalent form for NYDEC SCO.

4. Shading indicates a concentration above groundwater standard.

5. A blank in the action level column indicates no EPA RBSL and/or NYDEC SCO for unrestricted use.

U = compound was not detected

J = the reported value is and estimated concentration

R = the compound was rejected

TABLE 1-4
DISPOSAL PIT C SUBSURFACE SOIL ANALYTICAL DATA SUMMARY
SEAD-12 REMOVAL ACTION WORK PLAN
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY										SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID										TP12-3B		TP12-3C		TP12-4A		TP12-4B		TP12-4C		TP12-5A		TP12-5A		TP12-5B		TP12-5C		TP12-6A		TP12-6B		TP12-6C	
MATRIX										SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE ID										123083		123084		123086		123087		123088		123092		123089		123090		123091		123158		123159		123160	
SAMPLE DEPTH TO TOP OF SAMPLE										5.5		4		0.5		6		8		0.5		0.5		2		8		2.5		3		3.5	
SAMPLE DEPTH TO BOTTOM OF SAMPLE										5.5		4		0.5		6		8		0.5		0.5		2		8		2.5		3		3.5	
SAMPLE DATE										07-Oct-98		07-Oct-98		12-Oct-98		12-Oct-98		12-Oct-98		13-Oct-98		13-Oct-98		13-Oct-98		13-Oct-98		17-Oct-98		17-Oct-98		17-Oct-98	
QC CODE										SA		SA		SA		SA		SA		DU		SA		SA		SA		SA		SA		SA	
STUDY ID			FREQUENCY	EPA	NYDEC	NO. ABOVE	NO. ABOVE	NUMBER	NUMBER	RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1	
			OF	RSL [2]	UNRESTRICTED	EPA RSL	UNRESTRICTED	OF	OF																							
PARAMETER	UNIT	MAXIMUM	DETECTION	RESIDENTIAL	USE SCO [2]	RESIDENTIAL	USE SCO	DETECTS	ANALYSES	N		N		N		N		N		N		N		N		N		N		N		N	
VOLATILE ORGANICS																																	
Acetone	UG/KG	61	21%	61,000,000	50	0	1	8	39	35	U	17	U	12	U	11	U	11	U	11	U	12	U	12	U	11	U	13	U	16	UJ	13	UJ
Chlorobenzene	UG/KG	5	5%	310,000	1,100	0	0	2	39	13	U	12	U	12	U	11	U	11	U	11	U	12	U	12	U	11	U	13	U	16	U	13	U
Methylene chloride	UG/KG	180	13%	11,000	50	0	1	5	39	2	J	12	U	12	U	11	U	11	U	11	U	12	U	12	U	11	U	13	U	16	U	13	U
Tetrachloroethene	UG/KG	2	3%	570	1,300	0	0	1	39	2	J	12	U	12	U	11	U	11	U	11	U	12	U	12	U	11	U	13	U	16	U	13	U
Toluene	UG/KG	62	15%	5,000,000	700	0	0	6	39	3	J	12	U	12	U	11	U	11	U	11	U	12	U	12	U	11	U	13	U	16	U	13	U
Total Xylenes	UG/KG	14	3%	600,000	260	0	0	1	39	14		12	U	12	U	11	U	11	U	11	U	12	U	12	U	11	U	13	U	16	U	13	U
Trichloroethene	UG/KG	2	3%	2,800	470	0	0	1	39	13	U	12	U	12	U	11	U	11	U	11	U	12	U	12	U	11	U	13	U	16	U	13	U
SEMI VOLATILE ORGANICS																																	
2-Methylnaphthalene	UG/KG	22	8%	310,000		0	0	3	39	22	J	74	U	74	U	75	U	75	U	77	U	75	U	78	U	74	U	85	U	84	U	78	U
Acenaphthene	UG/KG	44	13%	3,400,000		0	0	5	39	170	U	74	U	74	U	75	U	75	U	7.6	J	75	U	78	U	74	U	85	U	84	U	78	U
Anthracene	UG/KG	63	21%	17,000,000	100,000	0	0	8	39	170	U	74	U	74	U	75	U	75	U	9.8	J	75	U	78	UJ	74	U	85	U	84	U	78	U
Benzo(a)anthracene	UG/KG	200	44%	150	1,000	2	0	17	39	170	U	74	U	74	U	75	U	3.9	J	32	J	20	J	7.7	J	74	U	85	U	15	J	7.4	J
Benzo(a)pyrene	UG/KG	180	44%	15	1,000	10	0	17	39	170	U	74	U	10	J	75	UJ	75	UJ	**34**	**J**	**26**	**J**	8	J	74	UJ	85	U	**15**	**J**	7.8	J
Benzo(b)fluoranthene	UG/KG	320	46%	150	1,000	2	0	18	39	170	U	74	U	74	U	75	U	5.9	J	33	J	23	J	11	J	74	U	5.1	J	16	J	11	J
Benzo(ghi)perylene	UG/KG	98	41%		100,000	0	0	16	39	170	U	74	U	74	U	75	U	75	U	26	J	16	J	13	J	74	U	4.9	J	13	J	9.7	J
Benzo(k)fluoranthene	UG/KG	170	38%	1,500	800	0	0	15	39	170	U	74	U	74	U	75	U	5.6	J	33	J	26	J	10	J	74	U	85	U	16	J	8.6	J
Bis(2-Ethylhexyl)phthalate	UG/KG	16	13%	35,000		0	0	5	39	170	U	74	U	74	U	75	U	75	U	77	U	75	U	78	U	74	U	12	J	13	J	16	J
Butylbenzylphthalate	UG/KG	30	13%	260,000		0	0	5	39	170	U	74	U	74	U	75	U	75	U	77	U	75	U	78	UJ	74	U	15	J	27	J	30	J
Carbazole	UG/KG	40	13%			0	0	5	39	170	UJ	74	UJ	74	U	75	U	75	U	14	J	75	UJ	78	UJ	74	U	85	U	84	U	78	U
Chrysene	UG/KG	310	49%	15,000	1,000	0	0	19	39	170	U	74	U	74	U	75	U	6.8	J	45	J	28	J	11	J	74	U	5.2	J	19	J	11	J
Di-n-butylphthalate	UG/KG	52	21%			0	0	8	39	170	U	74	U	74	U	75	U	75	U	77	U	75	U	5.8	J	74	U	640	UJ	850	UJ	680	UJ
Di-n-octylphthalate	UG/KG	20	26%			0	0	10	39	170	U	74	U	74	U	75	U	75	U	77	U	75	U	78	U	74	U	85	U	84	U	78	U
Dibenz(a,h)anthracene	UG/KG	99	21%	15	330	4	0	8	39	170	U	74	U	74	U	75	U	75	U	9	J	6.8	J	78	U	74	U	85	U	84	U	78	U
Fluoranthene	UG/KG	320	44%	2,300,000	100,000	0	0	17	39	170	U	74	U	74	U	75	U	75	U	62	J	40	J	17	J	74	U	7.7	J	31	J	17	J
Fluorene	UG/KG	35	5%	2,300,000	30,000	0	0	2	39	170	U	74	U	74	U	75	U	75	U	77	U	75	U	78	U	74	U	85	U	84	U	78	U
Indeno(1,2,3-cd)pyrene	UG/KG	140	31%	150	500	0	0	12	39	170	U	74	U	74	U	75	U	75	U	25	J	18	J	8.1	J	74	U	85	U	9.4	J	7.6	J
N-Nitrosodiphenylamine	UG/KG	9500	3%			0	0	1	39	9500		74	U	74	U	75	U	75	U	77	U	75	U	78	U	74	U	85	U	84	U	78	U
Naphthalene	UG/KG	13	3%	3,900	12,000	0	0	1	39	13	J	74	U	74	U	75	U	75	U	77	U	75	U	78	U	74	U	85	U	84	U	78	U
Phenanthrene	UG/KG	280	44%	1,700,000	100,000	0	0	17	39	170	U	74	U	74	U	75	U	75	U	51	J	36	J	12	J	74	U	5	J	13	J	8.3	J
Pyrene	UG/KG	310	46%	1,700,000	100,000	0	0	18	39	170	U	74	U	74	U	75	U	75	U	66	J	35	J	11	J	74	U	8.2	J	30	J	16	J
PESTICIDES/PCBS																																	
4,4'-DDD	UG/KG	25	10%	2,000	3.3	0	2	4	39	4.2	U	3.7	U	3.7	U	3.8	U	3.8	U	2.9	J	**25**	**J**	3.9	U	3.7	UJ	4.2	U	4.2	U	3.9	U
4,4'-DDE	UG/KG	6.4	18%	1,400	3.3	0	3	7	39	4.2	U	3.7	U	3.7	U	2.7	J	3.8	U	3.8	UJ	**5.7**	**J**	3.9	U	3.7	UJ	4.2	U	4.2	U	3.9	U
4,4'-DDT	UG/KG	4.9	21%	1,700	3.3	0	5	8	39	4.2	U	3.7	U	3.7	U	**4.9**		3.8	U	**3.3**	**J**	2.4	J	3.9	U	3.7	UJ	4.2	U	**3.4**	**J**	3.9	U
Alpha-BHC	UG/KG	5.8	3%		20	0	0	1	39	2.2	U	1.9	U	1.9	U	5.8		1.9	U	2	U	1.9	U	2	U	1.9	UJ	2.2	U	2.2	U	2	U
Alpha-Chlordane	UG/KG	2.6	3%		94	0	0	1	39	2.2	U	1.9	U	1.9	U	1.9	U	1.9	U	2	U	1.9	U	2	U	1.9	UJ	2.2	U	2.2	U	2	U
Aroclor-1254	UG/KG	28	3%	220	100	0	0	1	39	28	J	37	U	37	U	38	U	38	U	38	U	38	U	39	U	37	UJ	42	U	42	U	39	U
Aroclor-1260	UG/KG	25	3%	220	100	0	0	1	39	42	U	37	U	37	U	38	U	38	U	38	U	38	U	39	U	37	UJ	42	U	42	U	39	U
Beta-BHC	UG/KG	1.7	3%		36	0	0	1	39	2.2	U	1.9	U	1.9	U	1.7	J	1.9	U	2	U	1.9	U	2	U	1.9	UJ	2.2	U	2.2	U	2	U
Gamma-Chlordane	UG/KG	2.3	5%			0	0	2	39	2.2	U	1.9	U	1.9	U	1	J	1.9	U	2	U	1.9	U	2	U	1.9	UJ	2.2	U	2.2	U	2	U
Heptachlor	UG/KG	8.4	8%	110	42	0	0	3	39	2.2	U	1.9	U	1.9	U	8.4		1.9	U	2	U	1.9	U	2	U	1.9	UJ	2.2	U	2.2	U	2	U
Heptachlor epoxide	UG/KG	2	3%	53		0	0	1	39	2.2	U	1.9	U	1.9	U	2	J	1.9	U	2	U	1.9	U	2	U	1.9	UJ	2.2	U	2.2	U	2	U
METALS																																	
Aluminum	MG/KG	18600	100%	77,000		0	0	39	39	9140		6550		9170		7650		7360		11100		11300		10300		7130		11300		7180		7690	
Antimony	MG/KG	0.39	8%	31		0	0	3	39	1.3	UR	1.3	UR	1	UR	1.2	UR	1.1	UR	1.4	UR	0.9	UR	1.3	UR	1.2	UR	1.3	UR	1	UR	1.4	UR
Arsenic	MG/KG	11.1	100%	0.39	13	39	0	39	39	**11.1**		**4.3**		**3.4**		**2.7**		**3.7**		**3**		**3.2**		**4.4**		**3.3**		**4.3**		**4.1**		**3.8**	
Barium	MG/KG	135	100%	15,000	350	0	0	39	39	71.7		53.3		69.3		56.4		66.7		77.2		79.7		74.3		77.5		82.2		63.2		62.2	
Beryllium	MG/KG	0.83	100%	160	7.2	0	0	39	39	0.4	J	0.23	J	0.41	J	0.34	J	0.28	J	0.49	J	0.45	J	0.47	J	0.26	J	0.47	J	0.31	J	0.35	J
Cadmium	MG/KG	6	26%	70	2.5	0	2	10	39	**6**		0.07	U	0.05	U	0.06	U	0.05	U	0.07	U	0.04	U	0.06	U	0.06	U	0.07	U	0.05	U	0.07	U
Calcium	MG/KG	224000	100%			0	0	39	39	51900	J	78500	J	67200	J	14200	J	78600	J	30800	J	22300	J	49800	J	91300	J	24600		114000		138000	
Chromium	MG/KG	29.4	100%	280 [3]	30 [3]	0	0	39	39	29.4		13.5		15.4		10.8		12.4		25.4		23.6		15.4		12		16.5		11.2		13.1	
Cobalt	MG/KG	16.3	100%	23		0	0	39	39	8.3	J	8	J	9.5		6.4	J	8.5	J	9.2	J	9.4		8.6	J	10.5		10.2	J	8.5	J	7.8	J
Copper	MG/KG	38.4	100%	3,100	50	0	0	39	39	26.4		18.8		21		11.3		18.3		23.5		23.2		21.2		20		20.3		18.5		19.3	
Iron	MG/KG	34500	100%			0	0	39	39	18800	J	18500	J	20200	J	15300	J	17200	J	20000	J	20300	J	19600	J	16100	J	22700		14600		17400	
Lead	MG/KG	431	100%	400	63	1	1	39	39	15.8		8.3		9		9.3		7		36.2		32.7		13.8		8.1		15.4	J	15.1	J	14.8	J
Magnesium	MG/KG	36100	100%			0	0	39	39	12200		8290		8840		3960		15300		7700		6830		9720		15500		6520		9930		13500	
Manganese	MG/KG	857	100%		1,600	0	0	39	39	379		354		398		158		382		289		363		403		423		545		314		359	
Mercury	MG/KG	0.14	46%	6.7	0.18	0	0	18	39	0.08	J	0.05	U	0.05	U	0.05	U	0.05	U	0.06	J	0.05	U	0.1	J	0.1	J	0.06	U	0.06	U	0.09	J
Nickel	MG/KG	45.5	92%		30	0	5	36	39	27.5		24		29		15.6		24.8		28.3		26.8		24		25.5		24.1		21.2		22.6	
Potassium	MG/KG	3670	100%			0	0	39	39	875	J	898	J	787	J	755	J	1110		1090	J	1090		1220		1290		978	J	920		977	J
Selenium	MG/KG	1.9	28%	390	3.9	0	0	11	39	0.97	U	1	U	0.76	U	0.93	U	0.8	U	1.1	U	0.68	U	0.96	U	0.89	U	1	UJ	0.78	UJ	1.1	UJ
Silver	MG/KG	1.8	13%	390	2	0	0	5	39	1.8	J	0.39	J	0.2	U	0.24	U	0.21	U	0.28	U	0.18	U	0.25	U	0.23	U	0.27	U	0.2	U	0.28	U
Sodium	MG/KG	881	85%			0	0	33	39	881	J	109	J	105	J	70.4	J	127	J	79.7	J	88.7	J	80.4	J	148	J	55.7	U	42.9	U	82.5	J
Thallium	MG/KG	1.7	41%	5.1		0	0	16	39	1.4	U	1.1	U	0.86	U	1	U	0.91	U	1.2	U	0.77	U	1.1	U	1	U	1.1	U	0.89	U	1.2	U
Vanadium	MG/KG	36.4	100%	550		0	0	39	39	17.3		12.1		15.8		14		12.7		18.4		19.2		19		12.8		19.7		17.5		14.6	
Zinc	MG/KG	656	100%	23,000	109	0	7	39	39	**208**	**J**	44.8	J	49.7	J	36.7	J	51.7	J	104	J	88.4	J	62.3	J	53.1	J	59		61.5		94.5	

Notes:

1.Only compounds detected are shown on table.

2. Compounds detected in samples were compared to the USEPA 2008 Regional Risk Based Screening Levels and 6 New York Code of Rules and Regulations (NYCRR) Part 375-6Unrestricted Use Soil Cleanup Objectives (SCO).

3.Chromium value is total forUSEPA RBSL and the trivalent form for NYDEC SCO.

4. Shading indicates a concentration above groundwater standard.

5. A blank in the action level column indicates no EPA RBSL and/or NYDEC SCO for unrestricted use.

U = compound was not detected

J = the reported value is and estimated concentration

R = the compound was rejected

TABLE 1-4
DISPOSAL PIT C SUBSURFACE SOIL ANALYTICAL DATA SUMMARY
SEAD-12 REMOVAL ACTION WORK PLAN
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY										SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID										TP12-7AA		TP12-7BA		TP12-7BB		TP12-8A		TP12-8B		TP12-8C		TP12A-3		TP12A-3		TP12A-4		TP12A-4		TP12A-5		TP12A-6	
MATRIX										SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE ID										123128		123127		123129		123130		123132		123131		TP12A-3-1		TP12A-3-2		TP12A-4-1		TP12A-4-2		TP12A-5-1		TP12A-6-1	
SAMPLE DEPTH TO TOP OF SAMPLE										1		1		2		1		3		2		2.5		6		4		4		3		1	
SAMPLE DEPTH TO BOTTOM OF SAMPLE										1		1		2		1		3		2		2.5		6		4		4		3		1	
SAMPLE DATE										15-Oct-98		15-Oct-98		15-Oct-98		15-Oct-98		15-Oct-98		15-Oct-98		22-Jun-94		22-Jun-94		21-Jun-94		21-Jun-94		23-Jun-94		23-Jun-94	
QC CODE										SA		SA		SA		SA		SA		SA		SA		SA		SA		SA		SA		SA	
STUDY ID			FREQUENCY	EPA	NYDEC	NO. ABOVE	NO. ABOVE	NUMBER	NUMBER	RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		ESI		ESI		ESI		ESI		ESI		ESI		ESI	
PARAMETER	UNIT	MAXIMUM	OF DETECTION	RSL [2] RESIDENTIAL	UNRESTRICTED USE SCO [2]	EPA RSL RESIDENTIAL	UNRESTRICTED USE SCO	OF DETECTS	OF ANALYSES	N		N		N		N		N		N		N		N		N		N		N		N	
VOLATILE ORGANICS																																	
Acetone	UG/KG	61	21%	61,000,000	50	0	1	8	39	11	UJ	13	UJ	12	UJ	12	UJ	11	UJ	12	UJ	13	U	11	U	12	U	12	U	11	U	11	U
Chlorobenzene	UG/KG	5	5%	310,000	1,100	0	0	2	39	11	U	11	U	12	U	12	U	11	U	12	U	13	U	11	U	5	J	1	J	11	U	11	U
Methylene chloride	UG/KG	180	13%	11,000	50	0	1	5	39	11	U	11	U	12	U	12	U	11	U	12	U	1	J	1	J	12	U	12	U	11	U	11	U
Tetrachloroethene	UG/KG	2	3%	570	1,300	0	0	1	39	11	U	11	U	12	U	12	U	11	U	12	U	13	U	11	U	12	U	12	U	11	U	11	U
Toluene	UG/KG	62	15%	5,000,000	700	0	0	6	39	11	U	11	U	12	U	12	U	11	U	12	U	13	U	11	U	2	J	12	U	11	U	11	U
Total Xylenes	UG/KG	14	3%	600,000	260	0	0	1	39	11	U	11	U	12	U	12	U	11	U	12	U	13	U	11	U	12	U	12	U	11	U	11	U
Trichloroethene	UG/KG	2	3%	2,800	470	0	0	1	39	11	U	11	U	12	U	12	U	11	U	12	U	13	U	11	U	2	J	12	U	11	U	11	U
SEMI VOLATILE ORGANICS																																	
2-Methylnaphthalene	UG/KG	22	8%	310,000		0	0	3	39	7.8	J	73	U	6.8	J	78	U	120	U	74	U	430	U	370	U	390	U	400	U	370	U	380	U
Acenaphthene	UG/KG	44	13%	3,400,000		0	0	5	39	7.6	J	5	J	76	U	78	U	120	U	13	J	430	U	370	U	390	U	400	U	370	U	44	J
Anthracene	UG/KG	63	21%	17,000,000	100,000	0	0	8	39	8.3	J	5.4	J	17	J	57	J	120	U	20	J	430	U	370	U	390	U	400	U	370	U	63	J
Benzo(a)anthracene	UG/KG	200	44%	150	1,000	2	0	17	39	38	J	19	J	7.7	J	**200**		26	J	68	J	430	U	370	U	390	U	400	U	370	U	99	J
Benzo(a)pyrene	UG/KG	180	44%	15	1,000	10	0	17	39	**43**	**J**	**20**	**J**	8.6	J	**100**		**24**	**J**	**67**	**J**	430	U	370	U	390	U	400	U	370	U	**92**	**J**
Benzo(b)fluoranthene	UG/KG	320	46%	150	1,000	2	0	18	39	49	J	18	J	13	J	**200**		33	J	82	J	430	U	370	U	390	U	400	U	370	U	95	J
Benzo(ghi)perylene	UG/KG	98	41%		100,000	0	0	16	39	28	J	14	J	76	UJ	35	J	120	UJ	43	J	430	U	370	U	390	U	400	U	370	U	29	J
Benzo(k)fluoranthene	UG/KG	170	38%	1,500	800	0	0	15	39	42	J	24	J	76	U	170		29	J	84	J	430	U	370	U	390	U	400	U	370	U	76	J
Bis(2-Ethylhexyl)phthalate	UG/KG	16	13%	35,000		0	0	5	39	76	UJ	73	UJ	76	U	78	U	120	U	74	U	430	U	370	U	390	U	400	U	370	U	380	U
Butylbenzylphthalate	UG/KG	30	13%	260,000		0	0	5	39	76	UJ	73	UJ	76	U	78	U	120	U	11	J	430	U	370	U	390	U	400	U	370	U	380	U
Carbazole	UG/KG	40	13%			0	0	5	39	12	J	6.7	J	76	UJ	78	UJ	120	UJ	18	J	430	U	370	U	390	U	400	U	370	U	40	J
Chrysene	UG/KG	310	49%	15,000	1,000	0	0	19	39	55	J	26	J	16	J	310		36	J	88		430	U	370	U	390	U	400	U	370	U	130	J
Di-n-butylphthalate	UG/KG	52	21%			0	0	8	39	76	UJ	73	UJ	76	U	78	U	120	U	74	U	430	U	370	U	390	U	400	U	28	J	47	J
Di-n-octylphthalate	UG/KG	20	26%			0	0	10	39	8	J	73	UJ	76	UJ	78	UJ	120	UJ	74	UJ	430	U	370	U	390	U	400	U	370	U	380	U
Dibenz(a,h)anthracene	UG/KG	99	21%	15	330	4	0	8	39	11	J	7	J	76	UJ	**26**	**J**	120	UJ	**19**	**J**	430	U	370	U	390	U	400	U	370	U	**43**	**J**
Fluoranthene	UG/KG	320	44%	2,300,000	100,000	0	0	17	39	85		48	J	22	J	220		51	J	140		430	U	370	U	390	U	400	U	370	U	300	J
Fluorene	UG/KG	35	5%	2,300,000	30,000	0	0	2	39	76	U	73	U	76	U	78	U	120	U	12	J	430	U	370	U	390	U	400	U	370	U	35	J
Indeno(1,2,3-cd)pyrene	UG/KG	140	31%	150	500	0	0	12	39	26	J	13	J	76	UJ	44	J	120	UJ	42	J	430	U	370	U	390	U	400	U	370	U	69	J
N-Nitrosodiphenylamine	UG/KG	9500	3%			0	0	1	39	76	U	73	U	76	U	78	U	120	U	74	U	430	U	370	U	390	U	400	U	370	U	380	U
Naphthalene	UG/KG	13	3%	3,900	12,000	0	0	1	39	76	U	73	U	76	U	78	U	120	U	74	U	430	U	370	U	390	U	400	U	370	U	380	U
Phenanthrene	UG/KG	280	44%	1,700,000	100,000	0	0	17	39	67	J	39	J	16	J	20	J	16	J	100		430	U	370	U	390	U	400	U	370	U	280	J
Pyrene	UG/KG	310	46%	1,700,000	100,000	0	0	18	39	85		40	J	15	J	310		53	J	140		430	U	370	U	390	U	400	U	370	U	230	J
PESTICIDES/PCBS																																	
4,4'-DDD	UG/KG	25	10%	2,000	3.3	0	2	4	39	2.2	J	3.7	U	3.8	U	3.9	U	6.1	U	3.7	U	4.3	U	3.7	U	3.9	U	4	U	3.7	U	**5.1**	
4,4'-DDE	UG/KG	6.4	18%	1,400	3.3	0	3	7	39	2.5	J	3.7	U	**3.3**	**J**	3.9	U	6.1	U	2.1	J	4.3	U	3.7	U	3.9	U	4	U	3.7	U	**6.4**	
4,4'-DDT	UG/KG	4.9	21%	1,700	3.3	0	5	8	39	2.6	J	3.7	U	2.9	J	3.9	U	6.1	U	**4.4**		4.3	U	3.7	U	3.9	U	4	U	3.7	U	**3.8**	
Alpha-BHC	UG/KG	5.8	3%		20	0	0	1	39	2	U	1.9	U	2	U	2	U	3.1	U	1.9	U	2.2	U	1.9	U	2	U	2	U	1.9	U	2	U
Alpha-Chlordane	UG/KG	2.6	3%		94	0	0	1	39	2	U	1.9	U	2	U	2	U	3.1	U	1.9	U	2.2	U	1.9	U	2	U	2	U	1.9	U	2	U
Aroclor-1254	UG/KG	28	3%	220	100	0	0	1	39	38	U	37	U	38	U	39	U	61	U	37	U	43	U	37	U	39	U	40	U	37	U	38	U
Aroclor-1260	UG/KG	25	3%	220	100	0	0	1	39	38	U	37	U	38	U	39	U	61	U	37	U	43	U	37	U	39	U	40	U	37	U	38	U
Beta-BHC	UG/KG	1.7	3%		36	0	0	1	39	2	U	1.9	U	2	U	2	U	3.1	U	1.9	U	2.2	U	1.9	U	2	U	2	U	1.9	U	2	U
Gamma-Chlordane	UG/KG	2.3	5%			0	0	2	39	2	U	1.9	U	2	U	2	U	3.1	U	1.9	U	2.2	U	1.9	U	2	U	2	U	1.9	U	2	U
Heptachlor	UG/KG	8.4	8%	110	42	0	0	3	39	2	U	1.9	U	2	U	2	U	3.1	U	1.9	U	2.2	U	1.9	U	2	U	2	U	1.9	U	2	U
Heptachlor epoxide	UG/KG	2	3%	53		0	0	1	39	2	U	1.9	U	2	U	2	U	3.1	U	1.9	U	2.2	U	1.9	U	2	U	2	U	1.9	U	2	U
METALS																																	
Aluminum	MG/KG	18600	100%	77,000		0	0	39	39	9980	J	8110	J	11000	J	10300	J	14000	J	4140	J	13200		9720		9600		13400		9750		14000	
Antimony	MG/KG	0.39	8%	31		0	0	3	39	1.1	UR	1.3	UR	1.2	UR	1.3	UR	2	UR	1.2	UR	0.25	UJ	0.27	UJ	0.25	UJ	0.18	UJ	0.26	UJ	0.25	J
Arsenic	MG/KG	11.1	100%	0.39	13	39	0	39	39	**5.8**	**J**	**3.6**	**J**	**4.3**		**3.2**		**5.8**		**2.6**		**5**		**3.7**		**4.2**		**4.9**		**3.8**		**5.2**	
Barium	MG/KG	135	100%	15,000	350	0	0	39	39	69.9		51.8		49.9	J	106	J	113	J	38.9	J	89		73.6		72		102		94.5		78.7	
Beryllium	MG/KG	0.83	100%	160	7.2	0	0	39	39	0.32	J	0.31	J	0.46	J	0.44	J	0.6	J	0.21	J	0.71	J	0.49	J	0.48	J	0.63	J	0.45	J	0.61	J
Cadmium	MG/KG	6	26%	70	2.5	0	2	10	39	0.06	U	0.06	U	0.06	U	0.06	U	0.1	U	0.06	U	**3.6**		0.68	J	0.57	J	0.82		0.4	J	0.7	J
Calcium	MG/KG	224000	100%			0	0	39	39	51400	J	39000	J	27400		6830		139000		224000		5600		85400		82800		39100		78800	J	22000	J
Chromium	MG/KG	29.4	100%	280 [3]	30 [3]	0	0	39	39	24.6		13.8		20.9		14		24.1		6.7		18.1		14.8		14.1		18.5		15.1		20.7	
Cobalt	MG/KG	16.3	100%	23		0	0	39	39	10.8		11.6		11.7		9	J	16.3	J	4.9	J	10.2		8.3	J	8.6	J	9.6		8.2	J	10.1	
Copper	MG/KG	38.4	100%	3,100	50	0	0	39	39	26		20.9		33.9		14.7		32.5		14		18.6		18		21.2		24.2		19.5		21.2	
Iron	MG/KG	34500	100%			0	0	39	39	25500	J	23100	J	11300	J	20800	J	33500	J	13000	J	24100		19400		18700		23300		18900		26100	
Lead	MG/KG	431	100%	400	63	1	1	39	39	39.8	J	17.2	J	34.6	J	12.8	J	21.8	J	18.1	J	25.7		10		8.9		16.8		15.5	J	22.7	J
Magnesium	MG/KG	36100	100%			0	0	39	39	18400	J	7820	J	9900	J	4390	J	14300	J	11900	J	4530		12700		15700		9930		19100		6840	
Manganese	MG/KG	857	100%		1,600	0	0	39	39	656		378		167		597		786		515		490		429		395		419		394		524	
Mercury	MG/KG	0.14	46%	6.7	0.18	0	0	18	39	0.06	J	0.05	U	0.05	U	0.06	J	0.09	U	0.06	U	0.06	J	0.02	J	0.03	J	0.03	J	0.04	J	0.08	J
Nickel	MG/KG	45.5	92%		30	0	5	36	39	28.1	J	**34.9**	**J**	**39**	**J**	18.7	J	**45.5**	**J**	12.3	J	27.2		25		24.8		**30.9**		24		28.4	
Potassium	MG/KG	3670	100%			0	0	39	39	961		985	J	1210		881	J	1340	J	731	J	1290	J	1700	J	1990	J	2880	J	2350	J	1430	J
Selenium	MG/KG	1.9	28%	390	3.9	0	0	11	39	0.85	U	0.95	U	0.93	J	0.98	J	1.5	J	0.9	J	1.9		0.65	J	0.95	J	1.6		0.54	U	1.2	
Silver	MG/KG	1.8	13%	390	2	0	0	5	39	0.22	U	0.25	U	0.24	U	0.26	U	0.39	U	0.24	U	0.1	U	0.1	U	0.1	U	0.07	U	0.1	U	0.08	U
Sodium	MG/KG	881	85%			0	0	33	39	48.4	J	267	J	140	J	53.6	U	205	J	114	J	30.3	J	129	J	124	J	107	J	115	J	51.5	J
Thallium	MG/KG	1.7	41%	5.1		0	0	16	39	1.7	J	1.1	J	1.1	J	1.1	U	1.7	U	1	U	0.56	J	0.7	J	0.41	J	0.56	J	0.38	U	0.48	J
Vanadium	MG/KG	36.4	100%	550		0	0	39	39	19.3		14.9		19.9		17.5		23.7		11.1		22.5		15.4		16.2		21.5		17.5		22.7	
Zinc	MG/KG	656	100%	23,000	109	0	7	39	39	**172**	**J**	**656**	**J**	**411**	**J**	49.2	J	108	J	90.2	J	**112**		53.8		79.3		**281**		51.1		78.8	

Notes:

1.Only compounds detected are shown on table.

2. Compounds detected in samples were compared to the USEPA 2008 Regional Risk Based Screening Levels and 6 New York Code of Rules and Regulations (NYCRR) Part 375-6Unrestricted Use Soil Cleanup Objectives (SCO).

3.Chromium value is total forUSEPA RBSL and the trivalent form for NYDEC SCO.

4. Shading indicates a concentration above groundwater standard.

5. A blank in the action level column indicates no EPA RBSL and/or NYDEC SCO for unrestricted use.

U = compound was not detected

J = the reported value is and estimated concentration

R = the compound was rejected

TABLE 1-4
DISPOSAL PIT C SUBSURFACE SOIL ANALYTICAL DATA SUMMARY
SEAD-12 REMOVAL ACTION WORK PLAN
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY										SEAD-12		SEAD-12		SEAD-12		
LOCATION ID										TP12A-6		TP12A-7		TP12A-8		
MATRIX										SOIL		SOIL		SOIL		
SAMPLE ID										TP12A-6-2		TP12A-7-1		TP12A-8-1		
SAMPLE DEPTH TO TOP OF SAMPLE										7		4		7		
SAMPLE DEPTH TO BOTTOM OF SAMPLE										7		4		7		
SAMPLE DATE										23-Jun-94		23-Jun-94		24-Jun-94		
QC CODE										SA		SA		SA		
STUDY ID			FREQUENCY	EPA	NYDEC	NO. ABOVE	NO. ABOVE	NUMBER	NUMBER	ESI		ESI		ESI		
			OF	RSL [2]	UNRESTRICTED	EPA RSL	UNRESTRICTED	OF	OF							
PARAMETER	UNIT	MAXIMUM	DETECTION	RESIDENTIAL	USE SCO [2]	RESIDENTIAL	USE SCO	DETECTS	ANALYSES	N		N		N		
VOLATILE ORGANICS																
Acetone	UG/KG	61	21%	61,000,000	50	0	1	8	39	11	U	15	UJ	11	U	
Chlorobenzene	UG/KG	5	5%	310,000	1,100	0	0	2	39	11	U	15	UJ	11	U	
Methylene chloride	UG/KG	180	13%	11,000	50	0	1	5	39	11	U	15	UJ	11	U	
Tetrachloroethene	UG/KG	2	3%	570	1,300	0	0	1	39	11	U	15	UJ	11	U	
Toluene	UG/KG	62	15%	5,000,000	700	0	0	6	39	11	U	15	UJ	11	U	
Total Xylenes	UG/KG	14	3%	600,000	260	0	0	1	39	11	U	15	UJ	11	U	
Trichloroethene	UG/KG	2	3%	2,800	470	0	0	1	39	11	U	15	UJ	11	U	
SEMI VOLATILE ORGANICS																
2-Methylnaphthalene	UG/KG	22	8%	310,000		0	0	3	39	370	U	540	U	370	U	
Acenaphthene	UG/KG	44	13%	3,400,000		0	0	5	39	370	U	540	U	370	U	
Anthracene	UG/KG	63	21%	17,000,000	100,000	0	0	8	39	370	U	43	J	370	U	
Benzo(a)anthracene	UG/KG	200	44%	150	1,000	2	0	17	39	370	U	**150**	**J**	370	U	
Benzo(a)pyrene	UG/KG	180	44%	15	1,000	10	0	17	39	370	U	**180**	**J**	370	U	
Benzo(b)fluoranthene	UG/KG	320	46%	150	1,000	2	0	18	39	370	U	**320**	**J**	370	U	
Benzo(ghi)perylene	UG/KG	98	41%		100,000	0	0	16	39	370	U	98	J	370	U	
Benzo(k)fluoranthene	UG/KG	170	38%	1,500	800	0	0	15	39	370	U	540	UJ	370	U	
Bis(2-Ethylhexyl)phthalate	UG/KG	16	13%	35,000		0	0	5	39	370	U	540	U	370	U	
Butylbenzylphthalate	UG/KG	30	13%	260,000		0	0	5	39	370	U	540	U	370	U	
Carbazole	UG/KG	40	13%			0	0	5	39	370	U	540	U	370	U	
Chrysene	UG/KG	310	49%	15,000	1,000	0	0	19	39	370	U	210	J	370	U	
Di-n-butylphthalate	UG/KG	52	21%			0	0	8	39	32	J	50	J	52	J	
Di-n-octylphthalate	UG/KG	20	26%			0	0	10	39	370	U	540	U	370	U	
Dibenz(a,h)anthracene	UG/KG	99	21%	15	330	4	0	8	39	370	U	**99**	**J**	370	U	
Fluoranthene	UG/KG	320	44%	2,300,000	100,000	0	0	17	39	370	U	320	J	370	U	
Fluorene	UG/KG	35	5%	2,300,000	30,000	0	0	2	39	370	U	540	U	370	U	
Indeno(1,2,3-cd)pyrene	UG/KG	140	31%	150	500	0	0	12	39	370	U	140	J	370	U	
N-Nitrosodiphenylamine	UG/KG	9500	3%			0	0	1	39	370	U	540	U	370	U	
Naphthalene	UG/KG	13	3%	3,900	12,000	0	0	1	39	370	U	540	U	370	U	
Phenanthrene	UG/KG	280	44%	1,700,000	100,000	0	0	17	39	370	U	120	J	370	U	
Pyrene	UG/KG	310	46%	1,700,000	100,000	0	0	18	39	370	U	230	J	370	U	
PESTICIDES/PCBS																
4,4'-DDD	UG/KG	25	10%	2,000	3.3	0	2	4	39	3.7	U	5.4	U	3.7	U	
4,4'-DDE	UG/KG	6.4	18%	1,400	3.3	0	3	7	39	3.7	U	2.3	J	3.7	U	
4,4'-DDT	UG/KG	4.9	21%	1,700	3.3	0	5	8	39	3.7	U	5.4	U	3.7	U	
Alpha-BHC	UG/KG	5.8	3%		20	0	0	1	39	1.9	U	2.8	U	1.9	U	
Alpha-Chlordane	UG/KG	2.6	3%		94	0	0	1	39	1.9	U	2.6	J	1.9	U	
Aroclor-1254	UG/KG	28	3%	220	100	0	0	1	39	37	U	54	U	37	U	
Aroclor-1260	UG/KG	25	3%	220	100	0	0	1	39	37	U	54	U	37	U	
Beta-BHC	UG/KG	1.7	3%		36	0	0	1	39	1.9	U	2.8	U	1.9	U	
Gamma-Chlordane	UG/KG	2.3	5%			0	0	2	39	1.9	U	2.3	J	1.9	U	
Heptachlor	UG/KG	8.4	8%	110	42	0	0	3	39	1.9	U	2.8	U	1.9	U	
Heptachlor epoxide	UG/KG	2	3%	53		0	0	1	39	1.9	U	2.8	U	1.9	U	
METALS																
Aluminum	MG/KG	18600	100%	77,000		0	0	39	39	8460		18600		6610		
Antimony	MG/KG	0.39	8%	31		0	0	3	39	0.28	J	0.39	J	0.26	UJ	
Arsenic	MG/KG	11.1	100%	0.39	13	39	0	39	39	**2.9**		**7.7**		**3.1**		
Barium	MG/KG	135	100%	15,000	350	0	0	39	39	76.2		135		67.4		
Beryllium	MG/KG	0.83	100%	160	7.2	0	0	39	39	0.4	J	0.83	J	0.31	J	
Cadmium	MG/KG	6	26%	70	2.5	0	2	10	39	0.35	J	1	J	0.5	J	
Calcium	MG/KG	224000	100%			0	0	39	39	62000	J	25400	J	86700	J	
Chromium	MG/KG	29.4	100%	280 [3]	30 [3]	0	0	39	39	14		25		10.6		
Cobalt	MG/KG	16.3	100%	23		0	0	39	39	6.8	J	15.7		7.1	J	
Copper	MG/KG	38.4	100%	3,100	50	0	0	39	39	16.4		38.4		17.7		
Iron	MG/KG	34500	100%			0	0	39	39	17100		34500		14400		
Lead	MG/KG	431	100%	400	63	1	1	39	39	**431**	**J**	49	J	12.3	J	
Magnesium	MG/KG	36100	100%			0	0	39	39	11600		10600		36100		
Manganese	MG/KG	857	100%		1,600	0	0	39	39	358		857		326		
Mercury	MG/KG	0.14	46%	6.7	0.18	0	0	18	39	0.03	J	0.11		0.02	J	
Nickel	MG/KG	45.5	92%		30	0	5	36	39	22		**39.4**		18.9		
Potassium	MG/KG	3670	100%			0	0	39	39	1700	J	3670	J	1480	J	
Selenium	MG/KG	1.9	28%	390	3.9	0	0	11	39	0.48	U	1.2	J	0.54	U	
Silver	MG/KG	1.8	13%	390	2	0	0	5	39	0.09	U	0.13	U	0.1	U	
Sodium	MG/KG	881	85%			0	0	33	39	95	J	26.5	U	112	J	
Thallium	MG/KG	1.7	41%	5.1		0	0	16	39	0.34	U	0.98	J	0.38	U	
Vanadium	MG/KG	36.4	100%	550		0	0	39	39	14.1		36.4		11		
Zinc	MG/KG	656	100%	23,000	109	0	7	39	39	53.8		**155**		42.6		

Notes:

1.Only compounds detected are shown on table.

2. Compounds detected in samples were compared to the USEPA 2008 Regional Risk Based Screening Levels and 6 New York Code of Rules and Regulations (NYCRR) Part 375-6Unrestricted Use Soil Cleanup Objectives (SCO).

3.Chromium value is total forUSEPA RBSL and the trivalent form for NYDEC SCO.

4. Shading indicates a concentration above groundwater standard.

5. A blank in the action level column indicates no EPA RBSL and/or NYDEC SCO for unrestricted use.

U = compound was not detected

J = the reported value is and estimated concentration

R = the compound was rejected

TABLE 1-5
DISPOSAL PITS A/B AND C GROUNDWATER ANALYTICAL DATA SUMMARY
SEAD-12 REMOVAL ACTION WORK PLAN
SENECA ARMY DEPOT ACTIVITY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								DW12-815		DW12-815		MW12-10		MW12-10		MW12-11		MW12-11		MW12-12		MW12-12		MW12-13		MW12-13		MW12-14		MW12-14		MW12-15		MW12-15		MW12-16		MW12-16	
MATRIX								GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER	
SAMPLE ID								122018		122255		122040		122261		122038		122259		122041		122262		122047		122260		122049		122273		122023		122271		122015		122267	
DEPTH TO TOP OF SAMPLE								20		20		13.5		15		13		13		13.5		12		13.5		13		14.5		13		14		14		14	
DEPTH TO BOTTOM OF SAMPLE								20		20		13.5		15		13		13		13.5		12		13.5		13		14.5		13		14		14		14	
SAMPLE DATE								19-Apr-99		14-Dec-99		6-May-99		15-Dec-99		25-Apr-99		15-Dec-99		4-May-99		16-Dec-99		6-May-99		15-Dec-99		6-May-99		18-Dec-99		21-Apr-99		18-Dec-99		19-Apr-99		17-Dec-99	
QC CODE								SA		SA		SA		SA		SA		SA		SA		SA		SA		SA		SA		SA		SA		SA		SA	
STUDY ID								RI PHASE 1 STEP 1		RI P1S1 - Pu RS		RI PHASE 1 STEP 1		RI P1S1 - Pu RS		RI PHASE 1 STEP 1		RI P1S1 - Pu RS		RI PHASE 1 STEP 1		RI P1S1 - Pu RS		RI PHASE 1 STEP 1		RI P1S1 - Pu RS		RI PHASE 1 STEP 1		RI P1S1 - Pu RS		RI PHASE 1 STEP 1		RI P1S1 - Pu RS		RI PHASE 1 STEP 1		RI P1S1 - Pu RS	
			FREQUENCY	NYSDEC	NUMBER	NUMBER	NUMBER																															
SAMPLE ROUND			OF	CLASS GA	ABOVE	OF	OF	1		2		1		2		1		2		1		2		1		2		1		2		1		2		1		2	
PARAMETER	UNIT	MAXIMUM	DETECTION	STD.	STD.	DETECTS	ANALYSES	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	
1,1,1-Trichloroethane	UG/L	1.7	1.12%	5	0	1	89	1	U	0.5	U	1	U	0.5	U	1	U	0.5	U	1	U	0.5	U	1	U	0.5	U	1	U	0.5	U	1	U	0.5	U	1	U	0.5	
1,2-Dichloroethene (total)	UG/L	30	14.29%	5	1	1	7																																
Acetone	UG/L	9	6.74%		0	6	89	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	
Toluene	UG/L	3.1	5.62%	5	0	5	89	1	U	3.1		1	U	0.5	U	1	U	0.5	U	1	U	0.5	U	1	U	0.26	J	1	U	0.5	U	1	U	0.5	U	1	U	0.5	
Trichloroethene	UG/L	1600	3.37%	5	2	3	89	1	U	0.5	U	1	U	0.5	U	1	U	0.5	U	1	U	0.5	U	1	U	0.5	U	1	U	0.5	U	1	U	0.5	U	1	U	0.5	
1,4-Dichlorobenzene	UG/L	0.093	8.99%	3	0	8	89	1	U	1.1	U	1	U	1.3	U	1.1	UJ	0.063	J	1	U	1.2	U	1.1	U	1.2	U	1	U	0.065	J	1	U	1	U	1	U	1.1	
Benzo(a)pyrene	UG/L	0.097	2.25%	0	0	2	89	1	U	1.1	U	1	U	1.3	U	1.1	U	1.1	U	1	U	1.2	U	1.1	U	1.2	U	1	U	1.1	U	1	U	1	U	1	U	1.1	
Benzo(b)fluoranthene	UG/L	0.076	1.12%		0	1	89	1	U	1.1	U	1	U	1.3	U	1.1	U	1.1	U	1	U	1.2	U	1.1	U	1.2	U	1	U	1.1	U	1	U	1	U	1	U	1.1	
Benzo(ghi)perylene	UG/L	0.18	4.49%		0	4	89	0.052	J	1.1	U	1	U	1.3	U	1.1	U	1.1	U	1	U	1.2	U	1.1	U	1.2	U	1	U	1.1	U	1	U	1	U	1	U	1.1	
Benzo(k)fluoranthene	UG/L	0.091	1.12%		0	1	89	1	U	1.1	U	1	U	1.3	U	1.1	U	1.1	U	1	U	1.2	U	1.1	U	1.2	U	1	UJ	1.1	U	1	U	1	U	1	U	1.1	
Bis(2-Ethylhexyl)phthalate	UG/L	230	3.37%	5	2	3	89	1	U	1.1	U	1.7	U	1.3	U	1.1	U	1.1	U	1	U	1.2	U	1.1	U	1.2	U	1	U	1.1	U	1	U	1	U	1	U	1.1	
Butylbenzylphthalate	UG/L	0.064	1.12%		0	1	89	1	U	1.1	U	1	U	1.3	U	1.1	U	1.1	U	1	U	1.2	U	1.1	U	1.2	U	1	U	1.1	U	1	U	1	U	1	U	1.1	
Di-n-butylphthalate	UG/L	0.21	8.99%		0	8	89	1	U	1.1	U	1	U	1.3	U	1.1	U	1.1	U	1	U	1.2	U	1.1	U	1.2	U	1	U	1.1	U	1	U	1	U	1	U	1.1	
Di-n-octylphthalate	UG/L	0.41	6.74%		0	6	89	1	U	1.1	U	1	U	1.3	U	1.1	U	1.1	U	1	U	1.2	U	1.1	U	1.2	U	1	U	1.1	U	1	U	1	U	1	U	1.1	
Diethyl phthalate	UG/L	4.3	13.48%		0	12	89	1	U	1.1	U	1	U	1.3	U	1.1	U	1.1	U	0.053	J	1.2	U	0.12	J	1.2	U	1	U	1.1	U	1	U	1	U	1	U	1.1	
Indeno(1,2,3-cd)pyrene	UG/L	0.1	1.12%		0	1	89	1	U	1.1	U	1	U	1.3	U	1.1	U	1.1	U	1	U	1.2	U	1.1	U	1.2	U	1	U	1.1	U	1	U	1	U	1	U	1.1	
Phenol	UG/L	0.43	5.62%	1	0	5	89	1	U	1.1	U	1	U	1.3	U	1.1	U	1.1	U	1	U	1.2	U	1.1	U	1.2	U	1	U	1.1	U	1	U	1	U	1	U	1.1	
Pyrene	UG/L	0.08	2.25%		0	2	89	1	U	1.1	U	1	U	1.3	UJ	1.1	U	1.1	U	1	U	1.2	U	1.1	U	1.2	U	1	U	1.1	U	1	U	1	U	1	U	1.1	
4,4'-DDT	UG/L	0.018	1.12%	0.2	0	1	89	0.01	U	0.011	U	0.01	U	0.012	U	0.011	U	0.01	U	0.011	U	0.012	U	0.013	U	0.012	U	0.01	U	0.012	U	0.01	U	0.01	U	0.011	U	0.01	
Beta-BHC	UG/L	0.0034	1.12%	0.04	0	1	89	0.0052	U	0.0054	U	0.0053	U	0.0061	U	0.0056	UJ	0.0052	U	0.0053	U	0.0062	U	0.0034	J	0.0061	U	0.0051	U	0.0058	U	0.005	UJ	0.0053	U	0.0056	U	0.0053	
Gamma-Chlordane	UG/L	0.0056	1.12%		0	1	89	0.0052	U	0.0054	U	0.0053	U	0.0061	U	0.0056	U	0.0052	U	0.0053	U	0.0062	U	0.0064	U	0.0061	U	0.0051	U	0.0058	U	0.005	U	0.0053	U	0.0056	U	0.0053	
Heptachlor	UG/L	0.0029	1.12%	0.04	0	1	89	0.0052	U	0.0054	U	0.0053	U	0.0061	U	0.0056	U	0.0052	U	0.0053	U	0.0062	U	0.0064	U	0.0061	U	0.0051	U	0.0058	U	0.005	U	0.0053	U	0.0056	U	0.0053	
Aluminum	UG/L	9880	97.80%		0	89	91	114	J	62.6	J	42.8	J	80.4	J	65.9	J	90.9	J	600		53.6	J	46.4	J	200		1400		570		1210	J	314		400		40.9	
Antimony	UG/L	43.2	7.69%	3	3	7	91	2.2	U	2.2	U	5.2	U	2.7	J	2.2	U	2.2	U	5.2	U	2.2	U	5.2	U	2.2	U	5.2	U	2.2	U	2.2	U	2.2	U	2.2	U	2.2	
Arsenic	UG/L	5.1	14.29%	25	0	13	91	1.8	U	2.5	U	4.7	J	2.5	U	1.8	U	2.5	U	4.5	J	2.5	U	2.9	U	2.5	U	2.9	U	2.5	U	1.8	U	2.5	U	1.8	U	2.5	
Barium	UG/L	189	100.00%	1000	0	91	91	35.1	J	52.5	J	80.8	J	129	J	37.5	J	69.7	J	76.4	J	76.5	J	76.6	J	72.2	J	141	J	164	J	140	J	157	J	100	J	122	
Beryllium	UG/L	1.6	19.78%		0	18	91	0.1	U	0.18	J	0.34	J	0.1	U	0.1	U	0.19	J	0.36	J	0.1	U	0.3	U	0.19	J	0.31	J	0.32	J	0.1	U	0.1	U	0.1	U	0.1	
Cadmium	UG/L	3.3	28.57%	5	0	26	91	0.3	U	0.21	J	0.81	J	0.2	U	0.3	U	0.28	J	0.93	J	0.2	U	1.3	J	0.2	U	1.2	J	0.45	J	0.3	U	0.2	U	0.3	U	0.2	
Calcium	UG/L	260000	100.00%		0	91	91	64800		91300		91500		100000		49400	J	96500		109000		113000		80300		81900		111000		98500		104000	J	112000		134000		150000	
Chromium	UG/L	18.5	43.96%	50	0	40	91	2.1	J	1	U	1.2	U	1	U	1.2	U	1	U	2.3	J	1	U	1.2	U	1.1	J	2.8	J	3	J	2.5	J	1	U	1	J	1	
Cobalt	UG/L	15.2	19.78%		0	18	91	1.5	U	1.7	J	3.3	U	1.3	U	1.5	U	1.4	J	3.3	U	1.3	U	3.3	U	1.5	J	3.3	U	3.3	J	1.5	U	1.3	U	1.5	U	1.3	
Copper	UG/L	25.1	52.75%	200	0	48	91	2.4	J	7.2	J	4.1	J	1.9	U	1	U	1.9	U	4.7	J	1.9	U	3.9	J	1.9	U	6.1	J	4	J	1.6	J	1.9	U	1.6	J	1.9	
Iron	UG/L	20700	91.21%	300	44	83	91	178	J	**355**	J	79.4	J	107		30	J	150	J	**836**		64.8	J	47.2	J	256	J	**1710**		**426**		**1610**	J	**538**		**612**	J	20.3	
Lead	UG/L	18.8	13.19%	25	0	12	91	0.9	U	1.3	UJ	0.9	U	1.3	UJ	0.9	U	1.3	UJ	0.9	U	1.3	UJ	0.9	U	1.3	UJ	0.9	U	1.3	UJ	0.9	U	1.3	UJ	0.9	U	1.3	
Magnesium	UG/L	72800	100.00%		0	91	91	11400		15600		12900		15700		6680	J	12800		24700		24500		16700		17200		28300		24800		29900	J	28200		29700		34300	
Manganese	UG/L	3280	98.90%	300	12	90	91	1.4	J	5.1	J	44		101		23.9	J	107		116		98.8		14.5	J	27.9		75.7		53.1		53.7	J	45		9.3	J	5.7	
Mercury	UG/L	0.17	9.89%	0.7	0	9	91	0.1	UJ	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.14	J	0.1	U	0.1	U	0.1	U	0.1	UJ	0.1	
Nickel	UG/L	38.8	52.75%	100	0	48	91	1.4	U	1.7	U	10.2	U	29.5	J	1.4	U	1.7	U	10.2	U	2.9	J	10.2	U	1.7	U	10.2	U	3.8	J	3	J	1.7	U	2.6	J	2	
Potassium	UG/L	14200	100.00%		0	91	91	7260		6640		3860	J	4200	J	968	J	2250	J	1240	J	646	J	3280	J	2670	J	2570	J	1970	J	1820	J	1990	J	1380	J	1090	
Selenium	UG/L	6.5	21.98%	10	0	20	91	3.5	J	2.2	U	2.5	J	2.2	U	1.8	UJ	2.2	U	1.8	J	2.2	U	1.8	J	2.2	U	1.8	J	2.5	U	1.8	U	2.2	U	1.8	U	2.2	
Silver	UG/L	5.2	38.46%	50	0	35	91	0.9	U	2.8	J	4.5	J	1.3	UJ	0.9	U	2.4	J	3.1	J	1.3	UJ	4.6	J	2.3	J	3.9	J	4.7	J	0.9	U	1.3	UJ	0.9	U	1.3	
Sodium	UG/L	408000	100.00%	20000	24	91	91	**20200**		19500		6190		6450		2700	J	5330		2960	J	2770	J	5950		5320		7420		6690		5170	J	7310		11700		17300	
Thallium	UG/L	7	41.76%		0	38	91	4.5	J	3.2	U	4.4	J	3.9	J	1.9	U	3.2	U	2.7	J	3.2	U	2.7	J	3.2	U	2.6	U	5.3	J	1.9	U	3.9	J	3.4	J	3.4	
Vanadium	UG/L	18.3	28.57%		0	26	91	1.6	U	2.9	J	3.8	U	1.8	U	1.6	U	2.3	J	4	J	1.8	U	3.8	U	3.2	J	4.4	J	3.5	J	2.5	J	1.8	U	1.6	U	1.8	
Zinc	UG/L	2640	93.41%		0	85	91	22.7		33.8		2.6	J	5.7	J	3.1	U	79.6		3.2	J	23.4		5.5	J	10	J	33.2		5.1	J	7.1	J	6.2	J	4	J	7.8	

Notes:

1.Only compounds detected are shown on table.

2. The criteria values are NYSDEC Class GA Groundwater Standards (TOGS 1.1.1, June 1998) and EPA Maximum Contamination Limit (MCL), Source http://www.epa.gov/safewater/mcl.html#inorganic.htm

3. A blank in the action level column indicates no Class GA and/or MCL standand or standard is a secondary value.

4. Shading indicates a concentration above groundwater standard.

U = compound was not detected

J = the reported value is and estimated concentration

R = the compound was rejected

TABLE 1-5
DISPOSAL PITS A/B AND C GROUNDWATER ANALYTICAL DATA SUMMARY
SEAD-12 REMOVAL ACTION WORK PLAN
SENECA ARMY DEPOT ACTIVITY

FACILITY									SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID									MW12-17		MW12-17		MW12-18		MW12-18		MW12-18		MW12-19		MW12-19		MW12-20		MW12-20		MW12-20		MW12-21		MW12-21		MW12-22		MW12-22		MW12-23	
MATRIX								ER	GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER	
SAMPLE ID									122016		122242		122019		122017		122237		122005		122235		122006		122233		122232		122004		122236		122007		122228		122008	
DEPTH TO TOP OF SAMPLE									18		15		12.5		12.5		12.5		11		11		14		12		12		11		11		12		12		12.3	
DEPTH TO BOTTOM OF SAMPLE									18		15		12.5		12.5		12.5		11		11		14		12		12		11		11		12		12		12.3	
SAMPLE DATE									19-Apr-99		7-Dec-99		20-Apr-99		20-Apr-99		6-Dec-99		12-Apr-99		5-Dec-99		12-Apr-99		5-Dec-99		5-Dec-99		12-Apr-99		5-Dec-99		12-Apr-99		3-Dec-99		12-Apr-99	
QC CODE									SA		SA		DU		SA		SA		SA		SA		SA		DU		SA		SA		SA		SA		SA	
STUDY ID								S	RI PHASE 1 STEP 1		RI P1S1 - Pu RS		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI P1S1 - Pu RS		RI PHASE 1 STEP 1		RI P1S1 - Pu RS		RI PHASE 1 STEP 1		RI P1S1 - Pu RS		RI P1S1 - Pu RS		RI PHASE 1 STEP 1		RI P1S1 - Pu RS		RI PHASE 1 STEP 1		RI P1S1 - Pu RS		RI PHASE 1 STEP 1	
			FREQUENCY	NYSDEC	NUMBER	NUMBER	NUMBER																															
SAMPLE ROUND			OF	CLASS GA	ABOVE	OF	OF		1		2		1		1		2		1		2		1		2		2		1		2		1		2		1	
PARAMETER	UNIT	MAXIMUM	DETECTION	STD.	STD.	DETECTS	ANALYSES	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
1,1,1-Trichloroethane	UG/L	1.7	1.12%	5	0	1	89	U	1	U	0.5	U	1	U	1	U	0.5	U	1	U	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U	1	U	0.5	U	1	U
1,2-Dichloroethene (total)	UG/L	30	14.29%	5	1	1	7																															
Acetone	UG/L	9	6.74%		0	6	89	U	5	U	5	UJ	5	U	5	U	5	U	2	J	5	U	2	J	5	U	5	U	5	U	5	U	5	U	5	U	5	U
Toluene	UG/L	3.1	5.62%	5	0	5	89	U	1	U	0.5	U	1	U	1	U	0.5	U	1	U	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U	1	U	0.5	UJ	1	U
Trichloroethene	UG/L	1600	3.37%	5	2	3	89	U	1	U	0.5	U	1	U	1	U	0.5	U	1	U	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U	1	U	0.5	UJ	1	U
1,4-Dichlorobenzene	UG/L	0.093	8.99%	3	0	8	89	U	1	U	0.075	J	1.1	U	1	U	1.1	U	1	U	1	U	1	U	1.1	U	1	U	1	U	1.2	U	1	U	1	U	1.1	U
Benzo(a)pyrene	UG/L	0.097	2.25%	0	0	2	89	U	1	U	1	U	1.1	U	1	U	1.1	U	1	U	1	U	1	U	1.1	U	1	U	1	U	1.2	U	1	U	1	U	1.1	U
Benzo(b)fluoranthene	UG/L	0.076	1.12%		0	1	89	U	1	U	1	U	1.1	U	1	U	1.1	U	1	U	1	U	1	U	1.1	U	1	U	1	U	1.2	U	1	U	1	U	1.1	U
Benzo(ghi)perylene	UG/L	0.18	4.49%		0	4	89	U	1	U	1	U	1.1	U	1	U	1.1	U	1	U	1	U	1	U	1.1	U	1	U	1	U	1.2	U	1	U	1	U	1.1	U
Benzo(k)fluoranthene	UG/L	0.091	1.12%		0	1	89	U	1	U	1	U	1.1	U	1	U	1.1	U	1	U	1	U	1	U	1.1	U	1	U	1	U	1.2	U	1	U	1	U	1.1	U
Bis(2-Ethylhexyl)phthalate	UG/L	230	3.37%	5	2	3	89	U	1	U	2.9	U	1.1	U	1	U	1.1	U	1	U	**230**		1	U	1.1	U	1	U	1	U	1.5	U	1	U	**210**		1.1	U
Butylbenzylphthalate	UG/L	0.064	1.12%		0	1	89	U	1	U	1	U	1.1	U	1	U	1.1	U	1	U	1	U	1	U	1.1	U	1	U	1	U	1.2	U	1	U	1	U	1.1	U
Di-n-butylphthalate	UG/L	0.21	8.99%		0	8	89	U	1	U	1	U	1.1	U	0.083	J	1.1	U	1	U	1	U	1	U	1.1	U	1	U	0.09	J	1.2	U	1	U	0.1	U	1.1	U
Di-n-octylphthalate	UG/L	0.41	6.74%		0	6	89	U	1	U	1	U	1.1	U	1	U	1.1	U	0.06	J	1	U	1	U	1.1	U	1	U	1	U	1.2	U	1	U	0.06	J	1.1	U
Diethyl phthalate	UG/L	4.3	13.48%		0	12	89	U	1	U	1	U	1.1	U	1	U	1.1	U	1	U	1	U	1	U	0.067	J	0.096	J	1	U	1.2	U	1	U	0.065	J	1.1	U
Indeno(1,2,3-cd)pyrene	UG/L	0.1	1.12%		0	1	89	U	1	U	1	U	1.1	U	1	U	1.1	U	1	U	1	U	1	U	1.1	U	1	U	1	U	1.2	U	1	U	1	U	1.1	U
Phenol	UG/L	0.43	5.62%	1	0	5	89	U	1	U	1	U	1.1	U	1	U	1.1	U	1	U	1	U	0.15	J	1.1	U	1	U	1	U	1.2	U	1	U	1	U	1.1	U
Pyrene	UG/L	0.08	2.25%		0	2	89	U	1	U	1	U	1.1	U	1	U	1.1	U	1	U	1	U	1	U	1.1	U	1	U	1	U	1.2	U	1	U	1	U	1.1	U
4,4'-DDT	UG/L	0.018	1.12%	0.2	0	1	89	U	0.011	U	0.01	U	0.018	J	0.01	UJ	0.011	U	0.01	U	0.01	U	0.01	U	0.011	U	0.01	U	0.01	U	0.01	U	0.012	U	0.01	U	0.01	U
Beta-BHC	UG/L	0.0034	1.12%	0.04	0	1	89	U	0.0057	U	0.0053	U	0.0051	UJ	0.0051	U	0.0055	U	0.005	U	0.005	U	0.005	U	0.0054	U	0.005	U	0.005	U	0.0053	U	0.0062	U	0.005	U	0.0051	U
Gamma-Chlordane	UG/L	0.0056	1.12%		0	1	89	U	0.0057	U	0.0053	U	0.0051	U	0.0051	U	0.0055	U	0.005	U	0.005	U	0.005	U	0.0054	U	0.005	U	0.005	U	0.0053	U	0.0062	U	0.005	U	0.0051	U
Heptachlor	UG/L	0.0029	1.12%	0.04	0	1	89	U	0.0057	U	0.0053	U	0.0051	U	0.0051	U	0.0055	U	0.005	U	0.005	U	0.005	U	0.0029	J	0.005	U	0.005	U	0.0053	U	0.0062	U	0.005	U	0.0051	U
Aluminum	UG/L	9880	97.80%		0	89	91	J	1060		125	J	707	J	492	J	198	J	1590		168	J	657		1050		1430		35.3	J	63.3	J	99.6	J	222		289	
Antimony	UG/L	43.2	7.69%	3	3	7	91	U	2.2	U	2.7	U	2.2	U	2.2	U	2.7	U	2.2	U	2.7	U	2.2	U	2.7	U	2.7	U	2.2	U	2.7	J	2.2	U	2.7	U	2.2	U
Arsenic	UG/L	5.1	14.29%	25	0	13	91	U	1.8	U	1.9	U	1.8	U	1.8	U	1.9	U	1.8	U	1.9	U	1.8	U	1.9	U	1.9	U	1.8	U	1.9	U	1.8	U	1.9	U	2.1	J
Barium	UG/L	189	100.00%	1000	0	91	91	J	57.5	J	60.8	J	82	J	90.9	J	73.1	J	81.4	J	72.1	J	74.9	J	74.7	J	79	J	87.4	J	101	J	72.9	J	52	J	47.1	J
Beryllium	UG/L	1.6	19.78%		0	18	91	U	0.1	U	0.2	U	0.1	U	0.1	U	0.2	U	0.1	U	0.2	U	0.1	U	0.2	U	0.2	U	0.1	U	0.2	U	0.1	U	0.2	U	0.1	U
Cadmium	UG/L	3.3	28.57%	5	0	26	91	U	1.1	J	0.3	U	0.3	UJ	1.4	J	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U	0.58	J	0.3	U	0.3	U
Calcium	UG/L	260000	100.00%		0	91	91		105000		103000		176000	J	192000		179000		102000		94800		114000		103000		107000		93400		102000		158000		172000		148000	
Chromium	UG/L	18.5	43.96%	50	0	40	91	U	1.5	J	0.9	U	1.5	J	1.6	J	0.9	U	1.7	J	0.9	U	0.7	U	0.9	U	1.4	J	0.7	U	0.9	U	0.7	U	0.9	U	0.7	U
Cobalt	UG/L	15.2	19.78%		0	18	91	U	1.5	U	2	U	1.5	UJ	1.8	J	2	U	1.5	U	2	U	1.5	U	2	U	2	U	1.5	U	2	U	1.5	U	2	U	1.5	U
Copper	UG/L	25.1	52.75%	200	0	48	91	U	2	J	1.7	U	1	UJ	2.5	J	1.7	U	2.2	J	1.7	U	1	U	2.1	J	1.7	U	1	U	5.5	J	1.1	J	1.7	U	1	U
Iron	UG/L	20700	91.21%	300	44	83	91	U	**1350**	J	151		**1530**	J	**1370**	J	**762**		**1830**		129		**825**		**848**		**1360**		17.4	J	86.2	J	**540**		**310**		**474**	
Lead	UG/L	18.8	13.19%	25	0	12	91	UJ	0.9	U	1	U	0.9	U	0.9	U	1	U	0.9	U	1	U	0.9	U	1	UJ	1	U	0.9	U	1	U	1.1	J	1	J	0.9	U
Magnesium	UG/L	72800	100.00%		0	91	91		27900		27100		72800	J	72500		67400		12100		10600		22500		21400		23200		19400		20900		23700		32700		28000	
Manganese	UG/L	3280	98.90%	300	12	90	91	J	66.6		52.9		73.6	J	74		73.3		158		119		128		94.4		97.3		54.2		61.9		**501**		125		114	
Mercury	UG/L	0.17	9.89%	0.7	0	9	91	U	0.1	UJ	0.1	U	0.1	U	0.1	UJ	0.1	U	0.1	UJ	0.1	U	0.1	UJ	0.1	U	0.1	U	0.1	UJ	0.1	U	0.1	UJ	0.1	U	0.1	UJ
Nickel	UG/L	38.8	52.75%	100	0	48	91	J	4.2	J	1.7	U	2.7	J	4	J	1.7	U	4.1	J	1.7	U	2	J	1.7	U	1.9	J	1.4	U	1.7	U	2.3	J	1.7	U	2.6	J
Potassium	UG/L	14200	100.00%		0	91	91	J	3080	J	1830	J	3730	J	3330	J	4040	J	1780	J	989	J	2440	J	2440	J	2490	J	3380	J	3310	J	3720	J	3190	J	3020	J
Selenium	UG/L	6.5	21.98%	10	0	20	91	U	1.8	U	2.4	U	1.8	U	1.8	U	2.6	J	1.8	U	2.4	U	1.8	U	2.4	U	2.4	U	1.9	J	2.4	U	1.8	U	2.4	U	3	J
Silver	UG/L	5.2	38.46%	50	0	35	91	UJ	0.9	U	1.9	U	0.9	UJ	1.5	J	1.9	U	0.9	U	1.9	U	0.9	U	1.9	U	1.9	U	0.9	U	1.9	U	0.99	J	1.9	U	0.9	U
Sodium	UG/L	408000	100.00%	20000	24	91	91		4480	J	4630	J	**31700**	J	**32700**		**32900**		**43000**		**43000**		**100000**		**88900**		**85600**		7940		7880		15200		**21000**		17300	
Thallium	UG/L	7	41.76%		0	38	91	J	1.9	U	4.2	J	1.9	UJ	4.2	J	2.7	U	2.3	J	2.7	U	1.9	U	2.8	J	2.7	U	5	J	2.7	U	5.6	J	2.7	U	2.5	J
Vanadium	UG/L	18.3	28.57%		0	26	91	U	1.7	J	1.5	U	1.6	UJ	1.7	J	1.5	U	2.6	J	1.5	U	1.6	U	2.8	J	2.8	J	1.6	U	1.5	U	1.6	U	1.5	U	1.6	U
Zinc	UG/L	2640	93.41%		0	85	91	J	5.6	J	2.8	J	3.1	UJ	6	J	2.7	J	8.8	J	4.4	J	11.6	J	5.3	J	9.5	J	1.8	J	5.3	J	2.8	J	3	J	16.2	J

Notes:

1.Only compounds detected are shown on table.

2. The criteria values are NYSDEC Class GA Groundwater Standards (TOGS 1.1.1, June 1998) and EPA Maximum Contamination Limit (MCL), Source http://www.epa.gov/safewater/mcl.html#inorganic.htm

3. A blank in the action level column indicates no Class GA and/or MCL standand or standard is a secondary value.

4. Shading indicates a concentration above groundwater standard.

U = compound was not detected

J = the reported value is and estimated concentration

R = the compound was rejected

TABLE 1-5
DISPOSAL PITS A/B AND C GROUNDWATER ANALYTICAL DATA SUMMARY
SEAD-12 REMOVAL ACTION WORK PLAN
SENECA ARMY DEPOT ACTIVITY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								MW12-23		MW12-24		MW12-24		MW12-25		MW12-25		MW12-25		MW12-26		MW12-26		MW12-26		MW12-27		MW12-27		MW12-29		MW12-29		MW12-30		MW12-30		MW12-31	
MATRIX								GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER	
SAMPLE ID								122229		122002		122264		122043		122039		122263		122003		122265		122266		122012		122230		122014		122251		122013		122252		122032	
DEPTH TO TOP OF SAMPLE								12.3		9.5		10.5		11		11		11		11		11		11		10.25		10.25		14		14		13.7		14		10.5	
DEPTH TO BOTTOM OF SAMPLE								12.3		9.5		10.5		11		11		11		11		11		11		10.25		10.25		14		14		13.7		14		10.5	
SAMPLE DATE								3-Dec-99		11-Apr-99		17-Dec-99		4-May-99		4-May-99		16-Dec-99		11-Apr-99		17-Dec-99		17-Dec-99		14-Apr-99		3-Dec-99		14-Apr-99		13-Dec-99		14-Apr-99		13-Dec-99		24-Apr-99	
QC CODE								SA		SA		SA		DU		SA		SA		SA		DU		SA		SA		SA		SA		SA		SA		SA	
STUDY ID								RI P1S1 - Pu RS		RI PHASE 1 STEP 1		RI P1S1 - Pu RS		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI P1S1 - Pu RS		RI PHASE 1 STEP 1		RI P1S1 - Pu RS		RI P1S1 - Pu RS		RI PHASE 1 STEP 1		RI P1S1 - Pu RS		RI PHASE 1 STEP 1		RI P1S1 - Pu RS		RI PHASE 1 STEP 1		RI P1S1 - Pu RS		RI PHASE 1 ST	
			FREQUENCY	NYSDEC	NUMBER	NUMBER	NUMBER																															
SAMPLE ROUND			OF	CLASS GA	ABOVE	OF	OF	2		1		2		1		1		2		1		2		2		1		2		1		2		1		2		1	
PARAMETER	UNIT	MAXIMUM	DETECTION	STD.	STD.	DETECTS	ANALYSES	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	
1,1,1-Trichloroethane	UG/L	1.7	1.12%	5	0	1	89	0.5	U	1	U	0.5	U	1	U	1	U	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U	1	U	0.5	U	1	U	0.5	U	1	
1,2-Dichloroethene (total)	UG/L	30	14.29%	5	1	1	7																																
Acetone	UG/L	9	6.74%		0	6	89	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	3.4	J	2	J	5	U	5	U	5	U	5	U	5	U	5	
Toluene	UG/L	3.1	5.62%	5	0	5	89	0.5	UJ	1	U	0.5	U	1	U	1	U	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U	1	U	0.4	J	1	U	0.28	J	1	
Trichloroethene	UG/L	1600	3.37%	5	2	3	89	0.5	UJ	1	U	0.5	U	1	U	1	U	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U	1	U	0.5	U	1	U	0.5	U	1	
1,4-Dichlorobenzene	UG/L	0.093	8.99%	3	0	8	89	1	U	1	U	1.1	U	1	U	1.1	U	1.1	U	1	U	1	U	1.1	U	1.2	U	1	U	1.1	U	1.1	U	1.2	U	1.1	U	1	
Benzo(a)pyrene	UG/L	0.097	2.25%	0	0	2	89	1	U	1	U	1.1	U	1	U	1.1	U	1.1	U	1	U	1	U	1.1	U	1.2	U	1	U	1.1	U	1.1	U	1.2	U	1.1	U	1	
Benzo(b)fluoranthene	UG/L	0.076	1.12%		0	1	89	1	U	1	U	1.1	U	1	U	1.1	U	1.1	U	1	U	1	U	1.1	U	1.2	U	1	U	1.1	U	1.1	U	1.2	U	1.1	U	1	
Benzo(ghi)perylene	UG/L	0.18	4.49%		0	4	89	1	U	1	U	1.1	U	1	U	1.1	U	1.1	U	1	U	1	U	1.1	U	1.2	U	1	U	1.1	U	1.1	U	1.2	U	1.1	U	1	
Benzo(k)fluoranthene	UG/L	0.091	1.12%		0	1	89	1	U	1	U	1.1	U	1	U	1.1	U	1.1	U	1	U	1	U	1.1	U	1.2	U	1	U	1.1	U	1.1	U	1.2	U	1.1	U	1	
Bis(2-Ethylhexyl)phthalate	UG/L	230	3.37%	5	2	3	89	1	U	1	U	1.1	UJ	1	U	2.8	U	1.9	U	1	U	1	U	1.1	U	1.2	U	1	U	1.1	U	1.1	U	3.8	U	1.1	U	1	
Butylbenzylphthalate	UG/L	0.064	1.12%		0	1	89	1	U	1	U	1.1	U	1	U	1.1	U	1.1	U	0.064	J	1	U	1.1	U	1.2	U	1	U	1.1	U	1.1	U	1.2	U	1.1	U	1	
Di-n-butylphthalate	UG/L	0.21	8.99%		0	8	89	1	U	1	U	1.1	U	1	U	1.1	U	1.1	U	1	U	1	U	1.1	U	1.2	U	1	U	0.15	J	1.1	U	0.079	J	1.1	U	1	
Di-n-octylphthalate	UG/L	0.41	6.74%		0	6	89	1	U	1	U	1.1	U	1	U	1.1	U	1.1	U	1	U	1	U	1.1	U	1.2	U	1	U	1.1	U	0.016	J	1.2	U	0.38	J	1	
Diethyl phthalate	UG/L	4.3	13.48%		0	12	89	1	U	1	U	1.1	U	1	U	1.1	U	1.1	U	1	U	1	U	1.1	U	1.2	U	1	U	4.3		1.1	U	0.48	J	1.1	U	1	
Indeno(1,2,3-cd)pyrene	UG/L	0.1	1.12%		0	1	89	1	U	1	U	1.1	U	1	U	1.1	U	1.1	U	1	U	1	U	1.1	U	1.2	U	1	U	1.1	U	1.1	U	1.2	U	1.1	U	1	
Phenol	UG/L	0.43	5.62%	1	0	5	89	1	U	1	U	1.1	U	1	U	1.1	U	1.1	U	1	U	1	U	1.1	U	1.2	U	1	U	1.1	U	1.1	U	1.2	U	1.1	U	1	
Pyrene	UG/L	0.08	2.25%		0	2	89	1	U	1	U	1.1	U	1	U	1.1	U	1.1	U	1	U	1	U	1.1	U	0.08	J	1	U	1.1	U	1.1	UJ	1.2	U	1.1	UJ	1	
4,4'-DDT	UG/L	0.018	1.12%	0.2	0	1	89	0.01	U	0.01	U	0.011	U	0.01	U	0.011	U	0.011	U	0.01	U	0.01	U	0.011	U	0.012	U	0.01	U	0.01	U	0.011	U	0.01	U	0.011	U	0.01	
Beta-BHC	UG/L	0.0034	1.12%	0.04	0	1	89	0.005	U	0.0051	U	0.0053	U	0.0052	U	0.0053	U	0.0053	U	0.0051	U	0.0051	U	0.0053	U	0.0061	U	0.005	U	0.0051	U	0.0055	U	0.0052	U	0.0056	U	0.005	
Gamma-Chlordane	UG/L	0.0056	1.12%		0	1	89	0.005	U	0.0051	U	0.0053	U	0.0052	U	0.0053	U	0.0056		0.0051	U	0.0051	U	0.0053	U	0.0061	U	0.005	U	0.0051	U	0.0055	U	0.0052	U	0.0056	U	0.005	
Heptachlor	UG/L	0.0029	1.12%	0.04	0	1	89	0.005	U	0.0051	U	0.0053	U	0.0052	U	0.0053	U	0.0053	U	0.0051	U	0.0051	U	0.0053	U	0.0061	U	0.005	U	0.0051	U	0.0055	U	0.0052	U	0.0056	U	0.005	
Aluminum	UG/L	9880	97.80%		0	89	91	971		69.3	J	49.6	J	15.8	U	15.8	U	46.5	J	791		37.9	J	44.5	J	540		182	J	30.8	J	101	J	200	J	662		57.3	
Antimony	UG/L	43.2	7.69%	3	3	7	91	2.7	U	2.2	U	2.2	U	5.2	U	5.2	U	2.2	U	2.2	U	2.2	U	**3.2**	J	2.2	U	2.7	U	2.2	U	**3.6**	J	2.2	U	2.2	U	2.4	
Arsenic	UG/L	5.1	14.29%	25	0	13	91	1.9	U	1.8	U	2.5	U	3.1	J	2.9	U	2.5	U	1.8	U	2.9	J	2.5	U	1.8	U	1.9	U	1.8	U	2.5	U	1.8	U	2.5	U	1.8	
Barium	UG/L	189	100.00%	1000	0	91	91	86.4	J	76.4	J	64.6	J	166	J	165	J	160	J	117	J	137	J	134	J	39.7	J	27.7	J	78.2	J	84.1	J	53	J	56.9	J	39	
Beryllium	UG/L	1.6	19.78%		0	18	91	0.2	U	0.1	U	0.1	U	0.35	J	0.3	U	0.1	U	0.1	U	0.86	J	1.6	J	0.1	U	0.2	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	
Cadmium	UG/L	3.3	28.57%	5	0	26	91	0.3	U	0.3	U	0.2	U	0.7	J	0.91	J	0.2	U	0.3	U	0.2	U	0.39	J	0.43	J	0.3	U	0.3	U	0.2	U	0.3	U	0.2	U	0.3	
Calcium	UG/L	260000	100.00%		0	91	91	162000		102000		95900		151000		156000		143000		145000		148000		149000		97000		80300		102000		102000		92500		84900		112000	
Chromium	UG/L	18.5	43.96%	50	0	40	91	1	J	0.73	J	1	U	1.6	J	1.3	J	1	U	1.8	J	1	U	2.9	J	1.4	J	0.9	U	0.7	U	1	U	0.91	J	1	U	1.2	
Cobalt	UG/L	15.2	19.78%		0	18	91	2	U	1.5	U	1.3	U	3.3	U	3.3	U	1.3	U	2.4	J	1.3	U	2.7	J	1.7	J	2	U	1.5	U	1.3	U	1.5	U	1.3	U	1.5	
Copper	UG/L	25.1	52.75%	200	0	48	91	1.7	U	1.4	J	1.9	U	4.4	J	4.4	J	1.9	U	1	U	1.9	U	1.9	U	2.3	J	18	J	1	U	13.7	J	1.9	J	1.9	U	1.5	
Iron	UG/L	20700	91.21%	300	44	83	91	**1210**		66	J	20.3	U	17.1	U	17.1	U	20.3	U	**1430**		**1840**		**1710**		**692**	J	214		46.7	J	134		252	J	**630**		43.7	
Lead	UG/L	18.8	13.19%	25	0	12	91	1	U	1	J	1.3	UJ	0.9	U	0.9	U	1.3	UJ	0.9	U	1.3	UJ	1.3	UJ	0.9	U	1	U	0.9	U	1.3	UJ	0.9	U	1.3	UJ	0.9	
Magnesium	UG/L	72800	100.00%		0	91	91	25000		22000		20900		40300		41700		37500		29800		29300		29700		15400		12300		21600		21800		21500		20600		23300	
Manganese	UG/L	3280	98.90%	300	12	90	91	**415**		44.5		10.6	J	**586**		**642**		**450**		**3280**		**3200**		**3120**		130		109		177		194		184		167		45.7	
Mercury	UG/L	0.17	9.89%	0.7	0	9	91	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	UJ	0.1	U	0.1	U	0.1	UJ	0.1	U	0.1	UJ	0.17	J	0.1	UJ	0.15	J	0.1	
Nickel	UG/L	38.8	52.75%	100	0	48	91	2	J	1.8	J	1.7	U	10.2	U	10.2	U	1.7	U	2.1	J	2	J	2.6	J	3.6	J	1.7	U	2.6	J	1.7	U	3.9	J	2.1	J	2.7	
Potassium	UG/L	14200	100.00%		0	91	91	4290	J	1060	J	767	J	1390	J	1260	J	1410	J	1640	J	1510	J	1850	J	3940	J	2710	J	4410	J	3640	J	6710		5030		2800	
Selenium	UG/L	6.5	21.98%	10	0	20	91	2.4	U	1.8	U	2.2	U	2.1	J	6.5	J	2.2	U	1.8	U	2.2	U	2.5	U	1.8	U	2.4	U	1.8	U	2.2	U	1.8	U	2.2	U	1.8	
Silver	UG/L	5.2	38.46%	50	0	35	91	1.9	U	1.1	J	1.3	UJ	4.3	J	4.6	J	1.3	UJ	0.9	U	1.3	UJ	3	J	1.5	J	1.9	U	0.9	U	1.3	UJ	0.9	U	1.3	UJ	0.9	
Sodium	UG/L	408000	100.00%	20000	24	91	91	**61700**		8780		13700		4600	J	4480	J	4680	J	4590	J	6760		6360		11000		**34800**		9100		9290		12300		13700		10100	
Thallium	UG/L	7	41.76%		0	38	91	2.7	U	3	J	3.5	J	6.1	J	6	J	3.2	U	4.2	J	4.8	J	7	J	4.5	J	2.7	U	5.2	J	3.2	U	5.6	J	3.2	U	1.9	
Vanadium	UG/L	18.3	28.57%		0	26	91	1.5	J	1.6	U	1.8	U	3.8	U	3.8	U	1.8	U	1.6	U	1.8	U	1.8	U	1.6	U	1.5	U	1.6	U	1.8	U	1.6	U	1.8	U	1.6	
Zinc	UG/L	2640	93.41%		0	85	91	5.2	J	3.2	J	7.1	J	2.3	J	17.7	J	4.3	J	7	J	7.5	J	4.1	J	5.7	J	15.7	J	10	J	18.9	J	20.5		9.9	J	8.4	

Notes:

1.Only compounds detected are shown on table.

2. The criteria values are NYSDEC Class GA Groundwater Standards (TOGS 1.1.1, June 1998) and EPA Maximum Contamination Limit (MCL), Source http://www.epa.gov/safewater/mcl.html#inorganic.htm

3. A blank in the action level column indicates no Class GA and/or MCL standand or standard is a secondary value.

4. Shading indicates a concentration above groundwater standard.

U = compound was not detected

J = the reported value is and estimated concentration

R = the compound was rejected

TABLE 1-5
DISPOSAL PITS A/B AND C GROUNDWATER ANALYTICAL DATA SUMMARY
SEAD-12 REMOVAL ACTION WORK PLAN
SENECA ARMY DEPOT ACTIVITY

FACILITY									SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID									MW12-31		MW12-32		MW12-32		MW12-33		MW12-33		MW12-34		MW12-34		MW12-35		MW12-35		MW12-37		MW12-37		MW12-38	
MATRIX								ER	GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER	
SAMPLE ID									122234		122020		122231		122022		122243		122045		122246		122028		122241		122025		122257		122026	
DEPTH TO TOP OF SAMPLE									0		11		11.5		15.5		14		15		0		35		35		11		11		8.5	
DEPTH TO BOTTOM OF SAMPLE									0		11		11.5		15.5		14		15		0		35		35		11		11		8.5	
SAMPLE DATE									3-Dec-99		20-Apr-99		3-Dec-99		21-Apr-99		7-Dec-99		5-May-99		7-Dec-99		23-Apr-99		5-Dec-99		22-Apr-99		14-Dec-99		22-Apr-99	
QC CODE									SA		SA		SA		SA		SA		SA		SA		SA		SA		SA		SA		SA	
STUDY ID								EP 1	RI P1S1 - Pu RS		RI PHASE 1 STEP 1		RI P1S1 - Pu RS		RI PHASE 1 STEP 1		RI P1S1 - Pu RS		RI PHASE 1 STEP 1		RI P1S1 - Pu RS		RI PHASE 1 STEP 1		RI P1S1 - Pu RS		RI PHASE 1 STEP 1		RI P1S1 - Pu RS		RI PHASE 1 STEP 1	
			FREQUENCY	NYSDEC	NUMBER	NUMBER	NUMBER																									
SAMPLE ROUND			OF	CLASS GA	ABOVE	OF	OF		2		1		2		1		2		1		2		1		2		1		2		1	
PARAMETER	UNIT	MAXIMUM	DETECTION	STD.	STD.	DETECTS	ANALYSES	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
1,1,1-Trichloroethane	UG/L	1.7	1.12%	5	0	1	89	U	0.5	U	1	U	0.5	U	1	U	0.5	U	1	U	0.5	U	1	U	0.5	U	83	U	120	U	1	U	0.5	U
1,2-Dichloroethene (total)	UG/L	30	14.29%	5	1	1	7																						30	J				
Acetone	UG/L	9	6.74%		0	6	89	U	5	U	2	J	5	U	5	U	5	UJ	5	U	5	UJ	5	U	5	U	420	U	120	U	5	U	5	U
Toluene	UG/L	3.1	5.62%	5	0	5	89	U	0.5	U	1	U	0.5	UJ	1	U	0.5	U	1	U	0.5	U	1	U	0.5	U	83	U	120	U	1	U	0.5	U
Trichloroethene	UG/L	1600	3.37%	5	2	3	89	U	0.5	U	1	U	0.5	UJ	1	U	0.5	U	1	U	0.5	U	1	U	0.5	U	1600		1600		1	U	0.5	U
1,4-Dichlorobenzene	UG/L	0.093	8.99%	3	0	8	89	UJ	1.1	UJ	1.2	U	1.1	UJ	1.1	U	0.056	J	1	U	2.2	U	1.1	U	0.055	J	1.2	U	1	U	1.1	U	1.1	U
Benzo(a)pyrene	UG/L	0.097	2.25%	0	0	2	89	U	1.1	UJ	1.2	U	1.1	UJ	1.1	U	1	U	1	U	2.2	U	1.1	U	1	U	1.2	U	1	U	1.1	U	0.058	J
Benzo(b)fluoranthene	UG/L	0.076	1.12%		0	1	89	U	1.1	UJ	1.2	U	1.1	UJ	1.1	U	1	U	1	U	2.2	U	1.1	U	1	U	1.2	U	1	U	1.1	U	1.1	U
Benzo(ghi)perylene	UG/L	0.18	4.49%		0	4	89	U	1.1	UJ	1.2	U	1.1	UJ	1.1	U	1	U	1	U	2.2	U	1.1	U	1	U	1.2	U	1	U	1.1	U	0.072	J
Benzo(k)fluoranthene	UG/L	0.091	1.12%		0	1	89	U	1.1	UJ	1.2	U	1.1	UJ	1.1	U	1	U	1	U	2.2	U	1.1	U	1	U	1.2	U	1	U	1.1	U	1.1	U
Bis(2-Ethylhexyl)phthalate	UG/L	230	3.37%	5	2	3	89	U	1.1	UJ	1.2	U	1.1	UJ	1.1	U	1	U	1	U	13	U	1.1	U	1	U	4.2	U		U	1.1	U	1.8	U
Butylbenzylphthalate	UG/L	0.064	1.12%		0	1	89	U	1.1	UJ	1.2	U	1.1	UJ	1.1	U	1	U	1	U	2.2	U	1.1	U	1	U	1.2	U	1	U	1.1	U	1.1	U
Di-n-butylphthalate	UG/L	0.21	8.99%		0	8	89	U	1.1	UJ	0.15	J	1.1	UJ	1.1	U	1	U	1	U	2.2	U	1.1	U	1	U	1.2	U	1	U	1.1	U	1.1	U
Di-n-octylphthalate	UG/L	0.41	6.74%		0	6	89	U	1.1	UJ	1.2	U	1.1	UJ	1.1	U	1	U	1	U	2.2	U	1.1	U	1	U	1.2	U	1	U	1.1	U	0.074	J
Diethyl phthalate	UG/L	4.3	13.48%		0	12	89	U	1.1	UJ	1.2	U	1.1	UJ	1.1	U	1	U	0.067	J	2.2	U	1.1	U	1	U	1.2	U	1	U	1.1	U	1.1	U
Indeno(1,2,3-cd)pyrene	UG/L	0.1	1.12%		0	1	89	U	1.1	UJ	1.2	U	1.1	UJ	1.1	U	1	U	1	U	2.2	U	1.1	U	1	U	1.2	U	1	U	1.1	U	1.1	U
Phenol	UG/L	0.43	5.62%	1	0	5	89	U	1.1	UJ	1.2	U	1.1	UJ	1.1	U	1	U	1	U	2.2	U	1.1	U	1	U	0.13	J	1	U	1.1	U	0.12	J
Pyrene	UG/L	0.08	2.25%		0	2	89	U	1.1	UJ	1.2	U	1.1	UJ	1.1	U	1	U	1	U	2.2	U	1.1	U	1	UJ	1.2	U	1	U	1.1	U	1.1	UJ
4,4'-DDT	UG/L	0.018	1.12%	0.2	0	1	89	U	0.01	U	0.01	U	0.011	U	0.01	U	0.01	U	0.016	U	0.01	U	0.01	U	0.01	U	0.01	U	0.012	U	0.01	U	0.01	U
Beta-BHC	UG/L	0.0034	1.12%	0.04	0	1	89	UJ	0.0053	U	0.0051	U	0.0055	U	0.005	UJ	0.005	U	0.0081	U	0.005	U	0.0051	UJ	0.0051	U	0.005	UJ	0.006	U	0.0052	UJ	0.0055	U
Gamma-Chlordane	UG/L	0.0056	1.12%		0	1	89	U	0.0053	U	0.0051	U	0.0055	U	0.005	U	0.005	U	0.0081	U	0.005	U	0.0051	U	0.0051	U	0.005	U	0.006	U	0.0052	U	0.0055	U
Heptachlor	UG/L	0.0029	1.12%	0.04	0	1	89	U	0.0053	U	0.0051	U	0.0055	U	0.005	U	0.005	U	0.0081	U	0.005	U	0.0051	U	0.0051	U	0.005	U	0.006	U	0.0052	U	0.0055	U
Aluminum	UG/L	9880	97.80%		0	89	91	J	491		67	J	6670		513	J	71.5	J	65.4	J	246		174	J	48.6	J	482	J	78.9	J	29.2	J	259	
Antimony	UG/L	43.2	7.69%	3	3	7	91	J	2.7	U	2.2	U	2.7	U	2.2	U	2.7	U	5.2	U	2.7	U	2.2	U	2.7	U	2.2	U	2.2	U	2.2	U	2.2	U
Arsenic	UG/L	5.1	14.29%	25	0	13	91	U	1.9	J	1.8	U	3.6	J	1.8	U	1.9	U	3.9	J	1.9	U	1.8	U	1.9	U	1.8	U	2.5	U	1.8	U	2.5	U
Barium	UG/L	189	100.00%	1000	0	91	91	J	51.8	J	54	J	97.6	J	144	J	137	J	83.7	J	49.5	J	84.6	J	77.1	J	95.4	J	90.7	J	108	J	128	J
Beryllium	UG/L	1.6	19.78%		0	18	91	U	0.2	U	0.1	U	0.2	U	0.1	U	0.2	U	0.3	U	0.2	U	0.1	U	0.2	U	0.1	U	0.17	J	0.1	U	0.1	U
Cadmium	UG/L	3.3	28.57%	5	0	26	91	U	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U	1.1	J	0.3	U	0.3	U	0.3	U	0.3	U	0.2	U	0.3	U	0.2	U
Calcium	UG/L	260000	100.00%		0	91	91	J	125000		112000		132000		110000	J	113000		138000		153000		71200	J	70000		120000	J	103000		171000	J	169000	
Chromium	UG/L	18.5	43.96%	50	0	40	91	U	0.9	U	0.7	U	8.3	J	2.2	J	0.9	U	1.3	J	0.9	U	1.5	J	0.9	U	1.5	J	1	U	1.2	U	1	U
Cobalt	UG/L	15.2	19.78%		0	18	91	U	2	U	1.5	U	3.1	J	1.5	U	2	U	3.3	U	2	U	1.5	U	2	U	1.5	U	1.3	U	1.5	U	1.3	U
Copper	UG/L	25.1	52.75%	200	0	48	91	J	1.7	U	1.2	J	2.4	J	1.2	J	1.7	U	4.4	J	1.7	U	1.7	J	1.7	U	1.8	J	1.9	U	1	U	1.9	U
Iron	UG/L	20700	91.21%	300	44	83	91	J	490		80.5	J	6930		1120	J	69.1	J	68.9	J	317		211	J	126		677	J	69.5	J	18.9	J	289	
Lead	UG/L	18.8	13.19%	25	0	12	91	U	1	UJ	1.3	J	1	UJ	0.9	U	1	U	0.9	U	1	U	0.9	U	1	U	0.9	U	1.3	UJ	0.9	U	1.3	UJ
Magnesium	UG/L	72800	100.00%		0	91	91	J	24500		22500		24400		29100	J	30300		43000		45700		51200	J	49500		22600	J	17300		35100	J	33400	
Manganese	UG/L	3280	98.90%	300	12	90	91	J	22.9		34.2		112		57.8	J	36.3		161		218		22.1	J	24.2		131	J	53.9		306	J	246	
Mercury	UG/L	0.17	9.89%	0.7	0	9	91	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Nickel	UG/L	38.8	52.75%	100	0	48	91	J	1.7	U	1.6	J	8.3	J	1.6	J	1.7	U	10.2	U	4.6	J	1.4	U	1.7	U	8.6	J	1.7	U	9.9	J	8	J
Potassium	UG/L	14200	100.00%		0	91	91	J	2100	J	3460	J	3520	J	2130	J	1120	J	7260		5280		4810	J	4280	J	4790	J	2620	J	6250	J	3420	J
Selenium	UG/L	6.5	21.98%	10	0	20	91	UJ	2.4	U	2	J	2.4	U	1.8	U	2.4	U	1.8	J	2.4	U	1.8	U	2.4	U	1.8	U	2.2	U	1.8	U	2.2	U
Silver	UG/L	5.2	38.46%	50	0	35	91	U	1.9	U	1.2	J	2.3	J	0.9	U	1.9	U	4.8	J	1.9	U	0.9	U	1.9	J	1.5	J	2.4	J	0.9	U	1.3	UJ
Sodium	UG/L	408000	100.00%	20000	24	91	91	J	12100		20700		9020		6300	J	5750		18400		10900		36400	J	39000		35600	J	48600		178000	J	234000	
Thallium	UG/L	7	41.76%		0	38	91	U	2.7	U	5.7	J	2.7	U	1.9	U	2.7	U	4.8	J	2.7	U	1.9	U	2.7	U	1.9	U	3.2	U	1.9	U	4.3	J
Vanadium	UG/L	18.3	28.57%		0	26	91	U	1.5	U	1.6	U	12.6	J	1.6	U	1.5	U	3.8	U	1.5	U	1.6	U	1.5	U	2.2	J	1.8	U	1.6	U	1.8	U
Zinc	UG/L	2640	93.41%		0	85	91	J	5.3	J	5.3	J	17.6	J	4.6	J	3.2	J	8.9	J	9.9	J	3.1	U	4.1	J	3.3	J	7.6	J	3.1	U	11.6	J

									SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID									MW12-38		MW12-39		MW12-39																	
MATRIX									GROUND WATER		GROUND WATER		GROUND WATER																	
SAMPLE ID									122253		122027		122250																	
DEPTH TO TOP OF SAMPLE									9		8.2		8.5																	
DEPTH TO BOTTOM OF SAMPLE									9		8.2		8.5																	
SAMPLE DATE									13-Dec-99		22-Apr-99		13-Dec-99																	
QC CODE									SA		SA		SA																	
STUDY ID									RI P1S1 - Pu RS		RI PHASE 1 STEP 1		RI P1S1 - Pu RS																	
SAMPLE ROUND									2		1		2																	
PARAMETER	UNIT	MAXIMUM	DETECTION	STD.	STD.	DETECTS	ANALYSES	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)																
1,1,1-Trichloroethane	UG/L	1.7	1.12%	5	0	1	89	U	0.5	U	1	U	0.5	U																
1,2-Dichloroethene (total)	UG/L	30	14.29%	5	1	1	7																							
Acetone	UG/L	9	6.74%		0	6	89	U	5	U	6	U	5	U																
Toluene	UG/L	3.1	5.62%	5	0	5	89	U	0.5	U	1	U	0.5	U																
Trichloroethene	UG/L	1600	3.37%	5	2	3	89	U	0.5	U	1	U	0.5	U																
1,4-Dichlorobenzene	UG/L	0.093	8.99%	3	0	8	89	UJ	1.1	UJ	1.1	U	1.1	U																
Benzo(a)pyrene	UG/L	0.097	2.25%	0	0	2	89	U	1.1	UJ	1.1	U	1.1	U																
Benzo(b)fluoranthene	UG/L	0.076	1.12%		0	1	89	U	1.1	UJ	1.1	U	1.1	U																
Benzo(ghi)perylene	UG/L	0.18	4.49%		0	4	89	U	1.1	UJ	1.1	U	1.1	U																
Benzo(k)fluoranthene	UG/L	0.091	1.12%		0	1	89	U	1.1	UJ	1.1	U	1.1	U																
Bis(2-Ethylhexyl)phthalate	UG/L	230	3.37%	5	2	3	89	U	1.1	UJ	1.1	U	1.1	U																
Butylbenzylphthalate	UG/L	0.064	1.12%		0	1	89	U	1.1	UJ	1.1	U	1.1	U																
Di-n-butylphthalate	UG/L	0.21	8.99%		0	8	89	U	1.1	UJ	1.1	U	1.1	U																
Di-n-octylphthalate	UG/L	0.41	6.74%		0	6	89	U	1.1	UJ	1.1	U	1.1	U																
Diethyl phthalate	UG/L	4.3	13.48%		0	12	89	U	1.1	UJ	1.1	U	1.1	U																
Indeno(1,2,3-cd)pyrene	UG/L	0.1	1.12%		0	1	89	U	1.1	UJ	1.1	U	1.1	U																
Phenol	UG/L	0.43	5.62%	1	0	5	89	U	1.1	UJ	1.1	U	0.43	J																
Pyrene	UG/L	0.08	2.25%		0	2	89	U	1.1	UJ	1.1	U	1.2	UJ																
4,4'-DDT	UG/L	0.018	1.12%	0.2	0	1	89	U	0.01	U	0.01	U	0.012	U																
Beta-BHC	UG/L	0.0034	1.12%	0.04	0	1	89	UJ	0.0053	U	0.0059	U	0.0059	U																
Gamma-Chlordane	UG/L	0.0056	1.12%		0	1	89	U	0.0053	U	0.0059	U	0.0059	U																
Heptachlor	UG/L	0.0029	1.12%	0.04	0	1	89	U	0.0053	U	0.0059	U	0.0059	U																
Aluminum	UG/L	9880	97.80%		0	89	91	J	491		356	J	1550																	
Antimony	UG/L	43.2	7.69%	3	3	7	91	J	2.7	U	2.2	U	43.2	J																
Arsenic	UG/L	5.1	14.29%	25	0	13	91	U	1.9	J	2.5	U	2.5	U																
Barium	UG/L	189	100.00%	1000	0	91	91	J	51.8	J	48.8	J	80.4	J																
Beryllium	UG/L	1.6	19.78%		0	18	91	U	0.2	U	0.1	U	0.1	U																
Cadmium	UG/L	3.3	28.57%	5	0	26	91	U	0.3	U	0.3	U	1.1	J																
Calcium	UG/L	260000	100.00%		0	91	91	J	125000		171000	J	169000		26000	J	34200													
Chromium	UG/L	18.5	43.96%	50	0	40	91	U	0.9	U	2.3	J	3.2	J																
Cobalt	UG/L	15.2	19.78%		0	18	91	U	2	U	1.5	U	1.3	U																
Copper	UG/L	25.1	52.75%	200	0	48	91	J	1.7	U	1.7	J	3.1	J																
Iron	UG/L	20700	91.21%	300	44	83	91	J	490		2220																			
Lead	UG/L	18.8	13.19%	25	0	12	91	U	1	UJ	16.6	J																		
Magnesium	UG/L	72800	100.00%		0	91	91	J	24500		6790																			
Manganese	UG/L	3280	98.90%	300	12	90	91	J	22.9		164																			
Mercury	UG/L	0.17	9.89%	0.7	0	9	91	U	0.1	U	0.1	U	0.1	U																
Nickel	UG/L	38.8	52.75%	100	0	48	91	J	1.7	U	4.1	J																		
Potassium	UG/L	14200	100.00%		0	91	91	J	2100	J	4720	J																		
Selenium	UG/L	6.5	21.98%	10	0	20	91	UJ	2.4	U	2.2	U																		
Silver	UG/L	5.2	38.46%	50	0	35	91	U	1.9	U	1.3	UJ																		
Sodium	UG/L	408000	100.00%	20000	24	91	91	J	12100		408000																			
Thallium	UG/L	7	41.76%		0	38	91	U	2.7	U	5.3	J																		
Vanadium	UG/L	18.3	28.57%		0	26	91	U	1.5	U	2.4	J																		
Zinc	UG/L	2640	93.41%		0	85	91	J	5.3	J	2640																			

Notes:

1.Only compounds detected are shown on table.

2. The criteria values are NYSDEC Class GA Groundwater Standards (TOGS 1.1.1, June 1998) and EPA Maximum Contamination Limit (MCL), Source http://www.epa.gov/safewater/mcl.html#inorganic.htm

3. A blank in the action level column indicates no Class GA and/or MCL standand or standard is a secondary value.

4. Shading indicates a concentration above groundwater standard.

U = compound was not detected

J = the reported value is and estimated concentration

R = the compound was rejected

TABLE 1-5
DISPOSAL PITS A/B AND C GROUNDWATER ANALYTICAL DATA SUMMARY
SEAD-12 REMOVAL ACTION WORK PLAN
SENECA ARMY DEPOT ACTIVITY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12
LOCATION ID								MW12-40		MW12-40		MW12-6		MW12A-1		MW12A-1		MW12A-1		MW12A-2		MW12A-2		MW12A-2		MW12A-3		MW12A-3		MW12A-3		MW12B-1		MW12B-1		MW12B-1		MW12B-2
MATRIX								GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER
SAMPLE ID								122024		122254		122042		MW12A-1		122009		122256		MW12A-2		122010		122268		MW12A-3		122011		122249		MW12B-1		122021		122240		MW12B-2
DEPTH TO TOP OF SAMPLE								11.5		12.3		9.5		4		13		9		4.3		11		9		3.4		13		12		5.3		17		17		3.9
DEPTH TO BOTTOM OF SAMPLE								11.5		12.3		9.5		13		13		9		11.1		11		9		14		13		12		17		17		17		12.9
SAMPLE DATE								22-Apr-99		13-Dec-99		4-May-99		20-Jul-94		13-Apr-99		14-Dec-99		20-Jul-94		13-Apr-99		17-Dec-99		20-Jul-94		13-Apr-99		8-Dec-99		19-Jul-94		21-Apr-99		6-Dec-99		19-Jul-94
QC CODE								SA		SA		SA		SA		SA		SA		SA		SA		SA		SA		SA		SA		SA		SA		SA		SA
STUDY ID								RI PHASE 1 STEP 1		RI P1S1 - Pu RS		RI PHASE 1 STEP 1		ESI		RI PHASE 1 STEP 1		RI P1S1 - Pu RS		ESI		RI PHASE 1 STEP 1		RI P1S1 - Pu RS		ESI		RI PHASE 1 STEP 1		RI P1S1 - Pu RS		ESI		RI PHASE 1 STEP 1		RI P1S1 - Pu RS		ESI	
			FREQUENCY	NYSDEC	NUMBER	NUMBER	NUMBER																															
SAMPLE ROUND			OF	CLASS GA	ABOVE	OF	OF	1		2		1		0		1		2		0		1		2		0		1		2		0		1		2		0	
PARAMETER	UNIT	MAXIMUM	DETECTION	STD.	STD.	DETECTS	ANALYSES	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE
1,1,1-Trichloroethane	UG/L	1.7	1.12%	5	0	1	89	1	U	1.7				10	U	1	U	0.5	U	10	U	1	U	0.5	U	10	U	1	U	0.5	U	10	U	1	U	0.5	U	10
1,2-Dichloroethene (total)	UG/L	30	14.29%	5	1	1	7							10	U					10	U					10	U					10	U					10
Acetone	UG/L	9	6.74%		0	6	89	5	U	5	U			10	U	5	U	5	U	10	U	5	U	5	U	9	J	5	U	5	UJ	10	U	5	U	5	U	10
Toluene	UG/L	3.1	5.62%	5	0	5	89	1	U	0.5	U			10	U	1	U	0.26	J	10	U	1	U	0.5	U	10	U	1	U	0.5	U	10	U	1	U	0.5	U	10
Trichloroethene	UG/L	1600	3.37%	5	2	3	89	0.5	J	0.5	U			10	U	1	U	0.5	U	10	U	1	U	0.5	U	10	U	1	U	0.5	U	10	U	1	U	0.5	U	10
1,4-Dichlorobenzene	UG/L	0.093	8.99%	3	0	8	89	1.1	U	1.1	U			10	U	1.1	U	0.093	J	10	U	1.1	U	0.068	J	11	U	1.1	U	1	U	11	U	1	U	1	U	11
Benzo(a)pyrene	UG/L	0.097	2.25%	0	0	2	89	0.097	J	1.1	U			10	U	1.1	U	1.1	U	10	U	1.1	U	1	U	11	U	1.1	U	1	U	11	U	1	U	1	U	11
Benzo(b)fluoranthene	UG/L	0.076	1.12%		0	1	89	0.076	J	1.1	U			10	U	1.1	U	1.1	U	10	U	1.1	U	1	U	11	U	1.1	U	1	U	11	U	1	U	1	U	11
Benzo(ghi)perylene	UG/L	0.18	4.49%		0	4	89	0.18	J	1.1	U			10	U	1.1	U	1.1	U	10	U	1.1	U	1	U	11	U	1.1	U	1	U	11	U	1	U	1	U	11
Benzo(k)fluoranthene	UG/L	0.091	1.12%		0	1	89	0.091	J	1.1	U			10	U	1.1	U	1.1	U	10	U	1.1	U	1	U	11	U	1.1	U	1	U	11	U	1	U	1	U	11
Bis(2-Ethylhexyl)phthalate	UG/L	230	3.37%	5	2	3	89	2.4	UJ	1.1	U			10	U	1	U	1.1	U	10	U	1	U	1	U	11	U	1	U	1	U	11	U	1.3	U	1	U	11
Butylbenzylphthalate	UG/L	0.064	1.12%		0	1	89	1.1	U	1.1	U			10	U	1.1	U	1.1	U	10	U	1.1	U	1	U	11	U	1.1	U	1	U	11	U	1	U	1	U	11
Di-n-butylphthalate	UG/L	0.21	8.99%		0	8	89	1.1	U	1.1	U			10	U	1.1	U	1.1	U	10	U	1.1	U	1	U	11	U	1.1	U	1	U	11	U	1	U	1	U	11
Di-n-octylphthalate	UG/L	0.41	6.74%		0	6	89	1.1	UJ	1.1	U			10	U	1.1	U	1.1	U	10	U	1.1	U	1	U	11	U	1.1	U	1	U	11	U	1	U	1	U	11
Diethyl phthalate	UG/L	4.3	13.48%		0	12	89	1.1	U	1.1	U			10	U	1.1	U	1.1	U	10	U	1.1	U	1	U	11	U	1.1	U	0.08	J	11	U	1	U	1	U	11
Indeno(1,2,3-cd)pyrene	UG/L	0.1	1.12%		0	1	89	0.1	J	1.1	U			10	U	1.1	U	1.1	U	10	U	1.1	U	1	U	11	U	1.1	U	1	U	11	U	1	U	1	U	11
Phenol	UG/L	0.43	5.62%	1	0	5	89	1.1	U	1.1	U			10	U	1.1	U	1	UJ	10	U	1.1	U	1	U	11	U	0.12	J	1	U	11	U	1	U	1	U	11
Pyrene	UG/L	0.08	2.25%		0	2	89	1.1	U	1.1	U			10	U	1.1	U	1.1	U	10	U	1.1	U	1	U	11	U	0.057	J	1	U	11	U	1	U	1	UJ	11
4,4'-DDT	UG/L	0.018	1.12%	0.2	0	1	89	0.01	U	0.011	U			0.1	U	0.01	U	0.011	U	0.11	U	0.011	U	0.011	U	0.11	U	0.01	U	0.01	U	0.12	U	0.01	U	0.011	U	0.12
Beta-BHC	UG/L	0.0034	1.12%	0.04	0	1	89	0.0052	UJ	0.0057	U			0.052	U	0.0052	U	0.0056	U	0.054	U	0.0056	U	0.0053	U	0.054	U	0.0052	U	0.005	U	0.058	U	0.005	UJ	0.0054	U	0.058
Gamma-Chlordane	UG/L	0.0056	1.12%		0	1	89	0.0052	U	0.0057	U			0.052	U	0.0052	U	0.0056	U	0.054	U	0.0056	U	0.0053	U	0.054	U	0.0052	U	0.005	U	0.058	U	0.005	U	0.0054	U	0.058
Heptachlor	UG/L	0.0029	1.12%	0.04	0	1	89	0.0052	U	0.0057	U			0.052	U	0.0052	U	0.0056	U	0.054	U	0.0056	U	0.0053	U	0.054	U	0.0052	U	0.005	U	0.058	U	0.005	U	0.0054	U	0.058
Aluminum	UG/L	9880	97.80%		0	89	91	309	J	359		340		5840		348		142	J	2910		1190		1180		1040		230		174	J	4860	J	103	J	136	J	9880
Antimony	UG/L	43.2	7.69%	3	3	7	91	2.2	U	2.2	U	5.2	U	1.3	U	2.2	U	2.2	U	1.3	U	2.2	U	2.2	U	1.3	U	2.2	U	2.7	U	1.4	J	2.2	U	2.7	U	1.3
Arsenic	UG/L	5.1	14.29%	25	0	13	91	1.8	U	2.5	U	4	J	2	U	1.8	U	2.5	U	2	U	1.8	U	2.5	U	2	U	1.8	U	1.9	U	3.2	J	1.8	U	1.9	U	3
Barium	UG/L	189	100.00%	1000	0	91	91	47.7	J	33	J	42.7	J	94.2	J	71.9	J	80.1	J	79.1	J	76.4	J	79.5	J	146	J	151	J	151	J	102	J	64.4	J	89.3	J	171
Beryllium	UG/L	1.6	19.78%		0	18	91	0.1	U	0.18	J	0.31	J	0.1	U	0.1	U	0.18	J	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.2	U	0.21	J	0.1	U	0.2	U	0.71
Cadmium	UG/L	3.3	28.57%	5	0	26	91	0.3	U	0.22	J	0.8	J	0.2	U	1.2	J	0.2	U	0.2	U	0.3	U	0.2	U	0.2	U	1.1	J	0.3	U	0.2	U	0.3	U	0.3	U	0.26
Calcium	UG/L	260000	100.00%		0	91	91	97600	J	55800		100000		123000		134000		126000		108000		108000		104000		109000		114000		115000		183000		142000	J	159000		260000
Chromium	UG/L	18.5	43.96%	50	0	40	91	1.2	U	1.5	J	1.2	U	9.4	J	0.7	U	1	U	4.1	J	1.3	J	1	U	1.7	J	0.7	U	0.9	U	9.8	J	1.2	U	0.9	U	18.5
Cobalt	UG/L	15.2	19.78%		0	18	91	1.5	U	2.1	J	3.3	U	6.2	J	1.5	U	1.5	J	2.4	J	1.5	U	1.3	U	1.1	J	1.5	U	2	U	8	J	1.5	U	2	U	15.2
Copper	UG/L	25.1	52.75%	200	0	48	91	1	U	1.9	J	5.2	J	11.7	J	1.9	J	1.9	U	4.5	J	2.1	J	1.9	U	1.3	J	1.1	J	1.7	U	16.8	J	1	U	1.7	U	25.1
Iron	UG/L	20700	91.21%	300	44	83	91	**387**	J	**407**	J	**1060**		**9830**	J	**356**	J	68.3	J	**4030**	J	**1110**	J	**740**		**2140**	J	292	J	246		**10500**		161	J	90	J	**20700**
Lead	UG/L	18.8	13.19%	25	0	12	91	0.9	U	1.3	UJ	0.9	U	4.5		0.9	U	1.3	UJ	2	J	1	J	1.3	UJ	0.89	U	0.9	U	1	U	11		0.9	U	1	U	18.6
Magnesium	UG/L	72800	100.00%		0	91	91	19600	J	6280		47800		32800		35700		34300		17500		16600		15800		29900		29500		29500		46800		45900	J	46400		71100
Manganese	UG/L	3280	98.90%	300	12	90	91	23.9	J	8.8	J	41.2		223		7.9	J	5.3	J	237		51.8		58.2		77		38.1		37.2		**536**		22.4	J	24.8		**800**
Mercury	UG/L	0.17	9.89%	0.7	0	9	91	0.1	U	0.1	U	0.1	U	0.08	J	0.1	UJ	0.1	U	0.05	J	0.1	UJ	0.1	U	0.06	J	0.1	UJ	0.1	U	0.08	J	0.1	U	0.1	U	0.05
Nickel	UG/L	38.8	52.75%	100	0	48	91	2.6	J	1.7	U	10.2	U	17.3	J	2.2	J	1.7	U	6.9	J	4.5	J	3.7	J	2.6	J	1.4	U	1.7	U	24.4	J	4.2	J	4.3	J	38.8
Potassium	UG/L	14200	100.00%		0	91	91	2260	J	3120	J	2540	J	4180	J	1280	J	1380	J	2470	J	1440	J	1320	J	4730	J	1770	J	1630	J	13000	J	1890	J	1970	J	5510
Selenium	UG/L	6.5	21.98%	10	0	20	91	1.8	U	2.2	U	1.8	J	2.7	U	3.2	J	2.2	U	2.7	U	1.8	U	2.2	U	2.7	U	2	J	2.4	U	2.7	U	1.8	U	2.4	U	2.7
Silver	UG/L	5.2	38.46%	50	0	35	91	0.9	U	3.4	J	5.2	J	0.5	U	1.3	J	2.2	J	0.7	J	0.9	U	1.3	UJ	0.5	U	0.9	U	1.9	U	2.7	J	0.9	U	1.9	U	0.59
Sodium	UG/L	408000	100.00%	20000	24	91	91	2870	J	13200		8740		9020		12800		19000		5120		5780		8930		8770		6590		7020		18500		**31400**	J	**43500**		16400
Thallium	UG/L	7	41.76%		0	38	91	1.9	U	3.2	U	2.6	U	1.9	U	5.2	J	3.2	U	1.9	U	4.5	J	3.2	U	1.9	U	4	J	2.7	U	2.8	J	1.9	U	2.7	U	1.9
Vanadium	UG/L	18.3	28.57%		0	26	91	1.6	U	2.6	J	3.8	U	10	J	1.6	U	2	J	4.9	J	1.6	U	1.8	U	2.2	J	1.6	U	1.5	U	9.5	J	1.6	U	1.5	U	18.3
Zinc	UG/L	2640	93.41%		0	85	91	11	J	11.7	J	7.2	J	50.3		4	J	4.4	J	18.7	J	9.2	J	13.4	J	18.6	J	3.9	J	3.1	J	32.8		3.1	U	5.2	J	55.7

Notes:

1.Only compounds detected are shown on table.

2. The criteria values are NYSDEC Class GA Groundwater Standards (TOGS 1.1.1, June 1998) and EPA Maximum Contamination Limit (MCL), Source http://www.epa.gov/safewater/mcl.html#inorganic.htm

3. A blank in the action level column indicates no Class GA and/or MCL standand or standard is a secondary value.

4. Shading indicates a concentration above groundwater standard.

U = compound was not detected

J = the reported value is and estimated concentration

R = the compound was rejected

TABLE 1-5
DISPOSAL PITS A/B AND C GROUNDWATER ANALYTICAL DATA SUMMARY
SEAD-12 REMOVAL ACTION WORK PLAN
SENECA ARMY DEPOT ACTIVITY

FACILITY									SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID									MW12B-2		MW12B-2		MW12B-3		MW12B-3		MW12B-3		MW12-6		MW12-7		MW12-7		MW12-7		MW12-8		MW12-8		MW12-9		MW12-9	
MATRIX								ER	GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER	
SAMPLE ID									122031		122239		MW12B-3		122030		122238		122220		122048		122044		122272		122046		122258		122050		122245	
DEPTH TO TOP OF SAMPLE									14		14		4.6		14		10		9.5		14		14		13		13		13.86		15		16	
DEPTH TO BOTTOM OF SAMPLE									14		14		13.5		14		10		9.5		14		14		13		13		13.86		15		16	
SAMPLE DATE									23-Apr-99		6-Dec-99		19-Jul-94		23-Apr-99		6-Dec-99		12/7/1999		5/5/1999		5/5/1999		12/18/1999		5/6/1999		12/14/1999		5/6/1999		12/7/1999	
QC CODE									SA		SA		SA		SA		SA		SA		DU		SA		SA		SA		SA		SA		SA	
STUDY ID									RI PHASE 1 STEP 1		RI P1S1 - Pu RS		ESI		RI PHASE 1 STEP 1		RI P1S1 - Pu RS		RI P1S1 - Pu RS		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI P1S1 - Pu RS		RI PHASE 1 STEP 1		RI P1S1 - Pu RS		RI PHASE 1 STEP 1		RI P1S1 - Pu RS	
			FREQUENCY	NYSDEC	NUMBER	NUMBER	NUMBER																											
SAMPLE ROUND			OF	CLASS GA	ABOVE	OF	OF		1		2		0		1		2		2		1		1		2		1		2		1		2	
PARAMETER	UNIT	MAXIMUM	DETECTION	STD.	STD.	DETECTS	ANALYSES	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
1,1,1-Trichloroethane	UG/L	1.7	1.12%	5	0	1	89	U	1	U	0.5	U	10	U	1	U	0.5	U			1	U	1	U	0.5	U	1	U	0.5	U	1	U	0.5	U
1,2-Dichloroethene (total)	UG/L	30	14.29%	5	1	1	7	U					10	U																				
Acetone	UG/L	9	6.74%		0	6	89	U	5	U	5	U	10	U	5	U	5	U			5	U	5	U	5	U	5	U	5	U	5	U	5	UJ
Toluene	UG/L	3.1	5.62%	5	0	5	89	U	1	U	0.5	U	10	U	1	U	0.5	U			1	U	1	U	0.5	U	1	U	0.5	U	1	U	0.5	U
Trichloroethene	UG/L	1600	3.37%	5	2	3	89	U	1	U	0.5	U	10	U	1	U	0.5	U			1	U	1	U	0.5	U	1	U	0.5	U	1	U	0.5	U
1,4-Dichlorobenzene	UG/L	0.093	8.99%	3	0	8	89	U	1	U	1	U	10	U	1	U	1	U			1	U	1	U	1.2	U	1	U	1.2	U	1	U	0.063	J
Benzo(a)pyrene	UG/L	0.097	2.25%	0	0	2	89	U	1	U	1	U	10	U	1	U	1	U			1	U	1	U	1.2	U	1	U	1.2	U	1	U	1.2	U
Benzo(b)fluoranthene	UG/L	0.076	1.12%		0	1	89	U	1	U	1	U	10	U	1	U	1	U			1	U	1	U	1.2	U	1	U	1.2	U	1	U	1.2	U
Benzo(ghi)perylene	UG/L	0.18	4.49%		0	4	89	U	1	U	1	U	10	U	0.075	J	1	U			1	U	1	U	1.2	U	1	U	1.2	U	1	U	1.2	U
Benzo(k)fluoranthene	UG/L	0.091	1.12%		0	1	89	U	1	U	1	U	10	U	1	U	1	U			1	U	1	U	1.2	U	1	UJ	1.2	U	1	UJ	1.2	U
Bis(2-Ethylhexyl)phthalate	UG/L	230	3.37%	5	2	3	89	U	1.6	U	1	U	10	U	1	U	1	U			1.1	U	1	U	1.2	U	1	U	1.6		1	U	1.2	U
Butylbenzylphthalate	UG/L	0.064	1.12%		0	1	89	U	1	U	1	U	10	U	1	U	1	U			1	U	1	U	1.2	U	1	U	1.2	U	1	U	1.2	U
Di-n-butylphthalate	UG/L	0.21	8.99%		0	8	89	U	1	U	1	U	10	U	1	U	1	U			1	U	1	U	1.2	U	0.16	J	0.08	J	1	U	1.2	U
Di-n-octylphthalate	UG/L	0.41	6.74%		0	6	89	U	1	U	1	U	10	U	1	U	1	U			1	U	1	U	1.2	U	1	U	1.2	U	1	U	1.2	U
Diethyl phthalate	UG/L	4.3	13.48%		0	12	89	U	1	U	1	U	10	U	1	U	0.074	J			1	U	1	U	1.2	U	0.055	J	1.2	U	0.05	J	1.2	U
Indeno(1,2,3-cd)pyrene	UG/L	0.1	1.12%		0	1	89	U	1	U	1	U	10	U	1	U	1	U			1	U	1	U	1.2	U	1	U	1.2	U	1	U	1.2	U
Phenol	UG/L	0.43	5.62%	1	0	5	89	U	1	U	1	U	10	U	1	U	1	U			1	U	1	U	1.2	U	1	U	1.2	U	1	U	1.2	U
Pyrene	UG/L	0.08	2.25%		0	2	89	U	1	U	1	UJ	10	U	1	U	1	U			1	U	1	U	1.2	U	1	U	1.2	U	1	U	1.2	U
4,4'-DDT	UG/L	0.018	1.12%	0.2	0	1	89	U	0.01	U	0.011	U	0.11	U	0.01	U	0.01	U			0.01	U	0.01	U	0.01	U	0.017	U	0.011	U	0.014	U	0.01	U
Beta-BHC	UG/L	0.0034	1.12%	0.04	0	1	89	U	0.0051	UJ	0.0053	U	0.056	U	0.005	UJ	0.0051	U			0.005	U	0.0051	U	0.0051	U	0.0085	U	0.0054	U	0.007	U	0.0052	U
Gamma-Chlordane	UG/L	0.0056	1.12%		0	1	89	U	0.0051	U	0.0053	U	0.056	U	0.005	U	0.0051	U			0.005	U	0.0051	U	0.0051	U	0.0085	U	0.0054	U	0.007	U	0.0052	U
Heptachlor	UG/L	0.0029	1.12%	0.04	0	1	89	U	0.0051	U	0.0053	U	0.056	U	0.005	U	0.0051	U			0.005	U	0.0051	U	0.0051	U	0.0085	U	0.0054	U	0.007	U	0.0052	U
Aluminum	UG/L	9880	97.80%		0	89	91	J	23.9	J	28.3	J	6940	J	201	J	168	J	260		74.6	J	65.3	J	34.2	J	259		146	J	25.1	J	89.1	J
Antimony	UG/L	43.2	7.69%	3	3	7	91	U	2.2	U	2.7	U	1.3	U	2.2	U	2.7	U	2.7	U	5.2	U	5.2	U	2.2	U	5.2	U	2.2	U	5.2	U	2.7	U
Arsenic	UG/L	5.1	14.29%	25	0	13	91	J	1.8	U	1.9	U	2	U	1.8	U	1.9	U	3.6	J	2.9	U	2.9	U	2.5	U	5.1	J	2.5	U	2.9	U	1.9	U
Barium	UG/L	189	100.00%	1000	0	91	91	J	68.3	J	70.7	J	189	J	134	J	133	J	46.2	J	49.9	J	49.6	J	64.5	J	66.1	J	60.7	J	67	J	55.3	J
Beryllium	UG/L	1.6	19.78%		0	18	91	J	0.1	U	0.2	U	0.41	J	0.1	U	0.2	U	0.2	U	0.3	U	0.3	U	0.1	U	0.3	U	0.16	J	0.3	U	0.2	U
Cadmium	UG/L	3.3	28.57%	5	0	26	91	J	0.3	U	0.3	U	0.27	J	0.3	U	0.3	U	0.3	U	2	J	0.9	J	0.2	U	3.3	J	0.2	U	0.77	J	0.3	U
Calcium	UG/L	260000	100.00%		0	91	91		164000	J	168000		169000		130000	J	117000		108000		113000		113000		104000		86500		80600		116000		125000	
Chromium	UG/L	18.5	43.96%	50	0	40	91		1.4	J	0.9	U	13.5		1.3	J	0.9	U	0.9	U	1.2	U	1.2	U	1	U	1.4	J	1.4	J	1.2	U	1	J
Cobalt	UG/L	15.2	19.78%		0	18	91	J	1.5	U	2	U	12	J	1.5	U	2	U	2	U	3.3	U	3.3	U	1.3	U	3.3	U	1.9	J	3.3	U	2	U
Copper	UG/L	25.1	52.75%	200	0	48	91		1	U	1.7	U	19	J	1	U	2.1	J	1.7	U	3.2	J	4.1	J	15.8	J	4.2	J	1.9	U	3.8	J	1.7	U
Iron	UG/L	20700	91.21%	300	44	83	91		14.9	U	25.4	U	**14700**		207	J	118		**985**	J	94.4	J	86.2	J	20.3	U	**384**		166	J	19.3	J	197	
Lead	UG/L	18.8	13.19%	25	0	12	91		0.9	U	1	UJ	18.8		0.9	U	1	U	1	U	0.99	J	0.9	U	1.3	UJ	0.9	U	1.3	UJ	0.9	U	1	U
Magnesium	UG/L	72800	100.00%		0	91	91		62400	J	57500		37900		39900	J	31700		49200		27000		26900		24200		20600		17300		29400		28100	
Manganese	UG/L	3280	98.90%	300	12	90	91		52.6	J	40.8		**522**		6.3	J	5.1	J	38.6		90.4		92.2		21.2		21.7		7.6	J	138		27.4	
Mercury	UG/L	0.17	9.89%	0.7	0	9	91	J	0.1	U	0.1	U	0.05	J	0.1	U	0.1	U	0.1	UJ	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Nickel	UG/L	38.8	52.75%	100	0	48	91	J	2.4	J	2.1	J	32.5	J	1.4	U	1.7	U	1.7	U	10.2	U	10.2	U	1.9	J	10.2	U	1.7	U	10.2	U	1.7	U
Potassium	UG/L	14200	100.00%		0	91	91	J	2220	J	2060	J	2900	J	1290	J	909	J	2800	J	2740	J	2620	J	2310	J	4640	J	2120	J	5710		2650	J
Selenium	UG/L	6.5	21.98%	10	0	20	91	U	1.8	U	2.4	U	2.7	U	1.8	U	3	J	2.4	UJ	1.8	J	1.8	J	2.2	U	1.8	J	2.2	U	1.9	J	2.4	U
Silver	UG/L	5.2	38.46%	50	0	35	91	J	0.9	U	1.9	U	0.62	J	0.9	U	1.9	U	1.9	UJ	3.9	J	5	J	1.3	UJ	4.1	J	3.7	J	4.2	J	2.6	J
Sodium	UG/L	408000	100.00%	20000	24	91	91		19200	J	**21500**		4510	J	9120	J	5850		9100		13500		13400		14000		9340		7700		12000		8310	
Thallium	UG/L	7	41.76%		0	38	91	U	1.9	U	3.5	J	5	J	1.9	U	2.7	U	2.7	U	2.6	U	2.6	U	3.2	U	4.5	J	3.2	U	2.6	U	3.3	J
Vanadium	UG/L	18.3	28.57%		0	26	91	J	1.6	U	1.5	U	12.7	J	1.6	U	1.5	U	1.5	U	3.8	U	3.8	U	1.8	U	3.8	U	3	J	3.8	U	1.5	U
Zinc	UG/L	2640	93.41%		0	85	91		7.8	J	2.6	J	41.1		3.1	U	3.9	J	4.4	J	22.9		13.4	J	3.3	J	8.1	J	18.5	J	2.7	J	3.8	J

Notes:

1.Only compounds detected are shown on table.

2. The criteria values are NYSDEC Class GA Groundwater Standards (TOGS 1.1.1, June 1998) and EPA Maximum Contamination Limit (MCL), Source http://www.epa.gov/safewater/mcl.html#inorganic.htm

3. A blank in the action level column indicates no Class GA and/or MCL standand or standard is a secondary value.

4. Shading indicates a concentration above groundwater standard.

U = compound was not detected

J = the reported value is and estimated concentration

R = the compound was rejected

Table 2-1
TEST PIT CONTENTS OF DISPOSAL PIT A/B AND DISPOSAL PIT C
SEAD-12 Removal Action Work Plan
Seneca Army Depot Activity

Loc ID	Location	Debris/Contents	Removal Action
TP12A-1	Disposal Pit A	Misc. metal fragments	
TP12A-2	Disposal Pit A	[5-7] Instrument box [3-4] Empty drums [many] Tubes Pipe [3-4] Spool of wire Box of tools	
TP12-1	Disposal Pit A	Heavy sheet metal Broken fiberglass Electrical components Metal box with liquid – no VOCs	
TP12-2	Disposal Pit A	Large sheet metal object (maybe from a cabinet or shelving unit) (2) One gallon metal cans, with high VOCs – maybe paint cans? Electrical components Metal/fiberglass debris Light sheen on water at 6' Debris continues below the water table	Both cans and surrounding soil were drummed and removed
TP12A-3	Disposal Pit C	Foreign components – thermal battery? (4) SEAD "Trainer" – 1950's style	3 of the 4 Trainers were removed
TP12A-4	Disposal Pit C	Large cylindrical object composed of concrete and styrofoam	
TP12-3 (North)	Disposal Pit C	Cone-shaped objects above and below water table - gamma radiation screening – 8xbackground - paint on dial on cone likely source of rad Pocket of grease like material – no VOCs Metal lids Steel threaded pipes w/end caps Wood fragment with metal hasp Electrical components Sheet metal Styrofoam fiberglass	(6) cone-shaped objects were removed
TP12-3 (South)	Disposal Pit C	Electrical cable with connector Stacked sheet metal	
TP12-4	Disposal Pit C	Large cylindrical object (stainless steel?) (~4' in diameter, L>3')	Attempted, but unable to remove
TP12-5	Disposal Pit C (EM-23)	Small pieces of concrete with rebar Strands of insulated wire 1" diameter pipe	
TP12-6	Disposal Pit C (EM-23)	Concrete slab with rebar Small concrete pieces, asphalt	

Table 2-1
TEST PIT CONTENTS OF DISPOSAL PIT A/B AND DISPOSAL PIT C
SEAD-12 Removal Action Work Plan
Seneca Army Depot Activity

Loc ID	Location	Debris/Contents	Removal Action
TP12-7AA, 7BA, & 7BB	Disposal Pit C (EM-22, EM-21)	Steel drain pipe with wire inside Wire Culvert pipe Fired 7.62 NATO black casing Heavy gauge wire Aluminum foil	
TP12-8	Disposal Pit C (EM-21)	Railroad ties Nails 2’ diameter culvert pipe sections concrete with rebar asphalt brush electrical tape	
TP12-23	Disposal Pit C (EM-23)	Pocket of ash 8” grinding disk posts and pipe pocket of black material	TP log is nondescript about location of debris
TP12A-5	Disposal Pit C	6” piece of glass	
TP12A-6	Disposal Pit C	None	
TP12A-7	Disposal Pit C	None	
TP12A-8	Disposal Pit C	None	

Table 2-2
VOLUME ESTIMATES FOR MATERIAL REMOVAL
SEAD-12 Removal Action Work Plan
Seneca Army Depot Activity

	Surface Area (SF)	Average Depth (FT)	Approximate Volume for Excavation (CY)	% Debris	Approximate Debris Volume (CY)	Approximate Soil Volume (CY)
Disposal Pit A/B	22,500	6	5,000	10%	500	4,500
Disposal Pit C (total)	40,200		9,000		1,300	7,700
Disposal Pit C (northern area, Area 1)	13,200	4	2,000	30%	600	1,400
Disposal Pit C (southern area, Area 2)	27,000	7	7,000	10%	700	6,300
Total	62,700		14,000		1,800	12,200

Notes:
1. The debris volume was calculated based on the excavation volume and the percentage of debris encountered during the RI test pit investigation.

Table 3-1
SAMPLING AND ANALYSIS REQUIREMENTS
SEAD-12 Removal Action Work Plan
Seneca Army Depot Activity

Sample Matrix	Sample Type	Field Screening/Laboratory Analysis Parameter(s)	Laboratory Analytical Methods	Estimate No. of Field Sample	No. of QA/QC Samples*	Purpose
Limits of Disposal Pit Excavation - Bottom and Side Walls of Disposal Pits						
Soil	Grab	TCL VOCs	USEPA 8260B	**	**	Confirm Limits of Excavation - Results < NYSDEC part 375 SCOs for unrestricted use or Background
		TCL SVOCs	USEPA 8270C	**	**	
		PCBs/Pesticides	USEPA 8082/8081A	**	**	
		TAL Metals	USEPA 6010B/7471A	**	**	
		Radioactivity - Gross Alpha/Beta	USEPA 900.0M	**	**	
		Radioactivity - Gamma Spectroscopy with Rn-222 Ingrowth	USEPA 901.0M	**	**	
		Radioactivity - Tritium	USEPA 906.0M	**	**	
Reference Area (Background) Soil samples (72-Hour turn-around time)						
Soil	Grab	Radioactivity - Gross Alpha & Beta	USEPA 900.0M	19	2	For establishing baseline data
Disposal Characterization Analyses - Soil and Debris (5-day turn-around time)						
Soil	Grab	TCLP VOCs	USEPA 8260B	6	0	1 sample/700 CY
	Composite	TCLP SVOCs	USEPA 8270C	6	0	
		PCB/Pesticides	USEPA 8082/8081A	6	0	
		TCLP Metals	USEPA 6010B/7471A	6	0	
		Paint Filter Test	USEPA 9095	6	0	
		pH	USEPA 9045	6	0	
		% Solids	USEPA 160.3	6	0	
		Flashpoint	USEPA 1010	6	0	
		Reactivity	SW846/Section 7.3.3 and 7.3.4	6	0	
	Composite	Radioactivity - Gross Alpha & Beta	USEPA 900.0M	19	0	1 sample/200 CY
		Radioactivity - Gamma Spectroscopy	USEPA 901.0M	19	0	
		Radioactivity - Tritium	USEPA 906.0M	19	0	
Debris	Grab	TCLP Metals	USEPA 6010B/7471A	3	0	1 sample/700 CY
		Radioactivity - Gross Alpha & Beta	USEPA 900.0M	10	0	1 sample/200 CY
		Radioactivity - Gamma Spectroscopy	HASL 300	10	0	
		Radioactivity - Tritium	USEPA 906.0M	10	0	
Wastewater						
Water	Grab	TCL VOCs	USEPA8260B	1	0	Waste disposal characterization
		TCL SVOCs	USEPA 8270C	1	0	
		PCB/Pesticides	USEPA 8082/8081A	1	0	
		TAL Metals	USEPA 6000/7000	1	0	
		pH	USEPA 150.1	1	0	
		Radioactivity - Gross Alpha/Beta***	USEPA 900.0	1	0	
		Radioactivity - Ra-226 by Emanation ***	USEPA 903.1M	1	0	
		Radioactivity - Ra-228 ***	USEPA 904.0M	1	0	
		Radioactivity - Total Uranium ***	ICPMS 6020	1	0	
		Radioactivity - Tritium***	USEPA 906.0M	1	0	
Imported Fill Characterization						
Soil	Grab	TCL VOCs	USEPA 8260B	1	0	Backfill material characterization
		TCL SVOCs	USEPA 8270C	1	0	
		PCBs/Pesticides	USEPA 8082/8081A	1	0	
		TAL Metals	USEPA 6010B/7471A	1	0	
		Radioactivity - Gross Alpha/Beta	USEPA 900.0M	1	0	
		Radioactivity - Gamma Spectroscopy with Rn-222 Ingrowth	USEPA 901.0M	1	0	
		Radioactivity - Tritium	USEPA 906.0M	1	0	

Notes:

* indicates QA/QC samples collected and analyzed at frequencies of one replicate/duplicate for each 20 field samples per sample delivery group (SDG), one MS and one MSD per 20 samples per media per SDG one (sampling equipment) rinsate blank per day per media (for non-disposable sampling equipment only, one trip blank (VOCs only). No QA/QC samples for disposal characterization.

** indicates the number of field samples to be collected and analyzed will be based on radiological field screening results.

Table 3-2
SAMPLE HANDLING REQUIREMENTS
SEAD-12 Removal Action Work Plan
Seneca Army Depot Activity

Sample Matrix	Field Screening/Laboratory Analysis Parameter(s)	Laboratory Analytical Methods	Container Information			Maximum Holding Time
			Type	Quantity	Preservative	
Limits of Disposal Pit Excavation - Bottom and Side Walls of Disposal Pits						
	TCL VOCs	USEPA 8260B	EnCore™ Samplers	3	4º C	14 days
	TCL SVOCs	USEPA 8270C	4 Oz Glass	1	4º C	14 days
	PCBs/Pesticides	USEPA 8082/8081A	4 Oz Glass	1	4º C	14 days
	TAL Metals	USEPA 6010B/7471A	4 Oz Glass	1	None	180 days
	Radioactivity - Gross Alpha/Beta	USEPA 900.0M	4 Oz Glass	1	None	180 days
	Radioactivity - Gamma Spectroscopy with Rn-222 Ingrowth	USEPA 901.0M	8 Oz Glass	1	None	180 days
	Radioactivity - Tritium	USEPA 906.0M	8 Oz Glass	1	None	180 days
Reference Area (Background) Soil samples (72-Hour turn-around time)						
Soil	Radioactivity - Gross Alpha & Beta	USEPA 900.0M	4 Oz Glass	1	None	180 days
Disposal Characterization Analyses - Soil and Debris (5-day turn-around time)						
	TCLP VOCs	USEPA 8260B	4 Oz Glass	1	4º C	14 days
	TCLP SVOCs	USEPA 8270C	4 Oz Glass	1	4º C	14 days
	PCBs/Pesticides	USEPA 8082/8081A	4 Oz Glass	1	4º C	14 days
	TCLP Metals	USEPA 6010B/7471A	4 Oz Glass	1	None	180 days
	Paint Filter Test	USEPA 9095	8 Oz Glass	1	None	N/A
	pH	USEPA 9045	4 Oz Glass	1	None	Immediate
	% Solids	USEPA 160.3	4 Oz Glass	1	4º C	7 days
	Flashpoint	USEPA 1010	4 Oz Glass	1	None	N/A
	Reactivity	SW846 Section 7.3.3/7.3.4	4 Oz Glass	1	None	7 days
	Radioactivity - Gross Alpha & Beta	USEPA 900.0M	4 Oz Glass	1	None	180 days
	Radioactivity - Gamma Spectroscopy	USEPA 901.0M	8 Oz Glass	1	None	180 days
	Radioactivity - Tritium	USEPA 906.0M	8 Oz Glass	1	None	180 days
Debris	TCLP Metals	USEPA 6010B/7471A	4 Oz Glass	1	None	180 days
	Radioactivity - Gross Alpha & Beta	USEPA 900.0M	4 Oz Glass	1	None	180 days
	Radioactivity - Gamma Spectroscopy	HASL 300	8 Oz Glass	1	None	180 days
	Radioactivity - Tritium	USEPA 906.0M	8 Oz Glass	1	None	180 days
Wastewater						
	TCL VOCs	USEPA 8260B	40 mL VOA vials	3	4º C	14 days
	TCL SVOCs	USEPA 8270C	1000 mL Amber Glass	2	4º C	7 days
	PCBs/Pesticides	USEPA 8082/8081A	1000 mL Amber Glass	2	4º C	7 days
	TAL Metals	USEPA 6000/7000	500 mL Plastic	1	HNO3	180 days
	pH	USEPA150.1	250 mL Plastic	1	None	Immediate
	Radioactivity - Gross Alpha/Beta	USEPA 900.0	500 mL Plastic	1	pH < 2, HNO3	180 days
	Radioactivity - Ra-226 by Emanation	USEPA 903.1M	1 Liter Plastic	2	pH < 2, HNO3	180 days
	Radioactivity - Ra-228	USEPA 904.0M	1 Liter Plastic	1	pH < 2, HNO3	180 days
	Radioactivity - Total Uranium	ICPMS 6020	250 mL Plastic	1	pH < 2, HNO3	180 days
	Radioactivity - Tritium	USEPA 906.0M	250 mL Glass	1	None	180 days
Imported Fill Characterization						
	TCL VOCs	USEPA 8260B	EnCore™ Samplers	3	4º C	14 days
	TCL SVOCs	USEPA 8270C	4 Oz Glass	1	4º C	14 days
	PCBs/Pesticides	USEPA 8082/8081A	4 Oz Glass	1	4º C	14 days
	TAL Metals	USEPA 6010B/7471A	4 Oz Glass	1	None	180 days
Soil	Radioactivity - Gross Alpha/Beta	USEPA 900.0M	4 Oz Glass	1	None	180 days
	Radioactivity - Gamma Spectroscopy with Rn-222 Ingrowth	USEPA 901.0M	8 Oz Glass	1	None	180 days
	Radioactivity - Tritium	USEPA 906.0M	8 Oz Glass	1	None	180 days

Table 5-1
PRE-CONSTRUCTION INSPECTION ACTIVITIES
SEAD-12 Removal Action Work Plan
Seneca Army Depot Activity, New York

Preparatory Inspection Activity	Method	Frequency	Acceptance Criteria
Survey of Excavation Layout	GPS or Land Surveyor	Once prior to the start of construction	Establish grade stakes along the excavation boundary according to the drawings. Grade stakes shall be placed at the start and termination of each linear section, at 50-foot intervals along each linear segment, at 20-foot intervals along curves, and at any change in boundary direction not in a curve.
Clearing and Grubbing Excavation & Work Areas	Visual	Once prior to the start of construction.	Confirm that the excavation area has been cleared of obstructions and that equipment can operate in the area with no obstructions.
Utility Mark Out	Call UGFPO and consult As-Built drawings provided by the facility	Once prior to the start of construction.	Confirm all subsurface and overhead utilities are clearly marked and that excavation plans take the utilities into consideration.
Off Site Access / Egress	Visual	Once prior to the start of construction	Confirm approval for use of off-site roads for contaminated material transportation. Confirm that all access gates on-site and off-site are working properly.
Job Site Trailer and Lay-Down Approval	Visual	Once prior to the start of construction	Confirm approval and location for site trailer, lay-down area and availability of electrical power.
Equipment Examinations (Earthwork)	Visual	Once upon arrival at site.	Determine if equipment type and size conforms to project details, conforms to OSHA safety requirements and record information. Determine that equipment is in working order and is not leaking oil or fuel in quantities sufficient to be classified as a spill.
Staging Areas	Visual	Once prior to the start of construction	Determine that the various material staging areas and equipment decon areas conforms to project work plan.
Erosion & Sedimentation Control Installation	Visual	Once prior to the start of construction	Assess if control measures are appropriately located throughout the site
Establish Background Conditions		Once prior to the start of construction	Confirm that site for radiological background levels and air monitoring for airborne dust particulates levels has been established.
Fill Material (if needed)	Verification of Acceptance	1 sample per source	Compliance with NYSDEC Unrestricted Soil Cleanup Objectives (Table 375-6.8(a).

Table 5-2
CONSTRUCTION INSPECTION ACTIVITIES
SEAD-12- Removal Action Work Plan
Seneca Army Depot Activity, New York

Construction Inspection Activity	Method	Frequency	Acceptance Criteria
Radioactivity Real Time Monitoring		At start-up and during construction.	Refer to Section A8 of the HSP
Hazardous Air Monitoring	PID/OVM	At start-up and during construction	Refer to Section A8 of the HSP
Particulate Air Monitoring		At start-up and during construction	Refer to Section A8 of the HSP
Wind Direction Monitoring	Wind direction indicator	At start-up and during construction	Survey flagging tied to stake located up wind of work area
Construction Methods Observation	Visual	At start-up and during construction.	Ensure that the methods conform to standard construction practices and worker safety is always a primary consideration.
Site Security	Visual	Daily during construction and at end of day.	Confirm that any open excavation is fenced off and the base perimeter is secure.
Erosion Control Maintenance	Visual	Daily and during and after significant rainfall events	Control measures in good repair and ensure no migration of sediments or evidence of erosion.
Confirmatory field screening	Field instruments	Prior to backfilling	See criteria in FSP
Confirmatory sampling	Analytical testing	Prior to backfilling	If applicable, see criteria in FSP
Material Disposal	Analytical testing	Radiological constituents for soil or debris to be collected 1 every 200 cy , hazardous waste constituent 1 every 700 cy	See criteria in FSP
Backfill of excavation (if needed)	Visual	Every lift	Clean overburden material will used to backfill the excavation followed by the borrow material. Material will be machine compacted in 1 foot lifts with 3 runs over the material
Extent & Location of Excavations	GPS or Land Surveyor	Once at each excavation after the backfill is placed, before site restoration	Survey the final location of each excavation for position and elevation.

Table 5-3
POST-CONSTRUCTION ACTIVITIES
SEAD-12 Removal Action Work Plan
Seneca Army Depot Activity, New York

Follow-Up Inspection Activity	Method	Frequency	Acceptance Criteria
Final Grading	Visual	Completion of backfill operation.	The final grade should prevent storm water run-off or collection.
AOC Restoration	Visual	Once for each excavation after construction has been completed.	To ensure that the excavated areas and staging areas are graded to the original grade and seeded to promote vegetation where pre-construction vegetation existed.
Re-vegetation	Visual	At least semi-annually.	The previously vegetated disturbed areas are re-vegetated and no erosion is occurring.

Table 6-1
Post-Closure Monitoring and Maintenance Plan
Routine Inspections Checklist
Seneca Army Depot – SEAD 12 (Pits A/B and Pit C)
Seneca Army Depot Activity

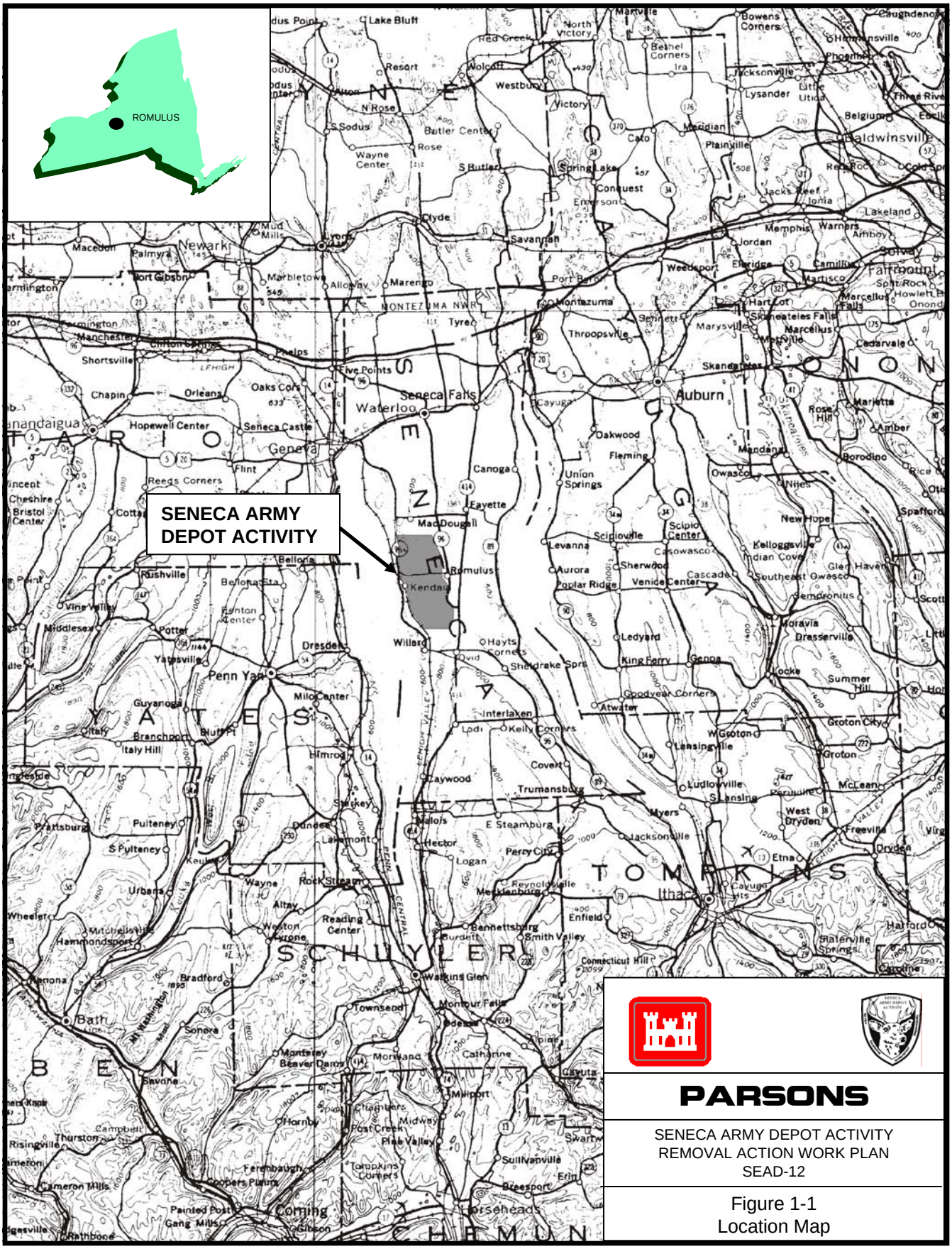
DATE:
INSPECTED BY: _____

Maintenance Inspections:

_____ (1) Confirm that vegetation is re-established in designated areas and erosion is not occurring. Designated areas include all disturbed areas that were previously vegetated and areas with an exposed layer of soil that were previously covered with gravel and/or asphalt.

_____ (2) Once inspection (1) is confirmed, erosion controls, such as hay bales, berms, and silt fencing will be removed. Confirm that drainage patterns have returned to their general conditions prior to remediation.

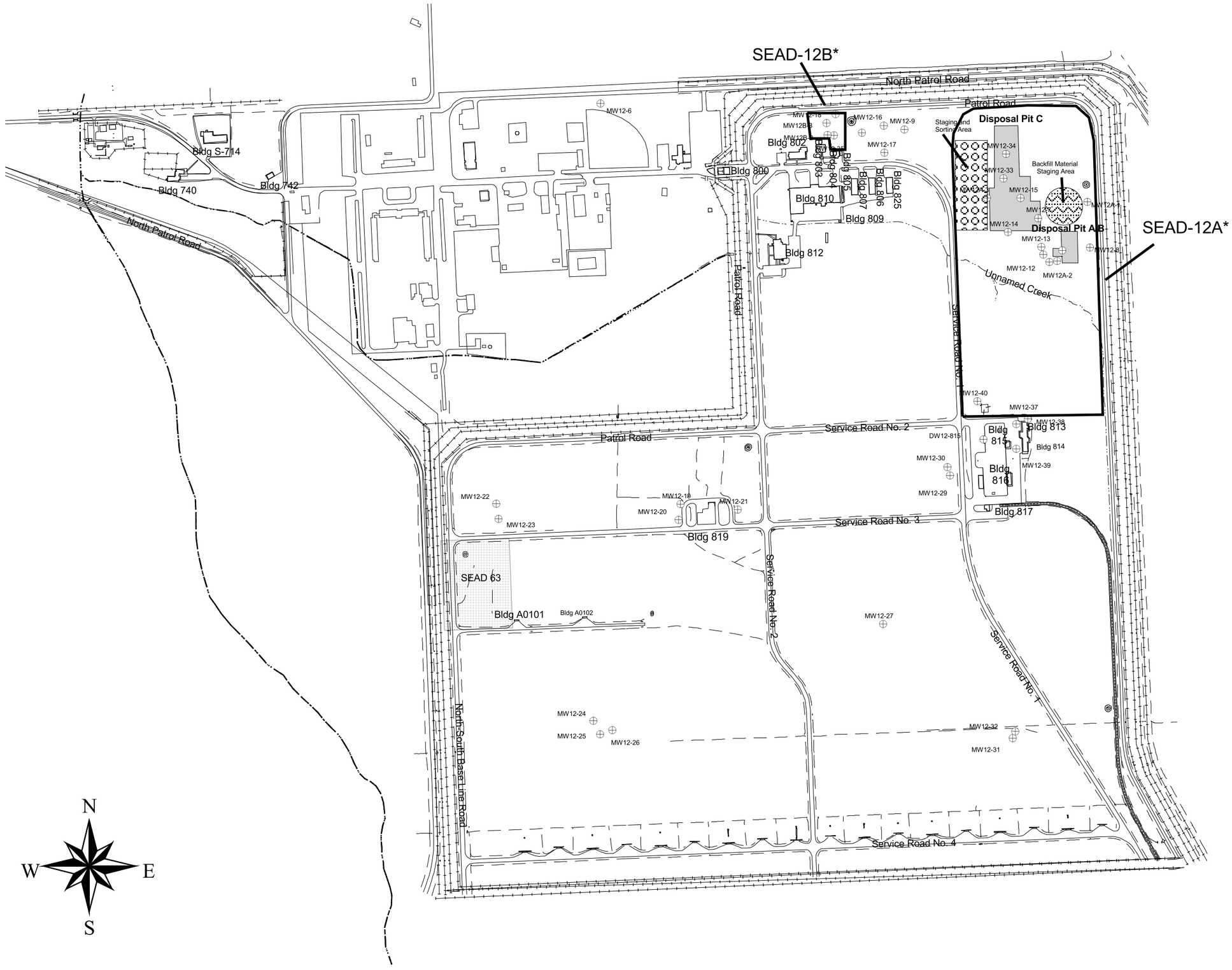
FIGURES



PARSONS

SENECA ARMY DEPOT ACTIVITY
REMOVAL ACTION WORK PLAN
SEAD-12

Figure 1-1
Location Map



LEGEND

MW12-15
MONITORING WELL LOCATION

DISPOSAL PIT AREA

SEAD-63

BUILDINGS (bldgs)

BACKFILL MATERIAL STAGING AREA

STAGING AND SORTING AREA

FENCE

ROADS

SURFACE WATER

Note:
* The SEAD-12 site boundary was expanded from the original site boundary which only consisted of two seperate areas, known as SEAD-12A and SEAD-12B.

500 0 500 Feet

PARSONS

SENECA ARMY DEPOT ACTIVITY
REMOVAL ACTION WORK PLAN
SEAD-12

Figure 1-2
Disposal Pits A/B and C Site Location Plan

March 2009

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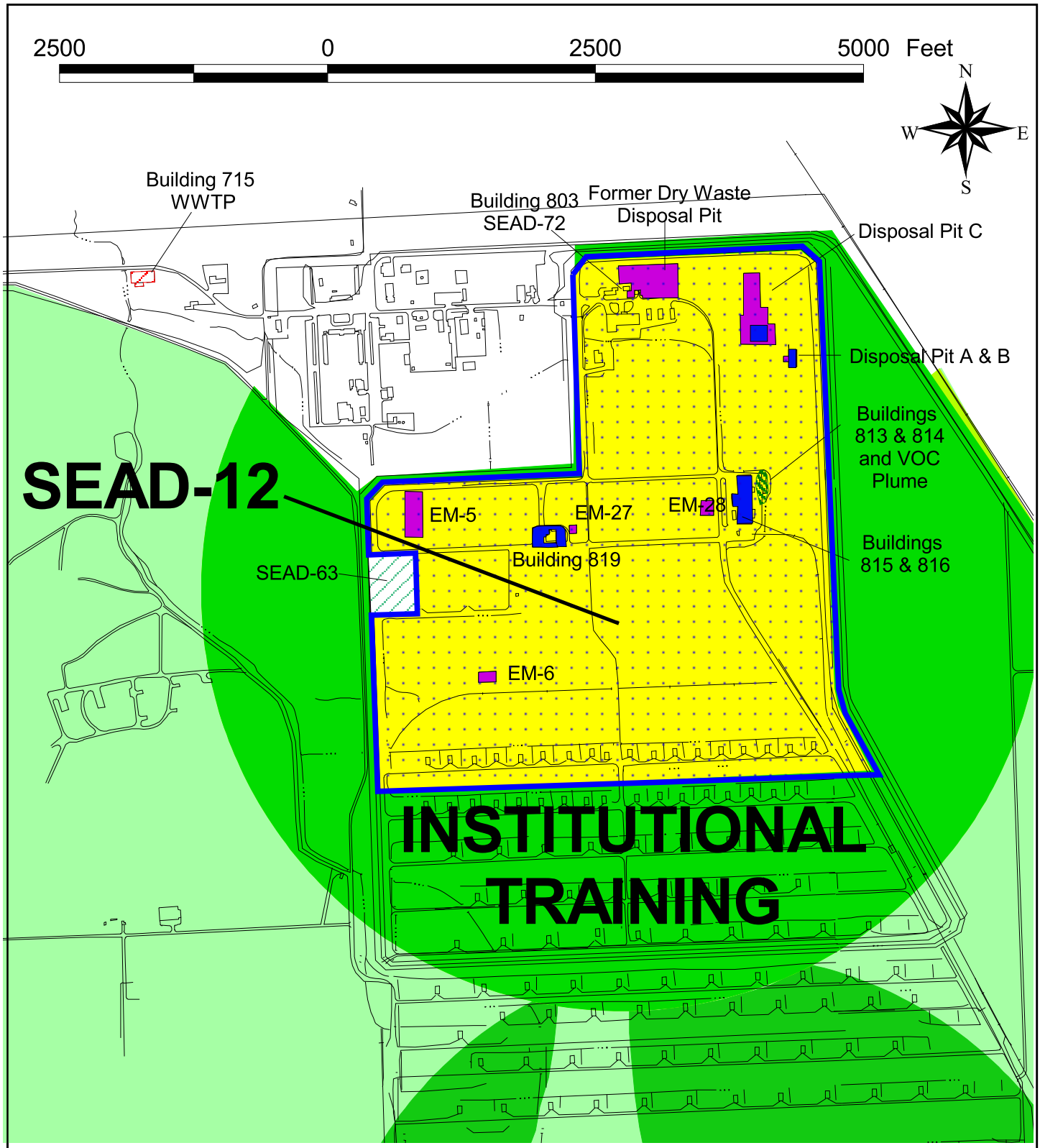


Extent of SEAD-12

Extent of SEAD-63

Radiation Classification Class 1 Area

Approximate Extent of Groundwater Access/Use and Vapor Intrusion Land Use Controls

Radiation Classification Class 2 Area

Radiation Classification Class 3 Area

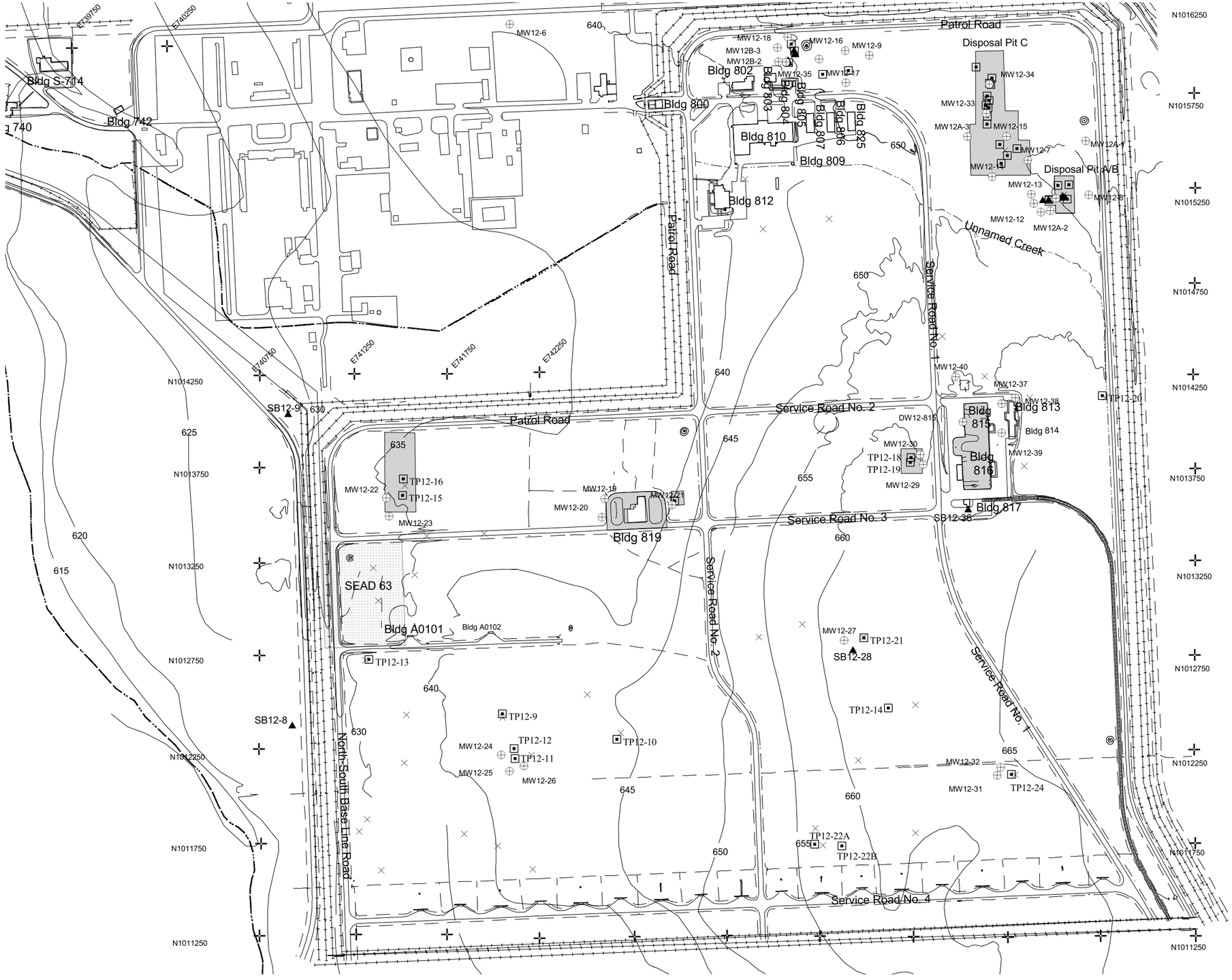
O:\Seneca\SEAD-1-2-5-24-48\SEAD-12.apr\SEAD-12 PRAP Figure 2

PARSONS

SENECA ARMY DEPOT ACTIVITY
REMOVAL ACTION WORK PLAN
SEAD-12

Figure 1-3
Future Land Use

March 2009



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S

LEGEND

- TP12-20 TESTPIT LOCATION
- SB12-10 SOIL BORING LOCATION
- MW12-15 MONITORING WELL LOCATION

PARSONS

SENECA ARMY DEPOT ACTIVITY
REMOVAL ACTION WORK PLAN
SEAD-12

Figure 1-4
Soil Boring,Monitoring Well, and Test Pit Locations

March 2009

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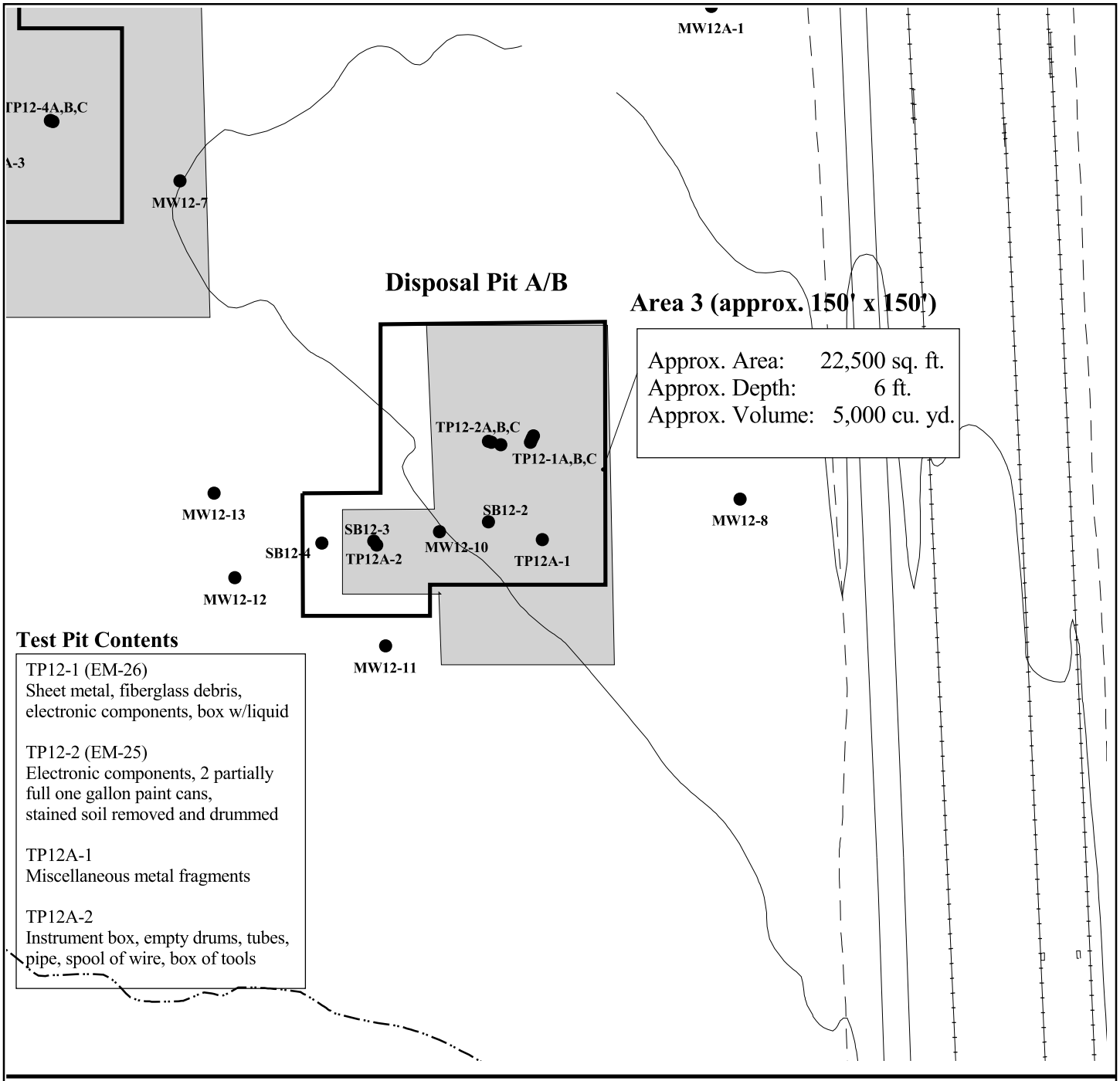

PARSONS

SENECA ARMY DEPOT ACTIVITY
REMOVAL ACTION WORK PLAN
SEAD-12

Figure 2-1
Approximate Excavation Limits
for Disposal Pit A/B

March 2009

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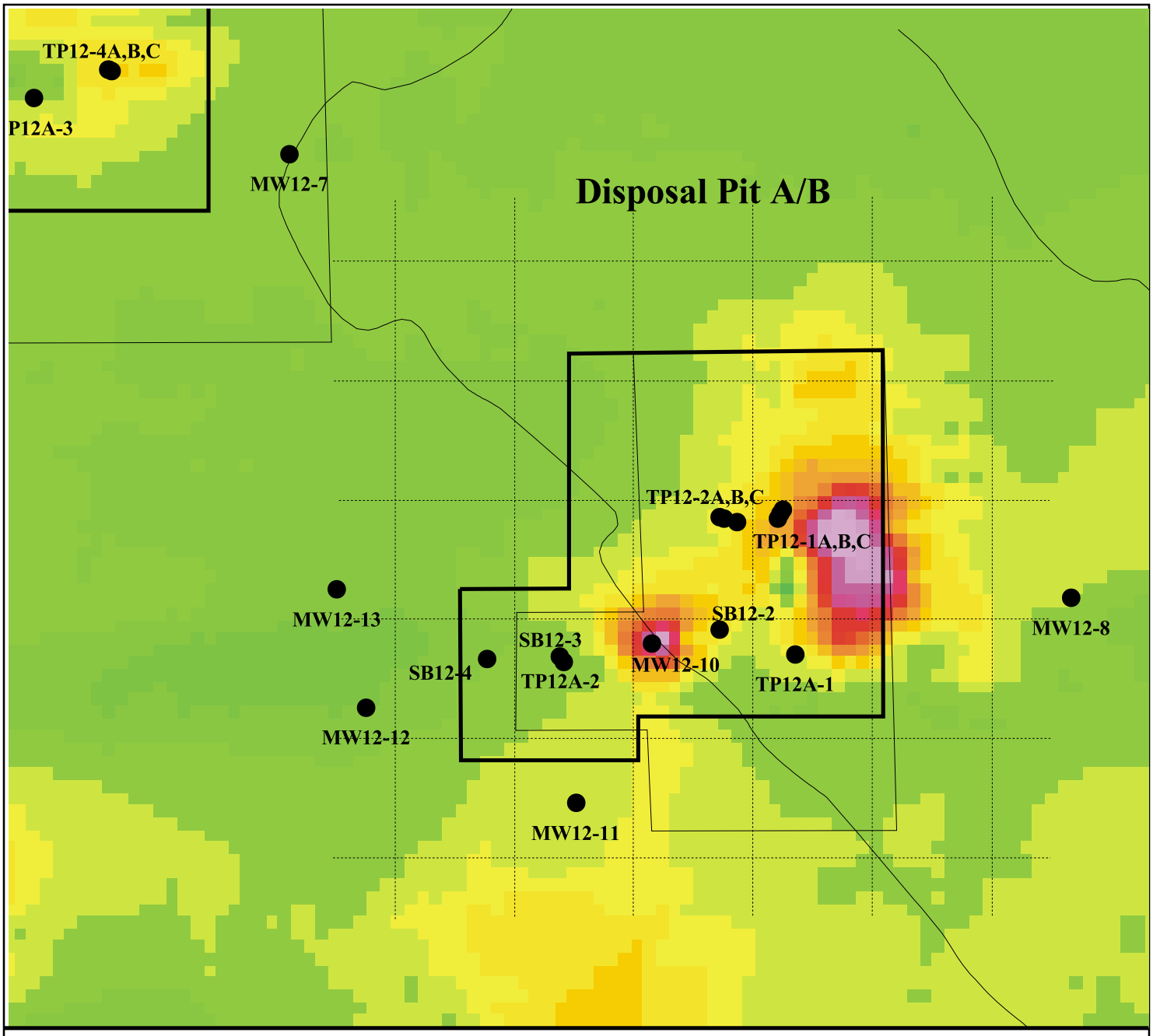


100 0 100 Feet

LEGEND

MW12-15 Sub-surface Soil sample with Loc_ID.

Approximate Area to be Excavated

N W E S

PARSONS

SENECA ARMY DEPOT ACTIVITY
REMOVAL ACTION WORK PLAN
SEAD-12

Figure 2-2
Electromagnetic Data for Disposal Pit A/B

March 2009

Test Pit Contents

TP12-8 (EM-21)
Concrete, rebar and wire construction debris

TP12-7A (EM-22)
Steel pipe, culvert sections

TP12-5 (EM-23)
Concrete and rebar construction debris

TP12-23 (EM-23)
Steel posts, pipe, lumber

TP12-6 (EM-23)
Concrete and rebar construction debris, asphalt road

TP12-3 (EM-24)
Sheet metal, fiberglass, styrofoam, electrical debris,
cone shaped military items removed and drummed

TP12-4 (EM-24)
Large stainless steel cylinder found but not removed

TP12A-8
None

TP12A-7
None

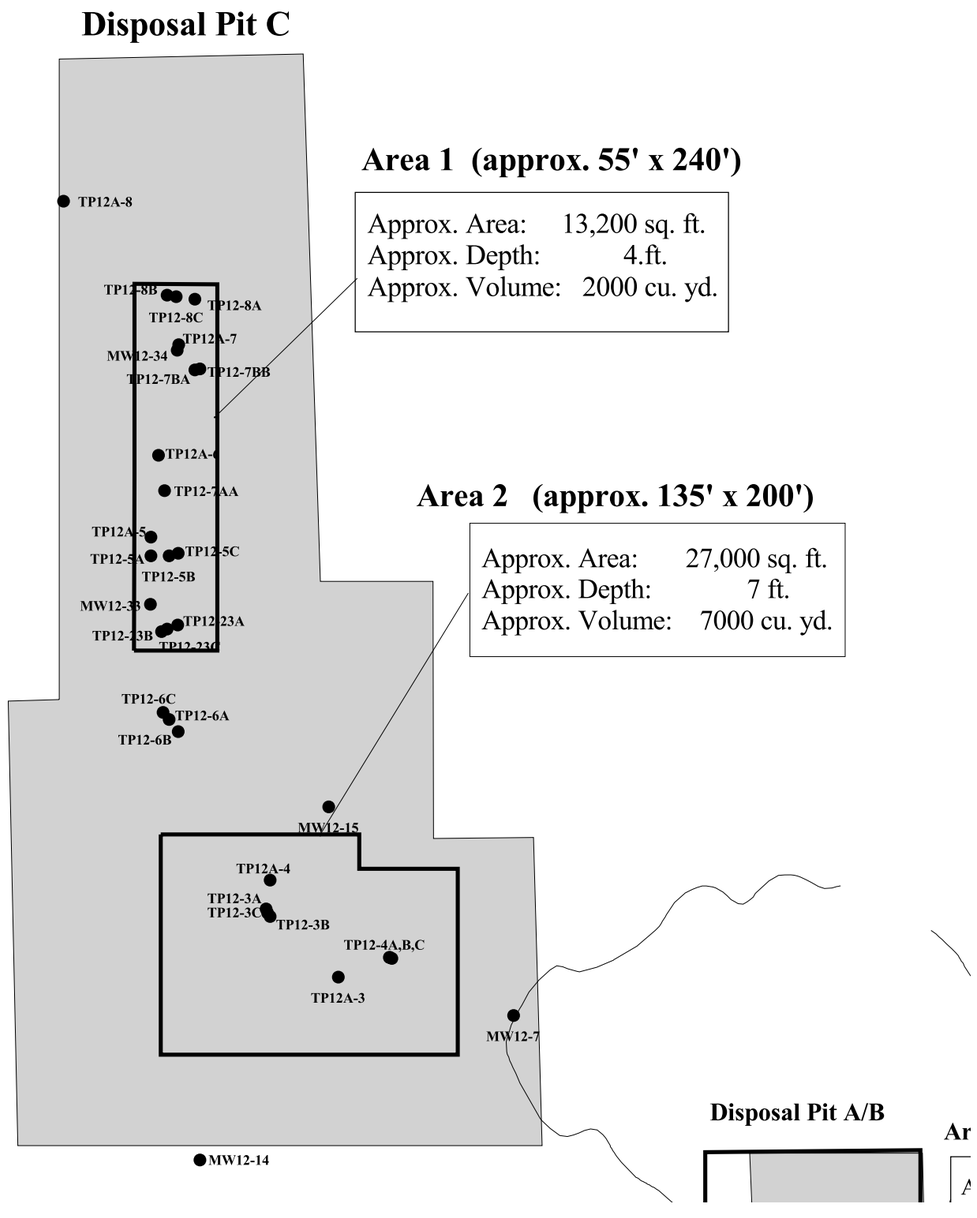
TP12-7B
Culvert pipe, fired NATO 7.62 black casing,
heavy gauge wire, aluminum foil

TP12A-6
None

TP12A-5
Piece of glass

TP12A-4
Large cylindrical object composed
of concrete and styrofoam

TP12A-3
Foreign components,
(4) SEAD 'Trainer' 1950's style



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S

LEGEND

MW12-15 Sub-surface Soil sample with Loc_ID.

Approximate Area to be Excavated

100 0 100 Feet

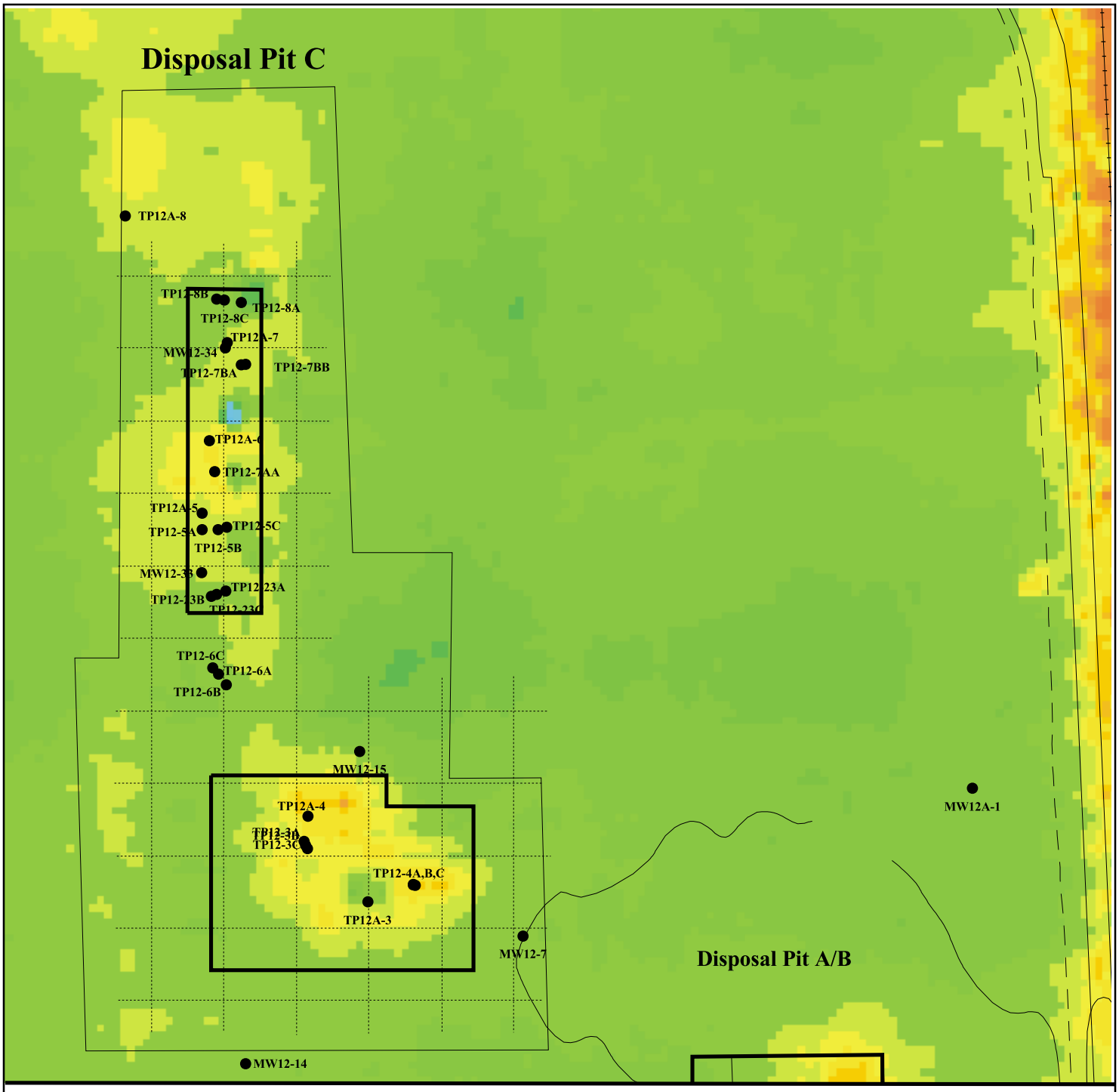
PARSONS

SENECA ARMY DEPOT ACTIVITY
REMOVAL ACTION WORK PLAN
SEAD-12

Figure 2-3
Approximate Excavation Limits
for Disposal Pit C

March 2009

O:\SENECA\SEAD-12\FS_2007\SUB_SOIL.APR\(4)Fig2-4 Disposal Pit C 11 x 17



100 0 100 Feet

LEGEND

MW12-15 Sub-surface Soil sample with Loc_ID.

Approximate Area to be Excavated

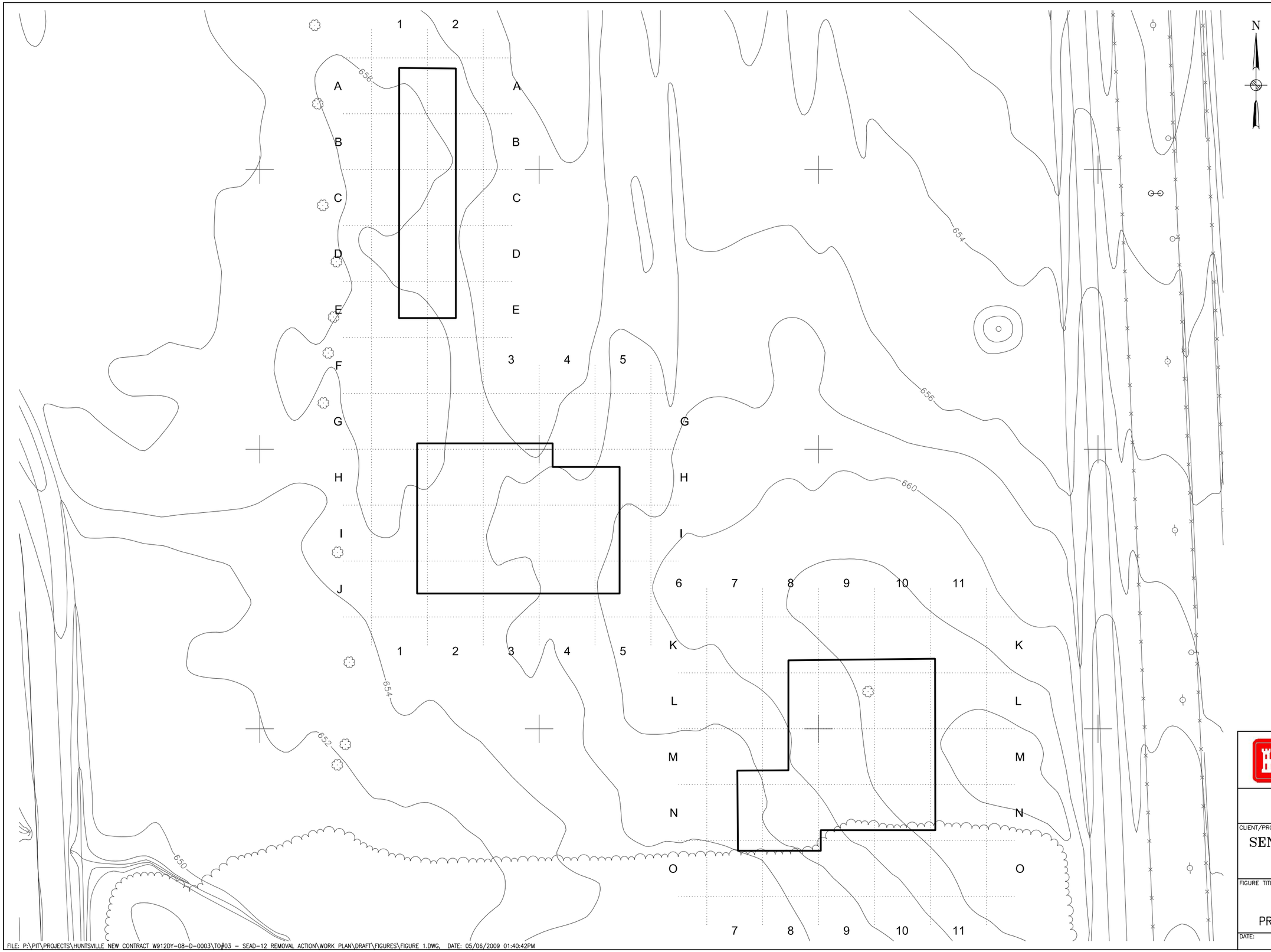
N W E S

PARSONS

SENECA ARMY DEPOT ACTIVITY
REMOVAL ACTION WORK PLAN
SEAD-12

Figure 2-4
Electromagnetic Data for Disposal Pit C

March 2009



PARSONS

CLIENT/PROJECT TITLE:

SENECA ARMY DEPOT ACTIVITY
REMOVAL ACTION WORKPLAN
SEAD-12

FIGURE TITLE:

FIGURE 3-1
SEAD -12
PROPOSED EXCAVATION SAMPLING GRID

DATE: MARCH 2009

FILE: P:\PIT\PROJECTS\HUNTSVILLE NEW CONTRACT W912DY-08-D-0003\TO#03 - SEAD-12 REMOVAL ACTION\WORK PLAN\DRAFT\FIGURES\FIGURE 1.DWG, DATE: 05/06/2009 01:40:42PM

1 0 1 2 Miles

LEGEND

EGRESS AND ACCESS ROUTES

DISPOSAL PIT AREA

BACKFILL MATERIAL STAGING AREA

STAGING AND SORTING AREA

N W E S

PARSONS

SENECA ARMY DEPOT ACTIVITY
REMOVAL ACTION WORK PLAN
SEAD-12

Figure 3-2
Truck Route

March 2009

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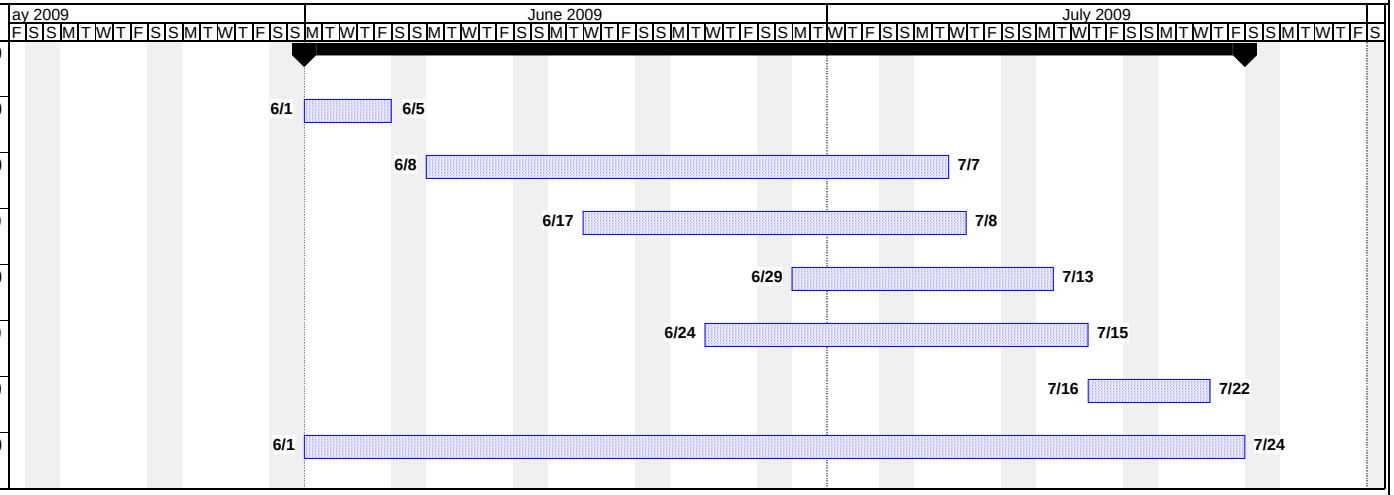
Figure 8-1
NON-TIME CRITICAL REMOVAL ACTION AT THE RADIOLOGICAL SITES (SEAD-12)
SENECA ARMY DEPOT ACTIVITY, ROMULUS, NEW YORK

ID	Task Name	Duration	Start
1	**NTCRA SEAD-12**	**40 days**	**Mon 6/1/09**
2	Mobilization	5 days	Mon 6/1/09
3	Excavation	22 days	Mon 6/8/09
4	Screening	16 days	Wed 6/17/09
5	Backfill	11 days	Mon 6/29/09
6	Loading	16 days	Wed 6/24/09
7	Site Restoration	5 days	Thu 7/16/09
8	Site Services	40 days	Mon 6/1/09



Project: Project Schedule_101608
Date: Wed 4/8/09

Task | Summary | Rolled Up Progress | Project Summary
Progress | Rolled Up Task | Split | Group By Summary
Milestone | Rolled Up Milestone | External Tasks | Deadline

APPENDICES

APPENDIX A

SUPPLEMENTAL HEALTH AND SAFETY INFORMATION

1.0 SUPPLEMENTAL HEALTH AND SAFETY PLAN

Information provided in this document is intended only for supplemental purposes and is not intended to be an all inclusive HSP. Refer to the Accident Prevention Plan and Generic Site Wide Health and Safety Plan for Seneca Army Depot Activity" (Parsons, 2005) for SEAD-12.

2.0 Background Information

Contractor

Parsons Infrastructure & Technology Group Inc. (Parsons)
150 Federal Street, 4th Floor
Boston, Massachusetts 02110-1713
(617) 946-9400 telephone
(617) 946-9777 facsimile

Contract Number

Contract No. W912DY-08-D-0003, Task Order No. 0003

Objective of Removal Action

The primary objective of this removal action is to excavate and segregate classified military-related materials from other debris and soil that may be present in the disposal pits at SEAD-12 to prevent public access to the classified or sensitive military material. Refer to the Figure included as part of the removal action plan for the location of the three disposal pits located within SEAD-12.

Brief Description of Work to be Performed, and Location

The remedial activities for the Disposal Pits A/B and C at SEAD-12 addressed in the work plan include the following:

- Excavating and segregate classified military-related materials from other debris and soil that are present in Disposal Pits A/B and C.
- Dewatering excavations, if warranted by pumping the water into a holding tank.
- Provide contingencies if hazardous substances are found in the excavated material.
- Stabilize soil exceeding the waste characterization criteria, if found, in order to render it non-hazardous.
- Disposing of the military material excavated debris and soil/fill containing hazardous substances above concentrations that allow for unrestricted use in off-site landfills.
- Backfill excavations with the existing non-contaminated soil/fill (not debris) removed from excavations and clean fill as necessary.
- Submitting a Completion Report after completion of the remedial action.

3.0 Air Monitoring

The air monitoring plan has been developed to protect the workers involved in the construction at the three disposal pits located at SEAD-12. Public health and safety will be ensured by monitoring within the work zone and creating an exclusion zone surrounding the construction area. The air monitoring for hazardous constituents and particulates will be conducted in accordance with the air monitoring program outlined in Section A8 of the Accident Prevention Plan and Generic Site Wide Health and Safety Plan for Seneca Army Depot Activity (Parsons 2005).

In addition, perimeter air monitoring will also be conducted in accordance with the New York State Department of Health (NYSDOH) Generic Community Air Monitoring Plan (CAMP). Based on requirements specified in the NYSDOH CAMP, the perimeter air monitoring program will consist of respirable airborne dust particulates (particulate matter less than 10 microns – PM10). Although the CAMP also requires real-time perimeter measurements for total volatile organic compounds (VOCs), such monitoring is not applicable at SEAD-12 since VOCs are not contaminates of concern (COC) at Disposal Pits A/B and C.

Although radiological contamination is not expected to be present, the radiological contractor selected to perform field radioactivity scanning is Cabrera Services, Inc (Cabrera) of East Hartford, Connecticut. If it is determined that radiation hazards are present, field activities will be performed in accordance with Cabrera's Radiation Safety Program (RSP) Plan. The RSP will ensure that contamination control activities are effective, samples and areas are not cross-contaminated, occupational doses are maintained as low as reasonably achievable (ALARA), and workers and the environment are protected. Implementation of the RSP will include a method to identify and prevent the release of potentially contaminated items from radiological control areas.

4.0 Accident and Incident Notification

Program/Project Managers measure and report accidents and incidents, injuries, near misses, and property damage as part of the ongoing process of enhancing project safety performance. Parsons' policy is that all incidents must be reported through the local supervisor and Project Manager to the GBU Safety Manager within four hours of the initial incident. See **Attachment A** for instructions how to use the Parsons Online Safety Reporting System. If internet access is not available, the Incident/Accident Report Form in **Attachment A** may be used. The GBU Safety Manager is responsible for notifying the Corporate Workers Compensation Analyst.

If an incident results in a lost workday case (LWDC) or worse, the Project Manager and immediate supervisor must call the GBU President within four hours. Any fatality, injury of a private citizen, property loss or damage in excess of $50,000, or catastrophes require immediate notification of the GBU or Corporate Safety Manager. Parsons will also notify the Army of any lost workday or worse incident. Army guidance and requirements regarding accident reporting, and the ENG Form 3394 are included as **Attachment B**.

OSHA requires reporting any work site fatality or accidents involving the hospitalization of three or more employees to the nearest OSHA office within eight hours. Reporting to OSHA is coordinated through the GBU or Corporate Safety Manager.

In addition to the required reporting of incidents, Project Managers establish key safety metrics appropriate to the work. These metrics, which include both leading and lagging indicators, are typically measured each month and reported to all project staff as a quality improvement measure. Common performance metrics are shown in **Table 1**.

Table 1
Safety and Health Performance Metrics

Category	Metrics
Accident Rates	Recordable Incident Frequency Rate Days Away from Work Incident Frequency Rate Severity Rate (numbers of days away from work)
Accident Costs	Total incurred workers compensation costs Loss ratios (W/C losses/premium)
Near Misses	Number of near misses reported and investigated
Training	START training participation Zero Incident Techniques training participation Parsons University monthly/quarterly participation Project-specific training participation
Inspections	Number and results (scored) of management inspections Audit results
Meetings	Participation in daily huddles or weekly toolbox meetings

4.1 Accident Investigations, Reports and Logs

Incident investigations are an important element of Parsons' safety program because they provide useful information to prevent similar incidents. Incident investigations identify root causes, system failures, unsafe acts and conditions, and noncompliance with or inadequacy of the PSP. All significant near miss, injury, illness, or major equipment or property damage incidents (including process interruptions) require an investigation.

The Project Manager and Safety Manager must conduct the on-site investigation immediately and prepare an incident investigation report. Additional participants may include the Project Controls Manager and the Project Human Resources Manager. The GBU Safety Manager or a designee completes the on-line safety reporting system incident investigation tab while Corporate Safety disseminates the results of the completed investigation throughout the Corporation as appropriate to implement lessons learned.

The purpose of an investigation is to identify all possible contributing root causes to prevent future incidents of a similar type. The investigation also determines factors that may affect Parsons' legal liability. Simple incidents may require only a brief investigation by the Project Manager or Safety Manager while more complex or significant incidents require a formal team investigation as described below. The investigation team must perform its job diligently and professionally.

The incident report must contain only facts, avoiding personal opinions, speculation, or conclusions. A paper copy of the report is maintained at the project site; electronic copies are submitted to the on-line safety reporting system as attachments to the investigation page.

5.0 Medical Support

At least one member of each field team will be trained in first aid and CPR. They, along with (or including) the Site Health and Safety Officer will be available to provide treatment as necessary.

Phone numbers for emergency personnel are posted at the jobsite. The nearest occupational clinic is Life Care Medical Associates in Seneca Falls, New York. The nearest hospital is Geneva Hospital. Driving directions to both facilities are included in **Attachment C**. Life threatening, medical emergencies, and after-hours at clinic will be sent to the hospital for treatment. Otherwise, a work related injury which is not a medical emergency; it is *preferable* that injured personnel go to the industrial clinic (e.g., Life Care Medical Associates).

ATTACHMENT A

PARSONS ACCIDENT AND INCIDENT NOTIFICATION

Parsons Project Incident/Accident Report Form

PLEASE PRINT

Attach all supplemental documentation, including photos, diagrams, witness statements and field reports

PROJECT Information	Project Title		Location	
	Subcontractor			
	Address			
	City, State, Zip			
	Contact Name		Phone Number	

INCIDENT Type	☐ **Worker's Compensation** ☐ Emergency Response Notified (Police, Fire, Medic, etc.) ☐ First-Aid Only ☐ Recordable Injury	☐ **General Liability** ☐ Bodily Injury/Illness ☐ Real Property Damage ☐ Personal Property Damage ☐ Utility Property Damage	☐ **Builder's Risk** ☐ Equipment ☐ Supplies ☐ Machinery ☐ Work

Incident Location	Date of Loss		Time of Loss	
	Place (exact location)			

Incident Description	Detailed Description of Accident

Worker's Comp Or Personal Injury (circle one)	Injured Name			
	Address			
	City, State, Zip			
	Home Phone		Date of Birth	
	Nature of Injury			
	Medical Facility		Work Status	
	Treatment Received			

Property Damage Or Builder's Risk (circle one)	Owner's Name			
	Address			
	City, State, Zip			
	Home Phone		Work Phone	
	Damage Type		Estimated Cost	
	Utility Type		Marked or Unmarked	
	Description of Damage			

WITNESS Information	Name			
	Address			
	City, State, Zip			
	Home Phone		Work Phone	
	Where to contact		Time to contact	

Contractor Subcontractor Action	Describe actions taken

Signature _____ Employer _____
Print Name _____ Date _____
Phone No. _____ Fax Number _____

On-Line Safety Reporting System

Policy Requirements

- Initial incident reports for all incidents, including near misses, shall be reported within 4 hours.
- Detail incident reports are required within 24 hours.
- Reporting is done via on-line (PWeb) incident report form.
- Injuries with Days Away from Work - immediate supervisor and PM must teleconference with GBU President within 4 hours.
- Projects enter hours via on-line form by FIRST Friday of new period.

Reporting Incidents

Corporate policy requires that all employees report safety incidents to their supervisor immediately. Supervisors must report all incidents to the appropriate Project Manager (Department Manager if the incident is not related to a project), who must officially report the incident to the GBU within four hours. This official reporting is done via the PWeb, unless PWeb is unavailable, in which case the incident can be reported by email, fax or telephone.

"Incidents" include work related injuries, work related illness, accidents with property damage only and near misses. "Near misses" are any unplanned event that had the potential to (but did not) result in injury or property damage.

Incident reports should reflect the best available information at the time. Where exact information is not known (recordability, days away from work, etc.) the PM's best judgment should be used when completing the initial incident report. This information can be subsequently revised when the detail incident report is submitted.

When in doubt, submit an initial report or contact the GBU Safety Manager.

On-line Reporting System

The on-line reporting system can be found on the PI&T Safety Page on PWeb. To locate the system, follow these steps:

1. From the Corporate PWeb Homepage, select PI&T from the Org Units menu
2. Locate and select "Safety" from the list of pages in the right hand column
3. Select the "Incident Reporting Form" link

To create and submit a new incident report, select the orange "Add" button from the main page of the reporting system. To update and existing incident report or complete the Detail Incident page, locate and select the appropriate incident from the list.

Creating or Updating Incidents

The Initial Incident page of the report must be completed within four hours of the incident occurring. This page includes basic information needed for the first notification to our insurance

carriers. If possible, all of the fields should be completed in the initial report. A list is provided at the end of this document describing all fields contained on the initial incident page.

Incident Detail Reports

Within 24 hours of the incident occurring, the Incident Detail page of the on-line report must be completed. This page includes detailed information about the injured party, the nature and extent of injuries, medical treatment provided, corrective actions taken, and witness statements. In the event of property damage, this page also includes descriptive information on the property owner. Finally, the page includes a section to include electronic attachments. These might include photographs, signed witness statements, etc.

Monthly Reporting of Hours

Hours must be entered into the on-line reporting system no later than the first Friday of the new period. If an accurate accounting of hours is not available, estimated hours are submitted into the system. The estimated hours can be revised later in the month, or the following month, when accurate data is available.

From the "Hours" page, select the GBU and the period (month and year) that is being reported. The system only allows hours to be entered for the period selected. MTD and PTD figures are calculated totals based on the sum of all monthly entries. To enter or correct a prior period entry, simply select that month from the drop-down box and correct the figures for that month.

Be sure to select the correct month and year when entering hours.

Hours must be entered for each (as applicable) of six different labor categories. The categories are as follows:

- Contractor (Field/Craft)
- Contractor (Office/Admin)
- JV Partner (Field/Craft)
- JV Partner (Office/Admin)
- Parsons Employee (Field/Craft)
- Parsons Employee (Office/Admin)

Monthly Statistics Summary Reports

The on-line reporting system automatically calculates incident rates based on incidents and hours entered into the system. To view the statistics, select the "Reports" page from the on-line system. Select "Parsons Safety Statistics Summary", the appropriate GBU, and the appropriate period. (NOTE: The system does not yet provide reports at the Division and Sector level. That enhancement is pending.) Use the checkboxes to select the labor categories desired.

Contact Rick McAlpin or Jim Owen for Assistance

Initial Incident Report Fields

1. GBU – Select the GBU from the drop down box. Incidents are reported primarily by project, and the GBU should reflect the unit responsible for the project. This may be different from the GBU that employees the person injured.
2. Field Project Name, Office Location or Other – If the applicable project is listed in the "Field Project" list, select from that box. If not, and if the incident occurred in a Parsons corporate office, select the office from the drop box. Otherwise, type in the name of the responsible organizational unit in the "Other" field. The GBU must be selected BEFORE attempting to select a Project/Office. Do NOT select both a field project AND an Office Location (or Other). If the appropriate Project or Office name can not be found, manually enter it into the "Other" field.
3. Job and WBS Numbers – These fields should reflect the charge number responsible for the incident. In general, that will be the number that the employee was charging at the time of the incident. Projects are responsible for visitors, regardless of what charge number they use while visiting the job. For example, if the Division Manager is injured while visiting Project X, the project number is entered, not the division overhead account.
4. Near Miss – Check this box if the report is for a near miss only (no injury or property damage occurred).
5. Emergency Response Notified – Check this box if fire, police or ambulance was called as a result of the incident.
6. Three or More Employees Hospitalized – Check this box if three or more employees were injured as the result of a single incident. In this case, the GBU or Corporate Safety Manager must also be immediately notified by telephone.
7. Extent of Injury – Select the appropriate radio button. First aid cases are as defined by OSHA 1904 criteria. All other injuries are considered recordable.
8. Restricted Duty (# of days) – If the injured person was limited (by a physician) to less than normal work duration or duties, enter the number of days. Estimate the days if unknown, and correct the number later. NOTE: this is the number of CALENDAR days (not scheduled work days), and it does NOT include the day of the injury.
9. Days Away From Work (# of days) – If the injured person was ordered by a physician not to return to work, enter the number of days missed. Estimate the days if unknown, and correct the number later. NOTE: this is the number of CALENDAR days (not scheduled work days), and it does NOT include the day of the injury. Injuries with Days Away From Work require a phone call to the GBU President within 4 hours.
10. Fatality (Date of Death) – In the event of a work related fatality, enter the date of death here. NOTE: Fatalities require immediate phone notification of the Division Manager, GBU President, GBU Safety Manager, and Corporate Safety Manager.
11. Property Damage – Check the appropriate boxes if applicable.
12. Place – Describe the exact location that incident occurred. For example, "in the north stairwell of building 21, between the second and third floor."
13. Date – This field reflects the date the incident occurred, not necessarily the date it was reported. If the exact date is not known, an estimate should be used.
14. Time – This field reflects the time of day that the incident occurred. If the exact time is not known, an estimate should be used.
15. Incident Description – Provide a detailed description of the incident. This is a memo field and text will scroll down the window as it is entered. Use as much space as needed to accurately describe the incident and the resulting injuries.

16. Reported by – This field defaults to the employee login ID that was used to access PWeb. However, the field can be over-written if needed.
17. Name – First and last name of the injured party.
18. Status – Select the most appropriate category from the drop box (Employee - Field, Subcontractor - Field, Partner - Field, Employee - Office, Subcontractor - Office, Partner - Office or 3rd Party).
19. Trade/Function – Select the most appropriate category from the drop box.

ATTACHMENT B

ARMY ACCIDENT AND INCIDENT NOTIFICATION

(For Safety Staff only)	REPORT NO.	EROC CODE	**UNITED STATES ARMY CORPS OF ENGINEERS ACCIDENT INVESTIGATION REPORT** *(For Use of this Form See Help Menu and USACE Suppl to AR 385-40)*	**REQUIREMENT CONTROL SYMBOL: CEEC-S-8(R2)**

1. ACCIDENT CLASSIFICATION

PERSONNEL CLASSIFICATION	INJURY/ILLNESS/FATAL	PROPERTY DAMAGE	MOTOR VEHICLE INVOLVED	DIVING
GOVERNMENT ☐ CIVILIAN ☐ MILITARY	☐	☐ FIRE INVOLVED ☐ OTHER	☐	☐
☐ CONTRACTOR	☐	☐ FIRE INVOLVED ☐ OTHER	☐	☐
☐ PUBLIC	☐ FATAL ☐ OTHER		☐	

2. PERSONAL DATA

a. Name *(Last, First, MI)*	b. AGE	c. SEX ☐ MALE ☐ FEMALE	d. SOCIAL SECURITY NUMBER	e. GRADE

f. JOB SERIES/TITLE	g. DUTY STATUS AT TIME OF ACCIDENT	h. EMPLOYMENT STATUS AT TIME OF ACCIDENT
	☐ ON DUTY ☐ TDY ☐ OFF DUTY	☐ ARMY ACTIVE ☐ ARMY RESERVE ☐ VOLUNTEER ☐ PERMANENT ☐ FOREIGN NATIONAL ☐ SEASONAL ☐ TEMPORARY ☐ STUDENT ☐ OTHER *(Specify)* _____

3. GENERAL INFORMATION

a. DATE OF ACCIDENT *(month/day/year)*	b. TIME OF ACCIDENT *(Military time)* hrs	c. EXACT LOCATION OF ACCIDENT	d. CONTRACTOR'S NAME (1) PRIME: (2) SUBCONTRACTOR:

e. CONTRACT NUMBER	f. TYPE OF CONTRACT	g. HAZARDOUS/TOXIC WASTE ACTIVITY
_____ ☐ CIVIL WORKS ☐ MILITARY ☐ OTHER *(Specify)* _____	☐ CONSTRUCTION ☐ SERVICE ☐ A/E ☐ DREDGE ☐ OTHER *(Specify)* _____	☐ SUPERFUND ☐ DERP ☐ IRP ☐ OTHER *(Specify)* _____

4. CONSTRUCTION ACTIVITIES ONLY *(Fill in line and corresponding code number in box from list - see help menu)*

a. CONSTRUCTION ACTIVITY	(CODE) #	b. TYPE OF CONSTRUCTION EQUIPMENT	(CODE) #

5. INJURY/ILLNESS INFORMATION *(Include name on line and corresponding code number in box for items e, f & g - see help menu)*

a. SEVERITY OF ILLNESS/INJURY	(CODE) #	B. ESTIMATED DAYS LOST	C. ESTIMATED DAYS HOSPITALIZED	D. ESTIMATED DAYS RESTRICTED DUTY

e. BODY PART AFFECTED	(CODE) #	g. TYPE AND SOURCE OF INJURY/ILLNESS	(CODE) #
PRIMARY _____		TYPE _____	
SECONDARY _____		SOURCE _____	
f. NATURE OF ILLNESS / INJURY _____			

6. PUBLIC FATALITY *(Fill in line and correspondence code number in box - see help menu)*

a. ACTIVITY AT TIME OF ACCIDENT	(CODE) #	b. PERSONAL FLOATATION DEVICE USED?
		☐ YES ☐ NO ☐ N/A

7. MOTOR VEHICLE ACCIDENT

a. TYPE OF VEHICLE	b. TYPE OF COLLISION	c. SEAT BELTS	USED	NOT USED	NOT AVAILABLE
☐☐ PICKUP/VAN ☐☐ AUTOMOBILE ☐☐ TRUCK ☐☐ OTHER *(Specify)* _____	☐ SIDE SWIPE ☐ HEAD ON ☐ REAR END ☐ BROADSIDE ☐ ROLL OVER ☐ BACKING ☐ OTHER *(Specify)* _____	(1) FRONT SEAT			
		(2) REAR SEAT			

8. PROPERTY/MATERIAL INVOLVED

a. NAME OF ITEM	B. OWNERSHIP	C. $ AMOUNT OF DAMAGE
(1)		
(2)		
(3)		

9. VESSEL/FLOATING PLANT ACCIDENT *(Fill in line and correspondence code number in box from list - see help menu)*

a. TYPE OF VESSEI/FLOATING PLANT	(CODE) #	b. TYPE OF COLLISION/MISHAP	(CODE) #

10. ACCIDENT DESCRIPTION *(Use additional paper, if necessary)*

See attached page.

11. CAUSAL FACTOR(S) *(Read Instruction Before Completing)*

a. (Explain YES answers in item 13)	YES	NO
DESIGN: Was design of facility, workplace or equipment a factor?	☐	☐
INSPECTION/MAINTENANCE: Were inspection & maintenance procedures a factor?	☐	☐
PERSON'S PHYSICAL CONDITION: In your opinion, was the physical condition of the person a factor?	☐	☐
OPERATING PROCEDURES: Were operating procedures a factor?	☐	☐
JOB PRACTICES: Were any job safety/health practices not followed when the accident occurred?	☐	☐
HUMAN FACTORS: Did any human factors such as, size or strength of person, etc., contribute to accident?	☐	☐
ENVIRONMENTAL FACTORS: Did heat, cold, dust, sun, glare, etc., contribute to the accident?	☐	☐

a. *(CONTINUED)*	YES	NO
CHEMICAL AND PHYSICAL AGENT FACTORS: Did exposure to chemical agents, such as dust, fumes, mists, vapors or physical agents, such as, noise, radiation, etc., contribute to accident?	☐	☐
OFFICE FACTORS: Did office setting such as, lifting office furniture, carrying, stooping, etc., contribute to the accident?	☐	☐
SUPPORT FACTORS: Were inappropriate tools/resources provided to properly perform the activity/task?	☐	☐
PERSONAL PROTECTIVE EQUIPMENT: Did the improper selection, use or maintenance of personal protective equipment contribute to the accident?	☐	☐
DRUGS/ALCOHOL: In your opinion, was drugs or alcohol a factor to the accident	☐	☐

b. WAS A WRITTEN JOB/ACTIVITY HAZARD ANALYSIS COMPLETED FOR TASK BEING PERFORMED AT TIME OF ACCIDENT?

☐ YES *(If yes, attach a copy.)* ☐ NO

12. TRAINING

a. WAS PERSON TRAINED TO PERFORM ACTIVITY/TASK?	b. TYPE OF TRAINING.	c. DATE OF MOST RECENT FORMAL TRAINING.
☐ YES ☐ NO	☐ CLASSROOM ☐ ON JOB	(Month) (Day) (Year)

13. FULLY EXPLAIN WHAT ALLOWED OR CAUSED THE ACCIDENT; INCLUDE DIRECT AND INDIRECT CAUSES *(See instruction for definition of direct and indirect causes.) (Use additional paper, if necessary)*

a. DIRECT CAUSE

See attached page.

b. INDIRECT CAUSE(S)

See attached page.

14. ACTION(S) TAKEN, ANTICIPATED OR RECOMMENDED TO ELIMINATE CAUSE(S).

DESCRIBE FULLY:

See attached page.

15. DATES FOR ACTIONS IDENTIFIED IN BLOCK 14.

a. BEGINNING (Month/Day/Year)	b. ANTICIPATED COMPLETION (Month/Day/Year)

c. SIGNATURE AND TITLE OF SUPERVISOR COMPLETING REPORT	d. DATE *(Mo/Da/Yr)*	e. ORGANIZATION IDENTIFIER *(Div, Br, Sect)*	f. OFFICE SYMBOL
CORPS _____			
CONTRACTOR _____			

16. MANAGEMENT REVIEW *(1st)*

a. ☐ CONCUR b. ☐ NON CONCUR c. COMMENTS

SIGNATURE	TITLE	DATE

17. MANAGEMENT REVIEW *(2nd - Chief Operations, Construction, Engineering, etc.)*

a. ☐ CONCUR b. ☐ NON CONCUR c. COMMENTS

SIGNATURE	TITLE	DATE

18. SAFETY AND OCCUPATIONAL HEALTH OFFICE REVIEW

a. ☐ CONCUR b. ☐ NON CONCUR c. ADDITIONAL ACTIONS/COMMENTS

SIGNATURE	TITLE	DATE

19. COMMAND APPROVAL

COMMENTS

COMMANDER SIGNATURE	DATE

*U.S. GOVERNMENT PRINTING OFFICE: 1993-0-791-757

10. ACCIDENT DESCRIPTION *(Continuation)*

13a. DIRECT CAUSE *(Continuation)*

13b. INDIRECT CAUSES *(Continuation)*

14. ACTION(S) TAKEN, ANTICIPATED, OR RECOMMENDED TO ELIMINATE CAUSE(S) *(Continuation)*

GENERAL. Complete a separate report for each person who was *injured, caused,* or *contributed* to the accident (excluding uninjured personnel and witnesses). Use of this form for reporting USACE employee first-aid type injuries not submitted to the Office of Workers' Compensation Programs (OWCP) shall be at the descretion of the FOA commander. Please type or print legibly. Appropriate items shall be marked with an "X" in box(es). If additional space is needed, provide the information on a separate sheet and attach to the completed form. Ensure that these instructions are forwarded with the completed report to the designated management reviewers indicated in sections 16. and 17.

INSTRUCTIONS FOR SECTION 1— ACCIDENT CLASSIFICATION. *(Mark All Boxes That Are Applicable.)*

a. GOVERNMENT. Mark "CIVILIAN" box if accident involved government civilian employee; mark "MILITARY" box if accident involved U.S. military personnel.
   (1) INJURY/ILLNESS/FATALITY—Mark if accident resulted in any government civilian employee injury, illness, or fatality that requires the submission of OWCP Forms CA-1 (injury), CA-2 (illness), or CA-6 (fatality) to OWCP; mark if accident resulted in military personnel lost-time or fatal injury or illness.
   (2) PROPERTY DAMAGE—Mark the appropriate box if accident resulted in any damage of $1000 or more to government property (including motor vehicles).
   (3) VEHICLE INVOLVED—Mark if accident involved a motor vehicle, *regardless* of whether "INJURY/ILLNESS/FATALITY" or "PROPERTY DAMAGE" are marked.
   (4) DIVING ACTIVITY—Mark if the accident involved an in-house USACE diving activity.

b. CONTRACTOR.
   (1) INJURY/ILLNESS/FATALITY—Mark if accident resulted in any contractor lost-time injury/illness or fatality.
   (2) PROPERTY DAMAGE—Mark the appropriate box if accident resulted in any damage of $1000 or more to contractor property (including motor vehicles).
   (3) VEHICLE INVOLVED—Mark if accident involved a motor vehicle, *regardless* of whether "INJURY/ILLNESS/FATALITY" or "PROPERTY DAMAGE" are marked.
   (4) DIVING ACTIVITY—Mark if the accident involved a USACE Contractor diving activity.

c. PUBLIC.
   (1) INJURY/ILLNESS/FATALITY—Mark if accident resulted in public fatality or permanent total disability. (The "OTHER" box will be marked when requested by the FOA to report an unusual non-fatal public accident that could result in claims against the government or as otherwise directed by the FOA Commander).
   (2) VOID SPACE—Make no entry.
   (3) VEHICLE INVOLVED—Mark if accident resulted in a fatality to a member of the public and involved a motor vehicle, *regardless* of whether "INJURY/ILLNESS/FATALITY" is marked.
   (4) VOID SPACE—Make no entry.

INSTRUCTIONS FOR SECTION 2—PERSONAL DATA

a. NAME—(MANDATORY FOR GOVERNMENT ACCIDENTS. OPTIONAL AT THE DISCRETION OF THE FOA COMMANDER FOR CONTRACTOR AND PUBLIC ACCIDENTS). Enter last name, first name, middle initial of person involved.

b. AGE—Enter age.

c. SEX—Mark appropriate box.

d. SOCIAL SECURITY NUMBER—(FOR GOVERNMENT PERSONNEL ONLY) Enter the social security number (or other personal identification number if no social security number issued).

e. GRADE—(FOR GOVERNMENT PERSONNEL ONLY) Enter pay grade. Example: O-6; E-7; WG-8; WS-12; GS-11; etc.

f. JOB SERIES/TITLE—For *government civilian employees* enter the pay plan, full series number, and job title, e.g. GS-0810/Civil Engineer. For *military personnel* enter the primary military occupational specialty (PMOS), e.g., 15A30 or 11G50. For *contractor employees* enter the job title assigned to the injured person, e.g. carpenter, laborer, surveyor, etc.,

g. DUTY STATUS—Mark the appropriate box.
   (1) ON DUTY—Person was at duty station during duty hours or person was away from duty station during duty hours but on official business at time of the accident.
   (2) TDY - Person was on official business, away from the duty station and with travel orders at time of accident. Line-of-duty investigation required.
   (3) OFF DUTY - Person was not on official business at time of accident

h. EMPLOYMENT STATUS—(FOR GOVERNMENT PERSONNEL ONLY) Mark the most appropriate box. If "OTHER" is marked, specify the employment status of the person.

INSTRUCTION FOR SECTION 3—GENERAL INFORMATION

a. DATE OF ACCIDENT—Enter the month, day, and year of accident.

b. TIME OF ACCIDENT—Enter the local time of accident in military time. Example: 1430 hrs (not 2:30 p.m.).

c. EXACT LOCATION OF ACCIDENT—Enter facts needed to locate the accident scene. (installation/project name, building number, street, direction and distance from closest landmark, etc.,).

d. CONTRACTOR NAME
   (1) PRIME—Enter the exact name (title of firm) of the prime contractor.
   (2) SUBCONTRACTOR—Enter the name of any subcontractor involved in the accident.

e. CONTRACT NUMBER—Mark the appropriate box to identify if contract is civil works, military, or other: if "OTHER" is marked, specify contract appropriation on line provided. Enter complete contract number of prime contract, e.g., DACW 09-85-C-0100.

f. TYPE OF CONTRACT—Mark appropriate box. A/E means architect/engineer. If "OTHER" is marked, specify type of contract on line provided.

g. HAZARDOUS/TOXIC WASTE ACTIVITY (HTW)—Mark the box to identify the HTW activity being performed at the time of the accident. For Superfund, DERP, and Installation Restoration Program (IRP) HTW activities include accidents that occurred during inventory, predesign, design, and construction. For the purpose of accident reporting, DERP Formerly Used DoD Site (FUDS) activities and IRP activities will be treated separately. For Civil Works O&M HTW activities mark the "OTHER" box.

INSTRUCTIONS FOR SECTION 4—CONSTRUCTION ACTIVITIES

a. CONSTRUCTION ACTIVITY—Select the *most appropriate* construction activity being performed at time of accident from the list below. Enter the activity name and place the corresponding code number identified in the box.

CONSTRUCTION ACTIVITY LIST

1. MOBILIZATION
2. SITE PREPARATION
3. EXCAVATION/TRENCHING
4. GRADING (EARTHWORK)
5. PIPING/UTILITIES
6. FOUNDATION
7. FORMING
8. CONCRETE PLACEMENT
9. STEEL ERECTION
10. ROOFING
11. FRAMING
12. MASONRY
13. CARPENTRY
14. ELECTRICAL
15. SCAFFOLDING/ACCESS
16. MECHANICAL
17. PAINTING
18. EQUIPMENT/MAINTENANCE
19. TUNNELING
20. WAREHOUSING/STORAGE
21. PAVING
22. FENCING
23. SIGNING
24. LANDSCAPING/IRRIGATION
25. INSULATION
26. DEMOLITION

b. TYPE OF CONSTRUCTION EQUIPMENT – Select the equipment involved in the accident from the list below. Enter the name and place the corresponding code number identified in the box. If equipment is not included below, use code 24, "OTHER", and write in specific type of equipment.

CONSTRUCTION EQUIPMENT

1. GRADER
2. DRAGLINE
3. CRANE (ON VESSEL/BARGE)
4. CRANE (TRACKED)
5. CRANE (RUBBER TIRE)
6. CRANE (VEHICLE MOUNTED)
7. CRANE (TOWER)
8. SHOVEL
9. SCRAPER
10. PUMP TRUCK (CONCRETE)
11. TRUCK (CONCRETE/TRANSIT MIXER)
12. DUMP TRUCK (HIGHWAY)
13. DUMP TRUCK (OFF HIGHWAY)
14. TRUCK (OTHER)
15. FORKLIFT
16. BACKHOE
17. FRONT-END LOADER
18. PILE DRIVER
19. TRACTOR (UTILITY)
20. MANLIFT
21. DOZER
22. DRILL RIG
23. COMPACTOR/VIBRATORY ROLLER
24. OTHER

INSTRUCTIONS FOR SECTION 5 – INJURY/ILLNESS INFORMATION

a. SEVERITY OF INJURY / ILLNESS - Reference para 2-10 of USACE Suppl 1 to AR 385-40 and enter code and description from list below.

NOI NO INJURY
FAT FATALITY
PTL PERMANENT TOTAL DISABILITY
PPR PERMANENT PARTIAL DISABILITY
LWD LOST WORKDAY CASE INVOLVING DAYS AWAY FROM WORK
NLW RECORDABLE CASE WITHOUT LOST WORKDAYS
RFA RECORDABLE FIRST AID CASE
NRI NON-RECORDABLE INJURY

b. ESTIMATED DAYS LOST – Enter the estimated number of workdays the person will lose from work.

c. ESTIMATED DAYS HOSPITALIZED – Enter the estimated number of workdays the person will be hospitalized.

d. ESTIMATED DAYS RESTRICTED DUTY – Enter the estimated number of workdays the person, as a result of the accident, will not be able to perform all of their regular duties.

e. BODY PART AFFECTED – Select the most appropriate primary and when applicable, secondary body part affected from the list below. Enter body part name on line and place the corresponding code letters identifying that body part in the box.

GENERAL BODY AREA	CODE	BODY PART NAME
ARM/WRIST	AB	ARM AND WRIST
	AS	ARM OR WRIST
TRUNK, EXTERNAL MUSCULATURE	B1	SINGLE BREAST
	B2	BOTH BREASTS
	B3	SINGLE TESTICLE
	B4	BOTH TESTICLES
	BA	ABDOMEN
	BC	CHEST
	BL	LOWER BACK
	BP	PENIS
	BS	SIDE
	BU	UPPER BACK
	BW	WAIST
	BZ	TRUNK OTHER
HEAD, INTERNAL	C1	SINGLE EAR INTERNAL
	C2	BOTH EARS INTERNAL
	C3	SINGLE EYE INTERNAL
	C4	BOTH EYES INTERNAL
	CB	BRAIN
	CC	CRANIAL BONES
	CD	TEETH
	CJ	JAW
	CL	THROAT, LARYNX
	CM	MOUTH
	CN	NOSE
	CR	THROAT, OTHER
	CT	TONGUE
	CZ	HEAD OTHER INTERNAL
ELBOW	EB	BOTH ELBOWS
	ES	SINGLE ELBOW
FINGER	F1	FIRST FINGER
	F2	BOTH FIRST FINGERS
	F3	SECOND FINGER
	F4	BOTH SECOND FINGERS
	F5	THIRD FINGER
	F6	BOTH THIRD FINGERS
	F7	FOURTH FINGER
	F8	BOTH FOURTH FINGERS
TOE	G1	GREAT TOE
	G2	BOTH GREAT TOES
	G3	TOE OTHER
	G4	TOES OTHER
HEAD, EXTERNAL	H1	EYE EXTERNAL
	H2	BOTH EYES EXTERNAL
	H3	EAR EXTERNAL
	H4	BOTH EARS EXTERNAL
	HC	CHIN
	HF	FACE
	HK	NECK/THROAT
	HM	MOUTH/LIPS
	HN	NOSE
	HS	SCALP
KNEE	KB	BOTH KNEES
	KS	KNEE
LEG, HIP, ANKLE, BUTTOCK	LB	BOTH LEGS/HIPS/ ANKLES/BUTTOCKS
	LS	SINGLE LEG/HIP ANKLE/BUTTOCK
HAND	MB	BOTH HANDS
	MS	SINGLE HAND
FOOT	PB	BOTH FEET
	PS	SINGLE FOOT
TRUNK, BONES	R1	SINGLE COLLAR BONE
	R2	BOTH COLLAR BONES
	R3	SHOULDER BLADE
	R4	BOTH SHOULDER BLADES
	RB	RIB
	RS	STERNUM (BREAST BONE)
	RV	VERTEBRAE (SPINE; DISC)
	RZ	TRUNK BONES OTHER
SHOULDER	SB	BOTH SHOULDERS
	SS	SINGLE SHOULDER
THUMB	TB	BOTH THUMBS
	TS	SINGLE THUMB
TRUNK, INTERNAL ORGANS	V1	LUNG, SINGLE
	V2	LUNGS, BOTH
	V3	KIDNEY, SINGLE
	V4	KIDNEYS, BOTH
	VH	HEART
	VL	LIVER
	VR	REPRODUCTIVE ORGANS
	VS	STOMACH
	VV	INTESTINES
	VZ	TRUNK, INTERNAL; OTHER

f. NATURE OF INJURY/ILLNESS - Select the most appropriate nature of injury / illness from the list below. This nature of injury / illness shall correspond to the primary body part selected in 5e, above. Enter the nature of injury / illness name on the line and place the corresponding CODE letters in the box provided.

* The injury or condition selected below must be caused by a specific incident or event which occurred during a single work day or shift.

GENERAL NATURE CATEGORY	CODE	NATURE OF INJURY NAME
*TRAUMATIC INJURY OR DISABILITY	TA	AMPUTATION
	TB	BACK STRAIN.
	TC	CONTUSION; BRUISE; ABRASION
	TD	DISLOCATION
	TF	FRACTURE
	TH	HERNIA
	TK	CONCUSSION
	TL	LACERATION, CUT
	TP	PUNCTURE
	TS	STRAIN, MULTIPLE
	TU	BURN, SCALD, SUNBURN
	TI	TRAUMATIC SKIN DISEASES/ CONDITIONS INCLUDING DERMATITIS
	TR	TRAUMATIC RESPIRATORY DISEASE
	TQ	TRAUMATIC FOOD POISONING
	TW	TRAUMATIC TUBERCULOSIS
	TX	TRAUMATIC VIROLOGICAL/ INFECTIVE/PARASITIC DISEASE
	T1	TRAUMATIC CEREBRAL VASCULAR CONDITION/STROKE
	T2	TRAUMATIC HEARING LOSS
	T3	TRAUMATIC HEART CONDITION
	T4	TRAUMATIC MENTAL DISORDER; STRESS; NERVOUS CONDITION
	T8	TRAUMATIC INJURY — OTHER (EXCEPT DISEASE, ILLNESS)

**A nontraumatic physiological harm or loss of capacity produced by systemic infection; continued or repeated stress or strain; exposure to toxins, poisons, fumes, etc.; or other continued and repeated exposures to conditions of the work environment over a long period of time. For practical purposes, an occupational illness/disease or disability is any reported condition which doses not meet the definition of traumatic injury or disability as described above.

GENERAL NATURE CATEGORY	CODE	NATURE OF INJURY NAME
**NON-TRAUMATIC ILLNESS/DISEASE OR DISABILITY		
RESPIRATORY DISEASE	RA	ASBESTOSIS
	RB	BRONCHITIS
	RE	EMPHYSEMA
	RP	PNEUMOCONIOSIS
	RS	SILICOSIS
	R9	RESPIRATORY DISEASE, OTHER
VIROLOGICAL, INFECTIVE & PARASITIC DISEASES	VB	BRUCELLOSIS
	VC	COCCIDIOMYCOSIS
	VF	FOOD POISONING
	VH	HEPATITIS
	VM	MALARIA
	VS	STAPHYLOCOCCUS
	VT	TUBERCULOSIS
	V9	VIROLOGICAL/INFECTIVE/ PARASITIC—OTHER
DISABILITY, OCCUPATIONAL	DA	ARTHRITIS, BURSITIS
	DB	BACK STRAIN, BACK SPRAIN
	DC	CEREBRAL VASCULAR CONDITION; STROKE
	DD	ENDEMIC DISEASE (OTHER THAN CODE TYPES R&S)
	DE	EFFECT OF ENVIRONMENTAL CONDITION
	DH	HEARING LOSS
	DK	HEART CONDITION
	DM	MENTAL DISORDER, EMOTIONAL STRESS NERVOUS CONDITION
	DR	RADIATION
	DS	STRAIN, MULTIPLE
	DU	ULCER
	DV	OTHER VASCULAR CONDITIONS
	D9	DISABILITY, OTHER
SKIN DISEASE OR CONDITION	SB	BIOLOGICAL
	SC	CHEMICAL
	S9	DERMATITIS, UNCLASSIFIED

g. TYPE AND SOURCE OF INJURY/ILLNESS (CAUSE) - Type and Source Codes are used to describe what caused the incident. The Type Code stands for an ACTION and the Source Code for an OBJECT or SUBSTANCE. Together, they form a brief description of how the incident occurred. Where there are two different sources, code the initiating source of the incident (see example 1, below). Examples:

(1) An employee tripped on carpet and struck his head on a desk.
TYPE: 210 (fell on same level) SOURCE: 0110 (walking/working surface)

NOTE: This example would NOT be coded 120 (struck against) and 0140 (furniture).

(2) A Park Ranger contracted dermatitis from contact with poison ivy/ oak.
TYPE: 510 (contact) SOURCE: 0920 (plant)

(3) A lock and dam mechanic punctured his finger with a metal sliver while grinding a turbine blade.
TYPE: 410 (punctured by) SOURCE: 0830 (metal)

(4) An employee was driving a government vehicle when it was struck by another vehicle..
TYPE: 800 (traveling in) SOURCE: 0421 (government-owned vehicle, as driver)

NOTE: The Type Code 800, "Traveling In" is different from the other type codes in that its function is not to identify factors contributing to the injury or fatality, but rather to collect data on the type of vehicle the employee was operating or traveling in at the time of the incident.

Select the most appropriate TYPE and SOURCE identifier from the list below and enter the name on the line and the corresponding code in the appropriate box.

CODE	TYPE OF INJURY NAME
	STRUCK
0110	STRUCK BY
0111	STRUCK BY FALLING OBJECT
0120	STRUCK AGAINST
	FELL, SLIPPED, TRIPPED
0210	FELL ON SAME LEVEL
0220	FELL ON DIFFERENT LEVEL
0230	SLIPPED, TRIPPED (NO FALL)
	CAUGHT
0310	CAUGHT ON
0320	CAUGHT IN
0330	CAUGHT BETWEEN
	PUNCTURED, LACERATED
0410	PUNCTURED BY
0420	CUT BY
0430	STUNG BY
0440	BITTEN BY
	CONTACTED
0510	CONTACTED WITH (INJURED PERSON MOVING)
0520	CONTACTED BY (OBJECT WAS MOVING)
	EXERTED
0610	LIFTED, STRAINED BY (SINGLE ACTION)
0620	STRESSED BY (REPEATED ACTION)
	EXPOSED
0710	INHALED
0720	INGESTED
0730	ABSORBED
0740	EXPOSED TO
0800	TRAVELING IN

CODE	SOURCE OF INJURY NAME
0100	BUILDING OR WORKING AREA
0110	WALKING/WORKING SURFACE (FLOOR, STREET, SIDEWALKS, ETC)
0120	STAIRS, STEPS
0130	LADDER
0140	FURNITURE, FURNISHINGS, OFFICE EQUIPMENT
0150	BOILER, PRESSURE VESSEL
0160	EQUIPMENT LAYOUT (ERGONOMIC)
0170	WINDOWS, DOORS
0180	ELECTRICITY

CODE	SOURCE OF INJURY NAME
0200	ENVIRONMENTAL CONDITION
0210	TEMPERATURE EXTREME (INDOOR)
0220	WEATHER (ICE, RAIN, HEAT, ETC.)
0230	FIRE, FLAME, SMOKE (NOT TOBACCO)
0240	NOISE
0250	RADIATION
0260	LIGHT
0270	VENTILATION
0271	TOBACCO SMOKE
0280	STRESS (EMOTIONAL)
0290	CONFINED SPACE
0300	MACHINE OR TOOL
0310	HAND TOOL (POWERED: SAW, GRINDER, ETC.)
0320	HAND TOOL (NONPOWERED)
0330	MECHANICAL POWER TRANSMISSION APPARATUS
0340	GUARD, SHIELD (FIXED, MOVEABLE, INTERLOCK)
0350	VIDEO DISPLAY TERMINAL
0360	PUMP, COMPRESSOR, AIR PRESSURE TOOL
0370	HEATING EQUIPMENT
0380	WELDING EQUIPMENT
0400	VEHICLE
0411	AS DRIVER OF PRIVATELY OWNED/RENTAL VEHICLE
0412	AS PASSENGER OF PRIVATELY OWNED/RENTAL VEHICLE
0421	DRIVER OF GOVERNMENT VEHICLE
0422	PASSENGER OF GOVERNMENT VEHICLE
0430	COMMON CARRIER (AIRLINE, BUS, ETC.)
0440	AIRCRAFT (NOT COMMERCIAL)
0450	BOAT, SHIP, BARGE
0500	MATERIAL HANDLING EQUIPMENT
0510	EARTHMOVER (TRACTOR, BACKHOE, ETC.)
0520	CONVEYOR (FOR MATERIAL AND EQUIPMENT)
0530	ELEVATOR, ESCALATOR, PERSONNEL HOIST
0540	HOIST, SLING CHAIN, JACK
0550	CRANE
0551	FORKLIFT
0560	HANDTRUCK, DOLLY
0600	DUST, VAPOR, ETC.
0610	DUST (SILICA, COAL, ETC.)
0620	FIBERS
0621	ASBESTOS
0630	GASES
0631	CARBON MONOXIDE
0640	MIST, STEAM, VAPOR, FUME
0641	WELDING FUMES
0650	PARTICLES (UNIDENTIFIED)
0700	CHEMICAL, PLASTIC, ETC.
0711	DRY CHEMICAL—CORROSIVE
0712	DRY CHEMICAL—TOXIC
0713	DRY CHEMICAL—EXPLOSIVE
0714	DRY CHEMICAL—FLAMMABLE
0721	LIQUID CHEMICAL—CORROSIVE
0722	LIQUID CHEMICAL—TOXIC
0723	LIQUID CHEMICAL—EXPLOSIVE
0724	LIQUID CHEMICAL—FLAMMABLE
0730	PLASTIC
0740	WATER
0750	MEDICINE
0800	INANIMATE OBJECT
0810	BOX, BARREL, ETC.
0820	PAPER
0830	METAL ITEM, MINERAL
0831	NEEDLE
0840	GLASS
0850	SCRAP, TRASH
0860	WOOD
0870	FOOD
0880	CLOTHING, APPAREL, SHOES
0900	ANIMATE OBJECT
0911	DOG
0912	OTHER ANIMAL
0920	PLANT
0930	INSECT
0940	HUMAN (VIOLENCE)
0950	HUMAN (COMMUNICABLE DISEASE)
0960	BACTERIA, VIRUS (NOT HUMAN CONTACT)

CODE	SOURCE OF INJURY NAME
1000	PERSONAL PROTECTIVE EQUIPMENT
1010	PROTECTIVE CLOTHING, SHOES, GLASSES, GOGGLES
1020	RESPIRATOR, MASK
1021	DIVING EQUIPMENT
1030	SAFETY BELT, HARNESS
1040	PARACHUTE

INSTRUCTIONS FOR SECTION 6 — PUBLIC FATALITY

a. ACTIVITY AT TIME OF ACCIDENT—Select the activity being performed at the time of the accident from the list below. Enter the activity name on the line and the corresponding number in the box. If the activity performed is not identified on the list, select from the *most* appropriate primary activity area (water related, non-water related or other activity), the code number for "Other", and write in the activity being performed at the time of the accident.

WATER RELATED RECREATION

1. Sailing
2. Boating—powered
3. Boating—unpowered
4. Water skiing
5. Fishing from boat
6. Fishing from bank dock or pier
7. Fishing while wading
8. Swimming/supervised area
9. Swimming/designated area
10. Swimming/other area
11. Underwater activities (skin diving, scuba, etc.)
12. Wading
13. Attempted rescue
14. Hunting from boat
15. Other

NON-WATER RELATED RECREATION

16. Hiking and walking
17. Climbing (general)
18. Camping/picnicking authorized area
19. Camping/picnicking unauthorized area
20. Guided tours
21. Hunting
22. Playground equipment
23. Sports/summer (baseball, football, etc.)
24. Sports/winter (skiing, sledding, snowmobiling etc.)
25. Cycling (bicycle, motorcycle, scooter)
26. Gliding
27. Parachuting
28. Other non-water related

OTHER ACTIVITIES

29. Unlawful acts (fights, riots, vandalism, etc.)
30. Food preparation/serving
31. Food consumption
32. Housekeeping
33. Sleeping
34. Pedestrian struck by vehicle
35. Pedestrian other acts
36. Suicide
37. "Other" activities

b. PERSONAL FLOTATION DEVICE USED—If fatality was water-related was the victim wearing a person flotation device? Mark the appropriate box.

INSTRUCTIONS FOR SECTION 7—MOTOR VEHICLE ACCIDENT

a. TYPE OF VEHICLE—Mark appropriate box for each vehicle involved. If more than one vehicle of the same type is involved, mark both halves of the appropriate box. USACE vehicle(s) involved shall be marked in left half of appropriate box.

b. TYPE OF COLLISION—Mark appropriate box.

c. SEAT BELT—Mark appropriate box.

INSTRUCTIONS FOR SECTION 8—PROPERTY/ MATERIAL INVOLVED

a. NAME OF ITEM—Describe all property involved in accident. Property/material involved means material which is damaged or whose use or misuse contributed to the accident. Include the name, type, model; also include the National Stock Number (NSN) whenever applicable.

b. OWNERSHIP—Enter ownership for each item listed. (Enter one of the following: *USACE; OTHER GOVERNMENT; CONTRACTOR: PRIVATE)*

c. $ AMOUNT OF DAMAGE—Enter the total estimated dollar amount of damage (parts and labor), if any.

INSTRUCTIONS FOR SECTION 9 — VESSEL/ FLOATING PLANT ACCIDENT

a. TYPE OF VESSEL/FLOATING PLANT — Select the most appropriate vessel/floating plant from list below. Enter name and place corresponding number in box. If item is not listed below, enter item number for "OTHER" and write in specific type of vessel/ floating plant.

VESSEL/FLOATING PLANTS

1. ROW BOAT
2. SAIL BOAT
3. MOTOR BOAT
4. BARGE
5. DREDGE/HOPPER
6. DREDGE/SIDE CASTING
7. DREDGE/DIPPER
8. DREDGE/CLAMSHELL, BUCKET
9. DREDGE/PIPE LINE
10. DREDGE/DUST PAN
11. TUG BOAT
12. OTHER

b. COLLISION/MISHAP — Select from the list below the object(s) that contributed to the accident or were damaged in the accident.

COLLISION/MISHAP

1. COLLISION W/OTHER VESSEL
2. UPPER GUIDE WALL
3. UPPER LOCK GATES
4. LOCK WALL
5. LOWER LOCK GATES
6. LOWER GUIDE WALL
7. HAULAGE UNIT
8. BREAKING TOW
9. TOW BREAKING UP
10. SWEPT DOWN ON DAM
11. BUOY/DOLPHIN/CELL
12. WHARF OR DOCK
13. OTHER

INSTRUCTIONS FOR SECTION 10 — ACCIDENT DESCRIPTION

DESCRIBE ACCIDENT — Fully describe the accident. Give the sequence of events that describe what happened leading up to and including the accident. Fully identify personnel and equipment involved and their role(s) in the accident. Ensure that relationships between personnel and equipment are clearly specified. Continue on blank sheets if necessary and attach to this report.

INSTRUCTIONS FOR SECTION 11 — CAUSAL FACTORS

a. Review thoroughly. Answer each question by marking the appropriate block. If any answer is yes, explain in item 13 below. Consider, as a minimum, the following:

(1) DESIGN — Did inadequacies associated with the building or work site play a role? Would an improved design or layout of the equipment or facilities reduce the likelihood of similar accidents? Were the tools or other equipment designed and intended for the task at hand?

(2) INSPECTION/MAINTENANCE — Did inadequately or improperly maintained equipment, tools, workplace, etc. create or worsen any hazards that contributed to the accident? Would better equipment, facility, work site or work activity inspections have helped avoid the accident?

(3) PERSON'S PHYSICAL CONDITION — Do you feel that the accident would probably not have occurred if the employee was in "good" physical condition? If the person involved in the accident had been in better physical condition, would the accident have been less severe or avoided altogether? Was over exertion a factor?

(4) OPERATING PROCEDURES — Did a lack of or inadequacy within established operating procedures contribute to the accident? Did any aspect of the procedures introduce any hazard to, or increase the risk associated with the work process? Would establishment or improvement of operating procedures reduce the likelihood of similar accidents?

(5) JOB PRACTICES — Were any of the provisions of the Safety and Health Requirements Manual (EM 385-1-1) violated? Was the task being accomplished in a manner which was not in compliance with an established job hazard analysis or activity hazard analysis? Did any established job practice (including EM 385-1-1) fail to adequately address the task or work process? Would better job practices improve the safety of the task?

(6) HUMAN FACTORS — Was the person under undue stress (either internal or external to the job)? Did the task tend toward overloading the capabilities of the person; i.e., did the job require tracking and reacting to many external inputs such as displays, alarms, or signals? Did the arrangement of the workplace tend to interfere with efficient task performance? Did the task require reach, strength, endurance, agility, etc., at or beyond the capabilities of the employee? Was the work environment ill-adapted to the person? Did the person need more training, experience, or practice in doing the task? Was the person inadequately rested to perform safely?

(7) ENVIRONMENTAL FACTORS — Did any factors such as moisture, humidity, rain, snow, sleet, hail, ice, fog, cold, heat, sun, temperature changes, wind, tides, floods, currents, dust, mud, glare, pressure changes, lightning, etc., play a part in the accident?

(8) CHEMICAL AND PHYSICAL AGENT FACTORS — Did exposure to chemical agents (either single shift exposure or long-term exposure) such as dusts, fibers (asbestos, etc.), silica, gases (carbon monoxide, chlorine, etc.,), mists, steam, vapors, fumes, smoke, other particulates, liquid or dry chemicals that are corrosive, toxic, explosive or flammable, by-products of combustion or physical agents such as noise, ionizing radiation, non-ionizing radiation (UV radiation created during welding, etc.) contribute to the accident/incident?

(9) OFFICE FACTORS — Did the fact that the accident occurred in an office setting or to an office worker have a bearing on its cause? For example, office workers tend to have less experience and training in performing tasks such as lifting office furniture. Did physical hazards within the office environment contribute to the hazard?

(10) SUPPORT FACTORS — Was the person using an improper tool for the job? Was inadequate time available or utilized to safely accomplish the task? Were less than adequate personnel resources (in terms of employee skills, number of workers, and adequate supervision) available to get the job done properly? Was funding available, utilized, and adequate to provide proper tools, equipment, personnel, site preparation. etc?

(11) PERSONAL PROTECTIVE EQUIPMENT — Did the person fail to use appropriate personal protective equipment (gloves, eye protection, hard-toed shoes, respirator, etc.) for the task or environment? Did protective equipment provided or worn fail to provide adequate protection from the hazard(s)? Did lack of or inadequate maintenance of protective gear contribute to the accident?

(12) DRUGS/ALCOHOL — Is there any reason to believe the person's mental or physical capabilities, judgement, etc., were impaired or altered by the use of drugs or alcohol? Consider the effects of prescription medicine and over the counter medications as well as illicit drug use. Consider the effect of drug or alcohol induced "hangovers".

b. WRITTEN JOB/ACTIVITY HAZARD ANALYSIS — Was a written Job/Activity Hazard Analysis completed for the task being performed at the time of the accident? Mark the appropriate box. *If one was performed, attach a copy of the analysis to the report.*

INSTRUCTIONS FOR SECTION 12 — TRAINING

a. WAS PERSON TRAINED TO PERFORM ACTIVITY/TASK? — For the purpose of this section "trained" means the person has been provided the necessary information (either formal and/or on-the-job (OJT) training) to competently perform the activity/task in a safe and healthful manner.

b. TYPE OF TRAINING — Mark the appropriate box that best indicates the type of training; (classroom or on-the-job) that the injured person received before the accident happened.

c. DATE OF MOST RECENT TRAINING — Enter the month, day, and year of the last *formal* training completed that covered the activity-task being performed at the time of the accident.

INSTRUCTIONS FOR SECTION 13—CAUSES

a. DIRECT CAUSES—The direct cause is that single factor which most directly lead to the accident. See examples below.

b. INDIRECT CAUSES—Indirect causes are those factors which contributed to but did not directly initiate the occurrence of the accident.

Examples for section 13:

a. Employee was dismantling scaffold and fell 12 feet from unguarded opening.
Direct cause: failure to provide fall protection at elevation.
Indirect causes: failure to enforce USACE safety requirements; improper training/motivation of employee (possibility that employee was not knowledgeable of USACE fall protection requirements or was lax in his attitude towards safety); failure to ensure provision of positive fall protection whenever elevated; failure to address fall protection during scaffold dismantling in phase hazard analysis.

b. Private citizen had stopped his vehicle at intersection for red light when vehicle was struck in rear by USACE vehicle. (note USACE vehicle was in proper/safe working condition).
Direct cause: failure of USACE driver to maintain control of and stop USACE vehicle within safe distance.
Indirect cause: Failure of employee to pay attention to driving (defensive driving).

INSTRUCTIONS FOR SECTION 14—ACTION TO ELIMINATE CAUSE(S)

DESCRIPTION—Fully describe all the actions taken, anticipated, and recommended to eliminate the cause(s) and prevent reoccurrence of similar accidents/illnesses. Continue on blank sheets of paper if necessary to fully explain and attach to the completed report form.

INSTRUCTIONS FOR SECTION 15—DATES FOR ACTION

a. BEGIN DATE—Enter the date when the corrective action(s) identified in Section 14 will begin.

b. COMPLETE DATE—Enter the date when the corrective action(s) identified in Section 14 will be completed.

c. TITLE AND SIGNATURE—Enter the title and signature of supervisor completing the accident report. For a GOVERNMENT employee accident/illness the immediate supervisor will complete and sign the report. For PUBLIC accidents the USACE Project Manager/Area Engineer responsible for the USACE property where the accident happened shall complete and sign the report. For CONTRACTOR accidents the Contractor's project manager shall complete and sign the report and provide to the USACE supervisor responsible for oversight of that contractor activity. This USACE Supervisor shall also sign the report. Upon entering the information required in 15.d, 15.e and 15.f below, the responsible USACE supervisor shall forward the report for management review as indicated in Section 16.

d. DATE SIGNED—Enter the month, day, and year that the report was signed by the responsible supervisor.

e. ORGANIZATION NAME—For GOVERNMENT employee accidents enter the USACE organization name (Division, Branch, Section, etc.) of the injured employee. For PUBLIC accidents enter the USACE organization name for the person identified in block 15.c. For CONTRACTOR accidents enter the USACE organization name for the USACE office responsible for providing contract administration oversight.

f. OFFICE SYMBOL—Enter the latest complete USACE Office Symbol for the USACE organization identified in block 15.e.

INSTRUCTIONS FOR SECTION 16—MANAGEMENT REVIEW (1st)

1ST REVIEW—Each USACE FOA shall determine who will provide 1st management review. The responsible USACE supervisor in section 15.c shall forward the completed report to the USACE office designated as the 1st Reviewer by the FOA. Upon receipt, the Chief of the Office shall review the completed report, mark the appropriate box, provide substantive comments, sign, date, and forward to the FOA Staff Chief (2nd review) for review and comment.

INSTRUCTIONS FOR SECTION 17—MANAGEMENT REVIEW (2nd)

2ND REVIEW—The FOA Staff Chief (i.e., FOA Chief of Construction, Operations, Engineering, Planning, etc.) shall mark the appropriate box, review the completed report, provide substantive comments, sign, date, and return to the FOA Safety and Occupational Health Office.

INSTRUCTIONS FOR SECTION 18—SAFETY AND OCCUPATIONAL HEALTH REVIEW

3RD REVIEW—The FOA Safety and Occupational Health Office shall review the completed report, mark the appropriate box, ensure that any inadequacies, discrepancies, etc, are rectified by the responsible supervisor and management reviewers, provide substantive comments, sign, date and forward to the FOA Commander for review, comment, and signature.

INSTRUCTION FOR SECTION 19—COMMAND APPROVAL

4TH REVIEW—The FOA Commander shall (to include the person designated Acting Commander in his absence) review the completed report, comment if required, sign, date, and forward the report to the FOA Safety and Occupational Health Office. Signature authority shall not be delegated.

CEHNC-SO (385-10f) 5 April 2004

MEMORANDUM FOR SEE DISTRIBUTION

SUBJECT: Accident Reporting Requirements

1. References:

a. AR 385-40, Accident Reporting, 1 November 1994

b. U.S. Army Corps of Engineer (USACE) Draft Supplement 1 to AR 385-40, 5 October 2000

c. USASC Message, CSSC-Z, 081810Z Jun 01, subject: Clarification of Army Accident Classes

d. CEHNCR 385-1-1, Safety and Occupational Health Program Management, 19 June 1997

e. EM 385-1-1, U.S. Army Corps of Engineers Safety Manual, 03 November 2003

2. Accident Definitions:

a. Class A - Fatality or permanent total disability (Government Civilian, Military Personnel, and/or Contractor), or > $1,000,000 property damage*.

b. Class B - Permanent partial disability or inpatient hospitalization of 3 or more persons (Government Civilian, Military Personnel, and/or Contractor), $200,000 $\leq$ $1,000,000 property damage*.

c. Class C - Lost Workday (Contractor) or Lost Time (Government Civilian and Military Personnel), $20,000 $\leq$ $200,000 property damage*.

d. Class D - $2000 $\leq$ $20,000 property damage*.

*Property damage examples - rental cars, leased items/equipment, GSA property, Huntsville Center (HNC) property, installation property, land owner property.

3. All accidents meeting the definitions above, both contactor and government civilian, are to be reported immediately. Government civilian accidents are to be reported to the first line supervisor; for contractor accidents, either the project manager (PM), contracting officer (KO), contracting officer representative (COR) and/or resident engineer (RE) herein referred to as the “Government Designated Authority (GDA)”, who by position is responsible for overseeing, managing, directing, and/or administering the project/activity, operation, material

or person(s) involved at the time of an accident. The supervisor or GDA upon learning of an accident must promptly contact the CEHNC Safety Office and provide a brief summary of the events surrounding the accident. The Safety Office will notify the Command Group.

4. In addition to the accidents described in paragraph 2, the following conditions must also be reported per the guidance outlined in paragraph 3.

a. Army civilian or contractor personnel injured while on duty or on TDY status. Exception: Contractor employee injuries, occupational illnesses, and property damage accidents that occur away from, and involve activities unrelated to, a Corps project/activity for which the contractor is working, are not required to be reported.

b. Accidents or mishaps incident to a Corps project/activity that could cause embarrassment to USACE.

c. Serious near misses.

d. Injuries to CEHNC military personnel, on or off-duty.

e. Medical expenses incurred by government civilians regardless of whether or not the injury meets one of the accident definitions above.

5. For government civilian accidents the supervisor is responsible for investigating the accident. For contractor accidents occurring incident to a CEHNC project/activity, the contractor is responsible for performing the accident investigation in accordance with the contractor's accepted Accident Prevention Plan (APP). The investigation is the supervisor's or contractor's documented internal review, analysis and account of the accident, based on factual information gathered by a thorough and conscientious examination of all causal factors. Its purpose is PREVENTION. Therefore, it is essential for the supervisor or contractor to take positive measures and any necessary corrective actions to prevent future occurrences. At the conclusion of the investigation, the supervisor or contractor must submit a completed original ENG Form 3394, with its instructions to the CEHNC Safety Office for review and processing within 5 working days following the accident. A copy of the ENG Form 3394 can be found at:

http://www.hnd.usace.army.mil/engrdir/organization/systems-eng/Safety/safety2.htm

This form must be routed through the appropriate Director's office for review and signature prior to submitting to the Safety Office.

6. On the original ENG Form 3394, if block 11b is checked "Yes," the job/activity hazard analysis for the task/activity being performed at the time of the accident must be submitted as an attachment. If the block is checked "No," and the accident is on a project/activity for which EM 385-1-1, Corps Safety Manual is applicable, an activity hazard analysis must be developed and submitted to the CEHNC Safety Office for review and acceptance prior to resuming the specific work activity being performed at the time of the accident. The CEHNC Safety Office will assess the adequacy of the investigation as described in the ENG Form 3394 along with all submitted analyses to determine whether the information provided is acceptable. If the investigation report is found acceptable, the Safety Office will notify the supervisor or GDA that the specific work activity may resume.

7. For government civilian claims, all Class A through C accidents require the submission of a Department of Labor (DOL) Form CA-1 (injury), CA-2 (illness/disease/stress) or CA-6 (fatality) in addition to the ENG Form 3394. Please note that a CA-1 or CA-2 is a mandatory submission if medical expenses are incurred. The employee is responsible for completing and submitting the appropriate form to their immediate supervisor for processing. The supervisor is responsible for reviewing, signing and delivering the form to the CEHNC Safety Office for processing. The CA-1 and CA-2 forms are time sensitive and must be submitted within 15 working days from the date of the accident. A timely submission will ensure the forms reach the Office of Workers' Compensation Program (OWCP) administrator as required and expedites the judicious payment of expenses incurred. In the unlikely event a fatality should occur, please call the Safety Office immediately.

8. If assistance is needed in reporting or investigating accidents, please contact the undersigned at 256-895-1583 or Greg Bayuga, 256-895-1596. Completed sample forms are available in the Safety Office.

/s/
CHARLES R. (RAY) WAITS, JR.
Chief, Safety and Occupational
Health Office

DISTRIBUTION:

A & B (Branch Level)
CEHNC-SO (Williams, Bayuga, Plyler, Taylor, Griffin, Sawyers)

ATTACHMENT C

MEDICAL SUPPORT

DIRECTIONS AND PHONE NUMBERS

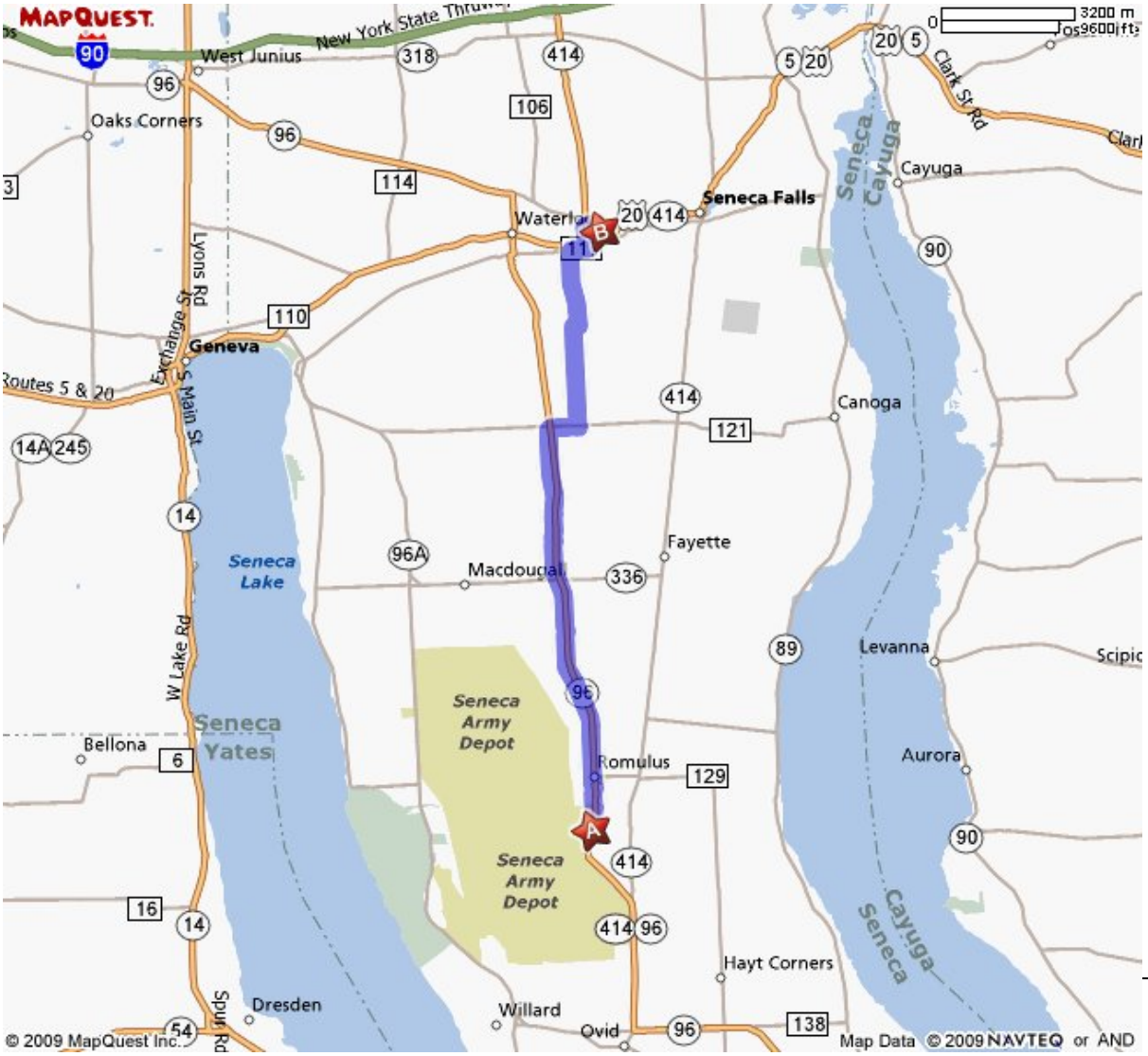
Route to Life Care Medical Associates (from East Side of Depot)

Clinic Address:	1991 Balsley Road, Seneca Falls, NY 13148
Telephone Number:	315-539-5229
Hours:	Mon- Fri, 8 am – 5 pm expect Thur 9 am – 5 pm
Distance to Clinic:	Approximately 13 miles

Directions to Clinic from the east side of the Depot (See Attached Map)

1. Exit Main Gate and Turn **LEFT** onto **NORTH NY STATE ROUTE-96** (Go 7.9 miles)
2. Turn **RIGHT** onto **YELLOW TAVERN RD/CR-121**. (Go 0.5 miles)
3. Turn **LEFT** onto **YOST RD**. (Go 2.0 miles)
4. Turn **RIGHT** onto **COUNTY HOUSE RD/CR-118**. (Go 0.1 miles)
5. Turn **LEFT** onto **BAUER RD**. (Go 1.5 miles)
6. Turn **RIGHT** onto **CR-117**. (Go 0.3 miles)
7. Turn **LEFT** onto **WATER FALLS BRIDGE**. (Go 0.2 miles)
8. **WATER FALLS BRIDGE** becomes **NY-414/MOUND RD**. (Go 0.3 miles)
9. Turn **RIGHT** onto **BALSEY RD**. (Go 0.3 miles)
10. End at 1991 Balsley Rd Seneca Falls, NY 13148-9714

TOTAL ESTIMATED TIME: 22 minutes | DISTANCE: 13.01 miles



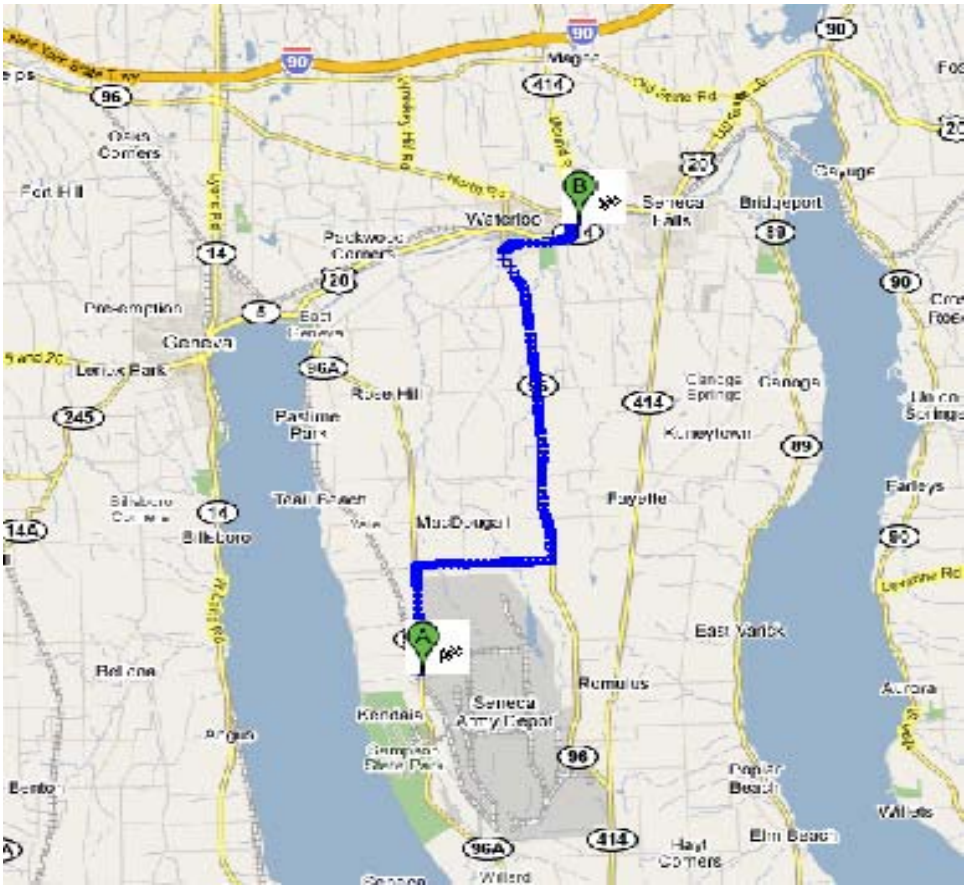
Route to Life Care Medical Associates (from West Side of Depot)

Clinic Address:	1991 Balsley Road, Seneca Falls, NY 13148
Telephone Number:	315-539-5229
Hours:	Mon- Fri, 8 am – 5 pm expect Thur 9 am – 5 pm
Distance to Clinic:	Approximately 15 miles

Directions to Clinic from the west side of the Depot (See Attached Map)

1. Head **NORTH** on **NY-96A/STATE ROUTE 96A** toward **DEAL ROAD** (Go 2.5 miles)
2. Turn **RIGHT** onto **YALE FARM RD**. (Go 2.8 miles)
3. Turn **LEFT** at **NY-96/STATE ROUTE 96.** (Go 7.3 miles)
4. Turn **RIGHT** onto at **LINCOLN ST**. (Go 0.1 miles)
5. **LINCOLN ST** turns left and becomes **GROVE STREE.** (Go 0.1 miles)
6. Turn **RIGHT** onto. **E RIVER ST.** (Go 1.3 miles)
7. Turn **left** onto **414/MOUND RD**. (Go 0.5 miles)
8. Turn **RIGHT** onto **BALSEY RD**. (Go 0.2 miles)
9. End at 1991 Balsley Rd Seneca Falls, NY 13148-9714

TOTAL ESTIMATED TIME: 28 minutes | DISTANCE: 14.7 miles



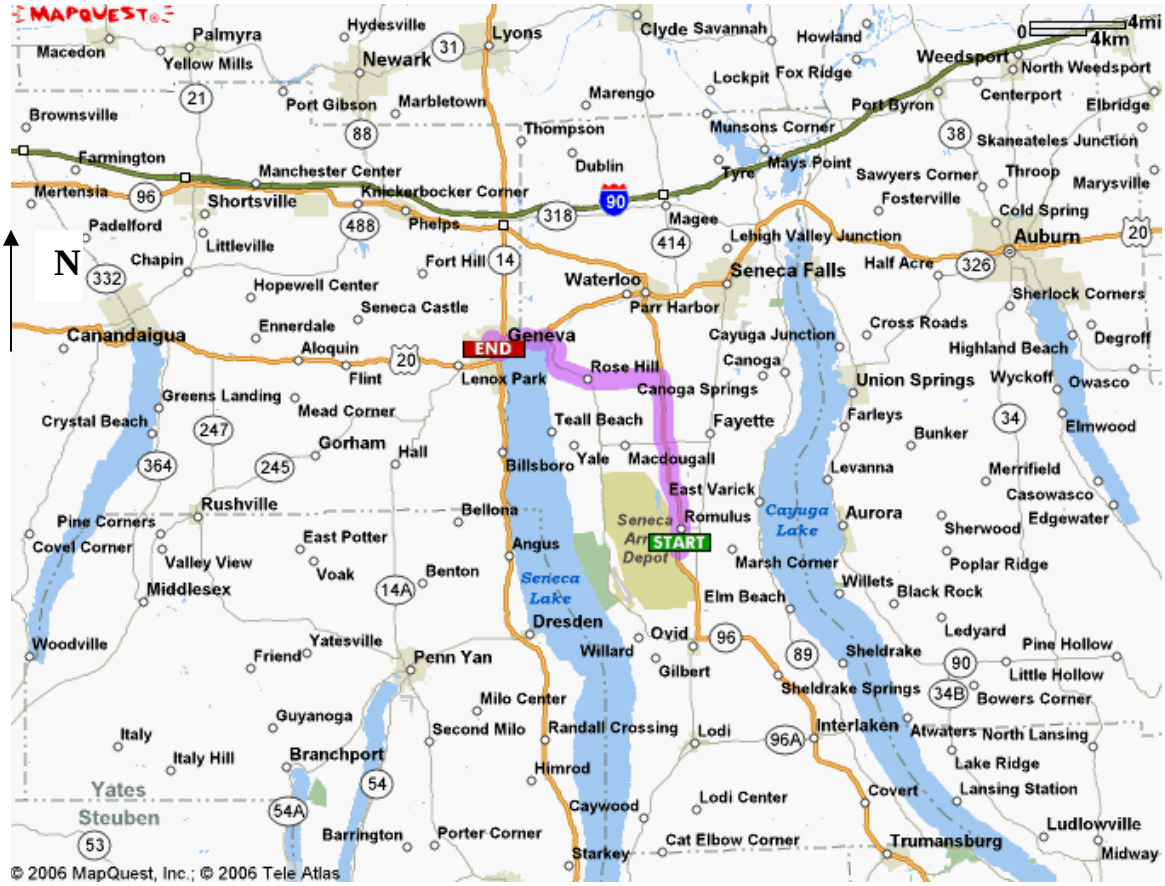
Route to Geneva General Hospital (from East Side of Depot)

Hospital Address:	196 North Street, Geneva, NY 14456
Telephone Number:	1-315-787-4000
Distance to Hospital:	Approximately 17 miles

Directions to Geneva General Hospital from the east side of the Depot (See Attached Map)

1. Exit Main Gate and Turn **LEFT** onto **NORTH NY STATE ROUTE-96** (Go 7.9 miles
2. Turn **LEFT** onto **NY-336/CR-126**. (Go 2.7 miles)
3. Turn **RIGHT** onto **NY-96A N**. (Go 6.1 miles)
4. Turn **LEFT** onto **US-20 W/NY-5 W**. (Go 2.1 miles)
5. Turn **RIGHT** onto **E CASTLE ST**. (Go 0.3 miles)
6. Turn **RIGHT** onto **N MAIN ST**. (Go 0.6 miles)
7. Turn **RIGHT** onto **NORTH ST**. (Go 0.1 miles)
8. End at 196 North St Geneva, NY 14456-1651

TOTAL ESTIMATED TIME: 22 minutes | DISTANCE: 16.66 miles



Route to Geneva General Hospital (from West Side of Depot)

Hospital Address:	196 North Street, Geneva, NY 14456
Telephone Number:	1-315-787-4000
Distance to Hospital:	Approximately 13 miles

Directions to Geneva General Hospital from the west side of the Depot (See Attached Map)

1. Head **NORTH** on **NY-96A/STATE ROUTE 96A** toward **DEAL ROAD** (Go 2.5 miles)
2. Turn **LEFT** onto **US-20 W/NY-5 W**. (Go 2.1 miles)
3. Turn **RIGHT** onto **E CASTLE ST**. (Go 0.3 miles)
4. Turn **RIGHT** onto **N MAIN ST**. (Go 0.6 miles)
5. Turn **RIGHT** onto **NORTH ST**. (Go 0.1 miles)
6. End at 196 North St Geneva, NY 14456-1651

TOTAL ESTIMATED TIME: 22 minutes | DISTANCE: 12.5 miles

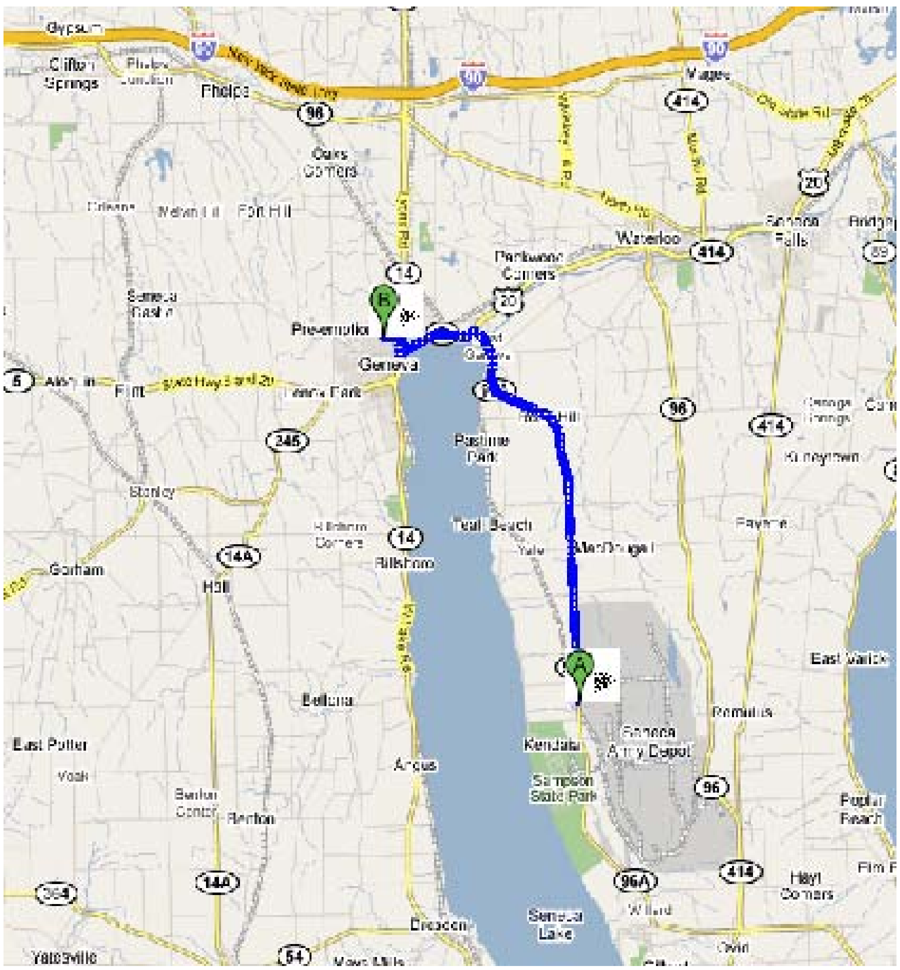


TABLE C

Emergency Telephone Numbers

CONTACT	NAME	PHONE
State Police, Fire, Ambulance		911
Program Health and Safety Officer	Tim Mustard	1-303-764-8810
Seneca Program Manager	Todd Heino	1-617-449-1405 (office) 1-339-206-7413 (cell)
Site Health & Safety Coordinator	Ben McAllister	1-607-869-1309 (Seneca office) 1-207-409-6151 (cell)
Parsons Site Manager	Tom Andrews	1-716-998-7473 (cell) 1-716-633-7074 (Buffalo office)
Primary Client Contact	Steve Absolom	1-607-869-1309
Alternate Client Contact	Randy Battaglia	1-607-869-1523
State Spill Number		1-585-226-2466
Fire Department	Romulus	1-607-869-9611
Police Department	Interlaken	1-607-532-4466
National Response Center		1-800-424-8802
Poison Control Center		1-800-962-1253
Occupational Physician	Dr. Walker	1-800-874-4676
Life Care Medical Associates		1-315-539-9229
Geneva General Hospital		1-315-787-4000
Regional USEPA Emergency Response		1-732-548-8730
Parsons 24-Hour Emergency #		1-800-883-7300
Parsons Boston H&S		1-617-449-1574
Parsons Medial Director Assistant	Donna Miller	1-661-904-0978
PWEB Incident Reporting System	https://pwebtools.parsons.com/safety/	

APPENDIX B

RADIOLOGICAL FIELD SAMPLING PLAN

DRAFT

RADIOLOGICAL FIELD SAMPLING PLAN

REMOVAL ACTION AT THE WASTE BURIAL RADIOLOGICAL SITES (SEAD-12)

SENECA ARMY DEPOT ACTIVITY, ROMULUS, NY

Prepared for:

U.S. ARMY CORPS OF ENGINEERS, ENGINEERING AND SUPPORT CENTER
HUNTSVILLE, ALABAMA
and
SENECA ARMY DEPOT ACTIVITY
ROMULUS, NEW YORK

Prepared by:

PARSONS
150 Federal Street
Boston, MA 02110

May 2009

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ACRONYMS & ABBREVIATIONS

BGS	Below ground surface
^{o}C	degrees Celsius
CDQM	Chemical Data Quality Management
COR	Contracting Officer's Representative
CQCP	Contractor Quality Control Plan
CY	Cubic Yards
DCGL	Derived Concentration Guideline Level
DQO	Data Quality Objective
DOT	Department of Transportation
DQCR	Daily Quality Control Report
EE/CA	Engineering Evaluation/Cost Analysis
EM	Engineer Manual
ER	Engineer Regulation
ESI	Expanded Site Investigation
^{o}F	degrees Fahrenheit
FOL	Field Operations Leader
FSP	Field Sampling Plan
FSS	Final Status Survey
HPLC	high-pressure liquid chromatography
Kg	kilogram
KO	Contracting Officer
ℓ	liter
LF	Linear Feet
LLRW	Low Level Radioactive Waste
MARSSIM	Multi-Agency Radiological Survey and Site Investigation Manual
MDL	Method Detection Limit
mg	milligram
MS	Matrix Spike
MSD	Matrix Spike Duplicate
NAI	Sodium iodide
NYSDEC	New York Department of Environmental Conservation
NTCRA	Non-Time Critical Removal Action
NY	New York
PCBs	Polychlorinated biphenyls
PM	Project Manager
PPE	Personal Protection Equipment
QA	Quality Assurance
QAPP	Quality Assurance Project Plan

QC	Quality Control
RA	Removal Action
RCRA	Resource Conservation and Recovery Act
SAP	Sampling and Analysis Plan
SDG	Sample Delivery Group
SEDA	Seneca Army Depot Activity
SF	Square Feet
SM	Site Manager
SQL	Sample Quantitation Limits
SOW	Scope of Work
SSHP	Site-specific Safety & Health Plan
SVOC	Semi-Volatile Organic Compound
TAGM	Technical and Administrative Guidance Memorandum
TIC	Tentatively-Identified Compound
US	United States
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
USDOT	United States Department of Transportation
VOC	Volatile Organic Compound

REFERENCES

Multi-Agency Radiological Site and Survey Investigation Manual, NUREG-1975. EPA 402-R-97-016. August 2000.

New York State Department of Environmental Protection, Division of Hazardous Waste Remediation. Technical and Administrative Guidance Memorandum # 4046, Determination of Soil Cleanup Objectives and Cleanup Levels. January 24, 1994.

New York State Department of Environmental Protection, Division of Hazardous Waste Remediation. Technical and Administrative Guidance Memorandum # 4003, Soil Cleanup Guideline for Soils Contaminated with Radioactive Materials. September 14, 1993.

Parsons Engineering Science, Inc. 1995. Expanded Site Inspection - Eight Moderately Low Priority AOCs SEADs 5, 9, 12 (A and B), 43, 56, 69, 44 (A and B), 50, 58, and 59, December 1995.

Parsons. 2002. Revised Final Remedial Investigation (RI) Report at the Radioactive Waste Burial Sites (SEAD-12), August 2002.

Parsons. 2003. Final Radiological Survey Report, SEAD-12 Phase I and Phase II Surveys, March 2003.

Parsons. 2006. Final Supplemental Remedial Investigation Report, Radioactive Waste Burial Sites (SEAD-12), October 2006.

Parsons. 2006. Revised Final Generic Site Wide Sampling and Analysis Plan, Seneca Army Depot Activity, July 2006.

Parsons. 2008. Final Feasibility Study (FS) Report for the Radioactive Waste Burial Sites (SEAD-12). Prepared for U.S. Army Engineer Division, Huntsville and Seneca Army Depot, January 2008.

1.0 OBJECTIVES AND SCOPE OF WORK

Parsons Infrastructure & Technology Group Inc. (Parsons) was tasked under United States Army Corps of Engineers (USACE) Contract Number W912DY-08-D-0003, Task Order No. 0003, to prepare a Removal Action (70884347RA) work plan that describes and documents the U.S. Army's (Army's) planned approach for removing classified military-related materials and other debris from Disposal Pits A/B and C that are located at the Radiological Waste Burial Sites (SEAD-12) within the former Seneca Army Depot Activity (SEDA or the Depot) in Seneca County, New York. The RA provides guidance and identifies the steps that will be initiated and completed during this removal action to: excavate, segregate, screen, characterize, secure, manage, treat (if needed), transport, and dispose of identified wastes in accordance with prevailing solid, hazardous, and radioactive waste regulations. The RA will be conducted under the oversight of the U.S. Environmental Protection Agency (EPA), the New York State Department of Environmental Conservation (NYSDEC), and the New York State Department of Health (NYSDOH).

Previous radiological investigations conducted at the Disposal Pits A/B and C indicates that there were no radiological exceedances. However, the Army assumes that there is a potential that some of the buried material in the three disposal pits could contain radioactive items or be radioactively-contaminated based on the nature of work historically conducted at SEAD-12. As such, this Radiological Field Sampling Plan (RFSP) provides for the contingent of field sampling and laboratory analyses, if a radioactive source is contained in miscellaneous components, radioactive-contaminated components, and radioactive-contaminated soil is present during construction activities.

The RFSP is provided as an Appendix to the RA work plan, and describes the procedures, if necessary that will be used to collect and manage the radiological field samples and document data collection activities in support of the removal action conducted at Disposal Pits A/B and C located at SEAD-12. This RFSP has been prepared in general accordance with:

- USACE Engineer Manual (EM) 200-1-3, Requirements for the Preparation of Sampling and Analysis Plans, 1 February 2001;
- Engineer Regulation (ER) 1110-1-263, Chemical Data Quality Management for Hazardous, Toxic, and Radioactive Waste Remedial Activities, 30 April 1998; and
- New York State Department of Environmental Conservation (NYSDEC) Draft DER-10, Technical Guidance for Site Investigation and Remediation, 25 December 2002.

1.1 BACKGROUND AND OBJECTIVES

1.1.1 Background

The SEDA is located approximately 40 miles south of Lake Ontario, near Romulus, New York as shown on **Figure 1-1**. 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. Since 2000, more than 8,270 acres of land have been transferred from the Army to other public and private parties for reuse.

The mission of SEDA primarily entailed the management of munitions and included:

- Receiving, storing, and distributing ammunition and explosives;
- Providing receipt, storage, and distribution of items that support special weapons; and,
- Performing depot-level maintenance, demilitarization, and surveillance on conventional ammunition and special weapons.

SEAD-12 is located in the north central portion of SEDA within the former Weapons Storage Area (WSA), which is also known as the "Q" Area. As shown on **Figure 1-2**, SEAD-12 originally was comprised of two separate areas designated as SEAD-12A located in the northeast corner of the WSA, and SEAD-12B located northeast of Buildings 803, 804, and 805 near the north central border of the Depot. SEAD-12A encompassed an area measuring approximately 1,000 feet long by 1,000 feet wide, and contains Disposal Pits A/B and C. SEAD-12B encompassed an area measuring approximately 300 feet long by 300 feet wide, and was suspected to have contained a buried 5,000 gallon underground storage tank and a small dry waste pit.

The bounds of SEAD-12 were increased to include approximately 360 acres of land after the completion of the Expanded Site Inspections (ESI) in 1995. This decision was based on the similarity of the chemicals found at SEAD-12A and SEAD-12B, and the Army's knowledge of the general history of the Q Area, which suggested similar constituents could exist throughout the larger area.

The portion of SEAD-12 located north of Service Road Number (No.) 2 was used for disposal of laboratory and maintenance wastes, and military components. The northern portion of SEAD-12 also includes Buildings 802 through 807, 810, 812 and 825 which were part of the WSA facility at SEDA. The eastern, western, and southern portions of SEAD-12 are primarily open fields and include Buildings 813 through 817, 819, and 823. These buildings were also part of the former WSA facility at SEDA.

The area designated as SEAD-12 excludes the area of SEAD-63, the Miscellaneous Components Burial Site, which is located along the western boundary of the former Q Area (see **Figure 1-2**). A

NTCRA was performed for SEAD-63 in 2004, resulting in the removal of 5,100 tons of soil and debris. A record of decision (ROD) for No Further Action (NFA) at SEAD-63 was submitted by the Army in September 2006, approved by the EPA with concurrence from the NYSDEC, and the SWMU is closed under CERCLA.

Refer to the RA work plan for information on previous investigations conducted at SEAD-12 including the three disposal pits.

1.1.2 Objectives

The primary objective of the RA is to:

- Excavate, segregate, and secure military-related materials from other debris and soil that are present in Disposal Pits A/B and C at SEAD-12 to prevent public access to the classified or sensitive military material.

The results of the baseline risk assessment completed for Disposal Pits A/B and C during the remedial investigation (RI) and documented in the *Final RI Report* (Parsons 2002) indicate that no further action is required for the contents of the pits as there is no indication that hazardous substances exist at levels that pose unacceptable levels of risk or potential hazard to human health or the ecological populations.

If classified military-related materials are recovered from the former disposal pits, it will be turned over to the Army for subsequent handling, storage, dismantling or potential destruction, and disposal in accordance with national security, and applicable solid, hazardous, and radiological requirements. The non-military-related debris will be recovered from the excavations, characterized, treated (as necessary), and disposed off-site at licensed landfills in accordance with prevailing solid, hazardous, and radiological waste regulations. Excavated fill or soil that are identified to contain either hazardous substances at concentrations that do not allow for its reuse as backfill, will be segregated, characterized, and transported off site for disposal in accordance with the disposal facility's permit requirements and applicable solid, hazardous, and radiological regulations. The fill and/or soil not found to be contaminated will be used as backfill in the open excavations at Pits A/B and C.

1.2 SCOPE OF WORK

The scope of the RA is to:

- Excavate and segregate classified military-related materials from other debris and soil that are present in Disposal Pits A/B and C.
- Dewatering excavations, if warranted, by pumping the water into a holding tank.
- Provide contingencies if hazardous substances are found in the excavated material.

- Stabilize soil exceeding the waste characterization criteria, if found, in order to render it non-hazardous.

- Dispose of the military-related items and debris, and soil/fill containing hazardous substances above concentrations that allow for unrestricted use in off-site landfills.

- Backfill excavations with the existing non-contaminated soil/fill (not debris) removed from excavations and clean fill as necessary.

- Submit a Completion Report after completion of the remedial action.

2.0 RADIOLOGICAL LABORATORY ANALYSIS OBJECTIVES

The objectives of the radiological laboratory analysis, if radiological contamination is detected above background levels in the material excavated and removed from Disposal Pits A/B and C are identified below. The laboratory selected to analyze the radiological samples collected during the removal action (if warranted) is GEL Laboratories, of Charleston, South Carolina. The radiological subcontractor selected to perform the field radioactivity scanning is Cabrera Services, Inc., (Cabrera) located in East Hartford, Connecticut.

Removal Action Sampling/Laboratory Analysis Objectives:

1. Final Limits of Disposal Pit Excavations – A final status survey (FSS) if warranted, will be performed by the health physics technician and will consist of field screening the surface of the excavation's side walls and bottom areas, and the collection/submittal of the confirmatory samples to an off-site laboratory for radiological analyses. Radiological surveys will be conducted in accordance with the procedures presented in **Attachment A**.

   Prior to the initiation of the excavation work, near surface soil samples will be collected within the WSA to establish background radiological levels in accordance with the Multi-Agency Radiological Survey and Site Investigation Manual (MARSSIM) guidance for a Class 3 FSS. These soil samples will be submitted to an off-site laboratory for analysis to establish radiological background data as required by MARSSIM.

2. Disposal Characterization for Soil and Debris – The health physics technician will perform field radioactivity scanning of the excavated soils and debris during excavation activities and during the temporary stockpiling of material. Samples of stockpiled soil and debris will be collected for radiological waste disposal characterization. These data will be used to segregate waste into the following possible categories:

   - Soil– Low Level Radioactive Waste (LLRW)
   - Soil– Resource Conservation and Recovery Act (RCRA) Hazardous Waste
   - Soil– Mixed Waste (both LLRW and RCRA Hazardous Waste)
   - Soil– Contaminated (Non-LLRW, non-RCRA Hazardous, non-Mixed Waste)
   - Debris – LLRW (radioactive sources)
   - Debris – LLRW (radioactive surface-contaminated material)
   - Debris – RCRA Hazardous Waste

- Debris – Mixed Waste
- Debris – Uncontaminated

3. Disposal Characterization for Waste Water – A sample of the waste water will be collected from the frac tank at the end of the project or when it's full, and analyzed for radiological constituents only if radiological contaminates are found in the soil and debris above background levels during the excavation of the material from the disposal pits.

3.0 RADIOLOGICAL FIELD SAMPLING ACTIVITIES & PROCEDURES

This section describes field sampling activities and procedures designed to meet the objectives identified in Section 2 of this RFSP. The numbers of samples to be collected for radiological analysis, the sampling locations, and rationale are summarized in **Table 3-1**.

All field activities will be conducted in accordance with Parson' site-specific health and safety plan (HSP), "Accident Prevention Plan and Generic Site Wide Health and Safety Plan for Seneca Army Depot Activity" (Parsons, 2005). In addition, radiological surveys, sampling, monitoring and decontamination procedures will be performed in accordance with the procedures presented in **Attachment A.**

3.1 FINAL LIMITS OF DISPOSAL PITS EXCAVATION – CONFIRMATORY SAMPLING

If radiological contamination is detected above background levels in material excavated from the disposal pits, confirmatory field screening and soil sampling if required will be conducted to verify that the identified contamination or debris has been removed, and that concentrations of contaminants remaining are acceptable.

Soil samples will be collected within the WSA to establish background radiological levels, in accordance with MARSSIM guidance. These samples will be submitted to an off-site laboratory for analysis of Gross Alpha, and Gross Beta to establish radiological background data.

3.1.1 Sample Types and Locations

Field screening will include field determination of radiation levels using field instrumentation. Field radioactivity scanning will be performed on the surface of excavations bottom and side walls. If radiation levels are found above the established background levels then discrete soil samples will be collected from the side walls and bottom of the excavations, and submitted to the laboratory for determination of radiological constituents.

3.1.2 Sampling Frequency

The number of field samples to be collected and analyzed will be based on field screening results.

3.1.3 Sampling Methods

3.1.4 Laboratory Analyses

If evidence of residual radiation in excess of background levels is observed, then confirmatory grab soil samples will be collected within the excavation pits and analyzed on a 5 day turn around time for the following:

- Gross Alpha by EPA Method 900.0M,
- Gross Beta. by EPA Method 900.0M,
- Gamma Spectroscopy (with RN-222 Ingrowth) by EPA Method 901.0M, and
- Tritium by EPA Method 906.0M.

The radionuclide library to be utilized by the off-site laboratory for Gamma Spectroscopy sample analyses will be approved by Parsons health physics subcontractor prior to field submittal of sample analyses.

3.2 DISPOSAL CHARACTERIZATION ANALYSES - SOLIDS

Samples of soil and select debris will be submitted to the laboratory for radiological disposal characterization analyses based on a five day turn-around time. The data will be used to segregate material for disposal at off-site landfill(s) and obtain landfills' approval for disposal. Disposal characterization will consist of collecting/analyzing samples of stockpiled material following excavation and segregation of debris (material greater than four inches in diameter) from soil, in accordance with NYSDEC requirements. Disposal characterization sampling/analysis will confirm that stockpiled wastes are properly segregated prior to loading for transport and off-site disposal.

3.2.1 Sample Types and Locations

Composite soil samples will be collected from random locations from each stockpile for radiological analysis as described in the procedures provided in **Attachment A**. Samples of debris will be selected for radiological laboratory analyses based on elevated field scanning. Debris samples will be collected as grab samples in accordance with the procedures provided in **Attachment A**.

3.2.2 Sampling Frequency

Soil samples will be collected from the temporary soil stockpiles at a rate of 1 sample per 200 cubic yards or less for radiological constituents. This sampling requirement is based on the disposal facility's requirements. Parsons' currently estimates that approximately 19 soil samples and 10 debris samples will be collected from the stockpiles for radiological analysis. Field QC samples and QA samples will not be collected for these waste disposal characterization samples.

3.2.3 Sampling Methods

Soil samples will be scanned for elevated areas of gamma radiation using a sodium iodide (NaI) gamma scintillation detector. The gamma scanning surveys will be performed by slowly moving the NaI detector in a serpentine motion as close as practical to the surface to be measured at a rate of approximately 0.5 m/s. (Additional information on the detector is provided in **Attachment A**.)

A pancake-type Geiger Mueller detector (Ludlum Model 44-9) coupled to the survey meter (Ludlum Model 3) will be used to scan debris for the presence of Gross Alpha, Gross bBta and Gamma radiation. An Alpha/Beta scintillator (Ludlum Model 43-89 or 43-93) coupled to an Alpha/Beta ratemeter (Ludlum Model 2224-1) will be used to differentiate between Alpha and Beta constituents to identify which radionuclides may be present prior to submitting to an off-site laboratory for radiological analysis.

Stockpile soil and debris samples collected for radiological waste characterization will be conducted in accordance with the procedures provided in **Attachment A**.

3.2.4 Laboratory Analyses

Samples of soil and debris will be transported via an overnight delivery service to the laboratory for the following waste disposal radiological analysis:

- Gross Alpha by EPA Method 900.0M,
- Gross Beta. by EPA Method 900.0M,
- Gamma Spectroscopy (with RN-222 Ingrowth) by EPA Method 901.0M, and
- Tritium by EPA Method 906.0M.

The radionuclide library to be utilized by the off-site laboratory for gamma spectroscopy sample analyses will be approved by Parsons' health physics subcontractor prior to submitting samples for analysis.

3.3 WASTE DISPOSAL CHARACTERIZATION ANALYSES – WASTE WATER

A sample of waste water will be collected from the frac tank and submitted to the laboratory for radiological analysis for waste disposal characterization only if radiological contaminated soil and debris is encountered in the excavations. If a sample is collected for radiological analysis, it will be analyzed on a 5-day turn-around time. The data will be used to secure approval to discharge the waste water to the Seneca County Sewer District (the District).

3.3.1 Sample Types and Locations

A grab sample will be collected from the frac tank.

3.3.2 Sampling Frequency

One field sample will be collected on one occasion and submitted for laboratory analysis. Field QC samples and QA samples will not be collected for these waste disposal characterization samples.

3.3.3 Sampling Methods

The waste water sample will be collected in accordance with the procedures provided in **Attachment A**.

3.3.4 Laboratory Analyses

If warranted, the waste water sample will be transported via an overnight service to the laboratory for the radiological analysis of:

- Gross Alpha by EPA Method 900.0M,
- Gross Beta by EPA Method 900.0M,
- Radium - 226 by Emanation by EPA Method 903.1M,
- Radium - 228 by EPA Method 904.0M,
- Total Uranium by ICPMS 6020, and
- Tritium by EPA Method 906.0M.

3.4 FIELD SCANNING OF SAMPLES FOR RADIOACTIVITY

Field and QC samples will be scanned for radioactivity prior to packaging and shipment to the laboratories in accordance with the procedures provided in **Attachment A.** Field scanning results will be recorded on the Chain-of-Custody (COC) forms submitted to the laboratories along with the samples, as well as documented on the field data sheets. Samples exceeding radioactivity acceptance thresholds for the chemical laboratory will be submitted for analysis at the radiological laboratory.

3.5 EQUIPMENT DECONTAMINATION PROCEDURES

Disposable sampling equipment will be used wherever possible to minimize decontamination requirements. Reusable equipment will be decontaminated in accordance with the procedures provided in **Attachment A**.

4.0 SAMPLE CHAIN-OF-CUSTODY AND DOCUMENTATION

The procedures provided in **Attachment A** will be used to record and document the field sampling and other relevant data collected for the radiological activities.

5.0 SAMPLE PACKAGING AND HANDLING

5.1 SAMPLE CONTAINERS

The analytical laboratory will supply a sufficient number of pre-cleaned sample containers compatible with the radiological analytes of interest and in accord with the guidance given in Appendix I of EM 200-1-3 for soil and waste-water samples. Sample bottles will meet the ICHEM Series 200 cleanliness requirements or equivalent. Cleanliness certification accompanying the bottles will be retained for the project files. Sample container requirements are presented in **Table 3-2**.

5.2 SAMPLE HOLDING TIMES

Holding time limitations are intended to minimize chemical change and biological transformation in the sample before it is analyzed. The maximum holding times for samples are presented in **Table 3-2** and are consistent with the guidance given in EM 200-1-3. The laboratory will ensure that all samples are analyzed within these specified holding times. If samples are collected for radiological analysis, then samples will be shipped to the analytical laboratory by overnight carrier either the day of collection or the following day in accordance with the procedures provided in **Attachment A**.

5.3 SAMPLE PRESERVATION

Samples are preserved to retard biological activity and hydrolysis of chemical compounds. Preservation may also reduce volatility and adsorption of the target constituents. Soil samples for radiological analysis do not require preservation other than cooling. The waste water sample will require preservation. All chemical samples will be cooled to 4 degrees Celsius (^{o}C) and removed from sunlight as soon after collection as possible. Sample preservation requirements, consistent with the guidance given in EM 200-1-3, are presented in **Table 3-2**.

5.4 COLLECTION OF FIELD QC/QA SAMPLES

Field QC samples will be collected and analyzed to assess the precision and representativeness of the overall measurement system. As discussed previously, discrete confirmatory soil samples from the excavations will only be collected and submitted for laboratory analysis, if evidence of residual radiation is detected in excess of background levels during field screening sampling. Currently, no QC samples will be collected since post-excavation confirmatory soil samples are not anticipated to be collected from the disposal pits. If samples are to be collected for radiological analysis, then QC samples that may be collected will include:

One duplicate/replicate will be collected for every 10 soil samples in accordance with NYSDEC requirements. One matrix spike (MS) and one matrix spike duplicate (MSD) will be collected for every 20 soil samples. Whenever possible, the MS and MSD will be collected from a location that is believed to have little or no contamination to avoid the laboratory having to dilute the sample.

MS/MSD samples are collected to assess matrix influences on analytical results.

5.5 SAMPLE SHIPPING

Samples will be packaged and shipped in accordance with the EPA's *Users Guide to the Contract Laboratory Program* (EPA, 1988a).

Sample packaging and shipping for radiological analysis will also be performed in accordance with the procedures provided in **Attachment A**.

6.0 WASTE HANDLING

Investigation-derived waste (IDW) will include equipment decontamination rinseate, and personnel protection equipment (PPE). Soil and debris from the excavation areas, run-on/run-off waters will be managed independently from IDW, as discussed in the RA work plan.

Since it is not anticipated that radiological contamination will be detected above background levels during construction activities, water used for decontamination will be collected in the frac tank.

If evidence of residual radiation in excess of background levels are observed then expendable sampling equipment, and materials that may be generated during field activities (e.g., PPE) will be containerized and handled in accordance with the procedures provided in **Attachment A**.

TABLES

Table 3-1
SAMPLING AND ANALYSIS REQUIREMENTS
SEAD-12 Removal Action Work Plan
Seneca Army Depot Activity

Sample Matrix	Sample Type	Field Screening/Laboratory Analysis Parameter(s)	Laboratory Analytical Methods	Estimate No. of Field Sample	No. of QA/QC Samples*	Purpose
Limits of Disposal Pit Excavation - Bottom and Side Walls of Disposal Pits						
Soil	Grab	TCL VOCs	USEPA 8260B	**	**	Confirm Limits of Excavation - Results < NYSDEC part 375 SCOs for unrestricted use or Background
		TCL SVOCs	USEPA 8270C	**	**	
		PCBs/Pesticides	USEPA 8082/8081A	**	**	
		TAL Metals	USEPA 6010B/7471A	**	**	
		Radioactivity - Gross Alpha/Beta	USEPA 900.0M	**	**	
		Radioactivity - Gamma Spectroscopy with Rn-222 Ingrowth	USEPA 901.0M	**	**	
		Radioactivity - Tritium	USEPA 906.0M	**	**	
Reference Area (Background) Soil samples (72-Hour turn-around time)						
Soil	Grab	Radioactivity - Gross Alpha & Beta	USEPA 900.0M	19	2	For establishing baseline data
Disposal Characterization Analyses - Soil and Debris (5-day turn-around time)						
Soil	Grab	TCLP VOCs	USEPA 8260B	6	0	1 sample/700 CY
	Composite	TCLP SVOCs	USEPA 8270C	6	0	
		PCB/Pesticides	USEPA 8082/8081A	6	0	
		TCLP Metals	USEPA 6010B/7471A	6	0	
		Paint Filter Test	USEPA 9095	6	0	
		pH	USEPA 9045	6	0	
		% Solids	USEPA 160.3	6	0	
		Flashpoint	USEPA 1010	6	0	
		Reactivity	SW846/Section 7.3.3 and 7.3.4	6	0	
	Composite	Radioactivity - Gross Alpha & Beta	USEPA 900.0M	19	0	1 sample/200 CY
		Radioactivity - Gamma Spectroscopy	USEPA 901.0M	19	0	
		Radioactivity - Tritium	USEPA 906.0M	19	0	
Debris	Grab	TCLP Metals	USEPA 6010B/7471A	3	0	1 sample/700 CY
		Radioactivity - Gross Alpha & Beta	USEPA 900.0M	10	0	1 sample/200 CY
		Radioactivity - Gamma Spectroscopy	HASL 300	10	0	
		Radioactivity - Tritium	USEPA 906.0M	10	0	
Wastewater						
Water	Grab	TCL VOCs	USEPA8260B	1	0	Waste disposal characterization
		TCL SVOCs	USEPA 8270C	1	0	
		PCB/Pesticides	USEPA 8082/8081A	1	0	
		TAL Metals	USEPA 6000/7000	1	0	
		pH	USEPA 150.1	1	0	
		Radioactivity - Gross Alpha/Beta***	USEPA 900.0	1	0	
		Radioactivity - Ra-226 by Emanation ***	USEPA 903.1M	1	0	
		Radioactivity - Ra-228 ***	USEPA 904.0M	1	0	
		Radioactivity - Total Uranium ***	ICPMS 6020	1	0	
		Radioactivity - Tritium***	USEPA 906.0M	1	0	
Imported Fill Characterization						
Soil	Grab	TCL VOCs	USEPA 8260B	1	0	Backfill material characterization
		TCL SVOCs	USEPA 8270C	1	0	
		PCBs/Pesticides	USEPA 8082/8081A	1	0	
		TAL Metals	USEPA 6010B/7471A	1	0	
		Radioactivity - Gross Alpha/Beta	USEPA 900.0M	1	0	
		Radioactivity - Gamma Spectroscopy with Rn-222 Ingrowth	USEPA 901.0M	1	0	
		Radioactivity - Tritium	USEPA 906.0M	1	0	

Notes:

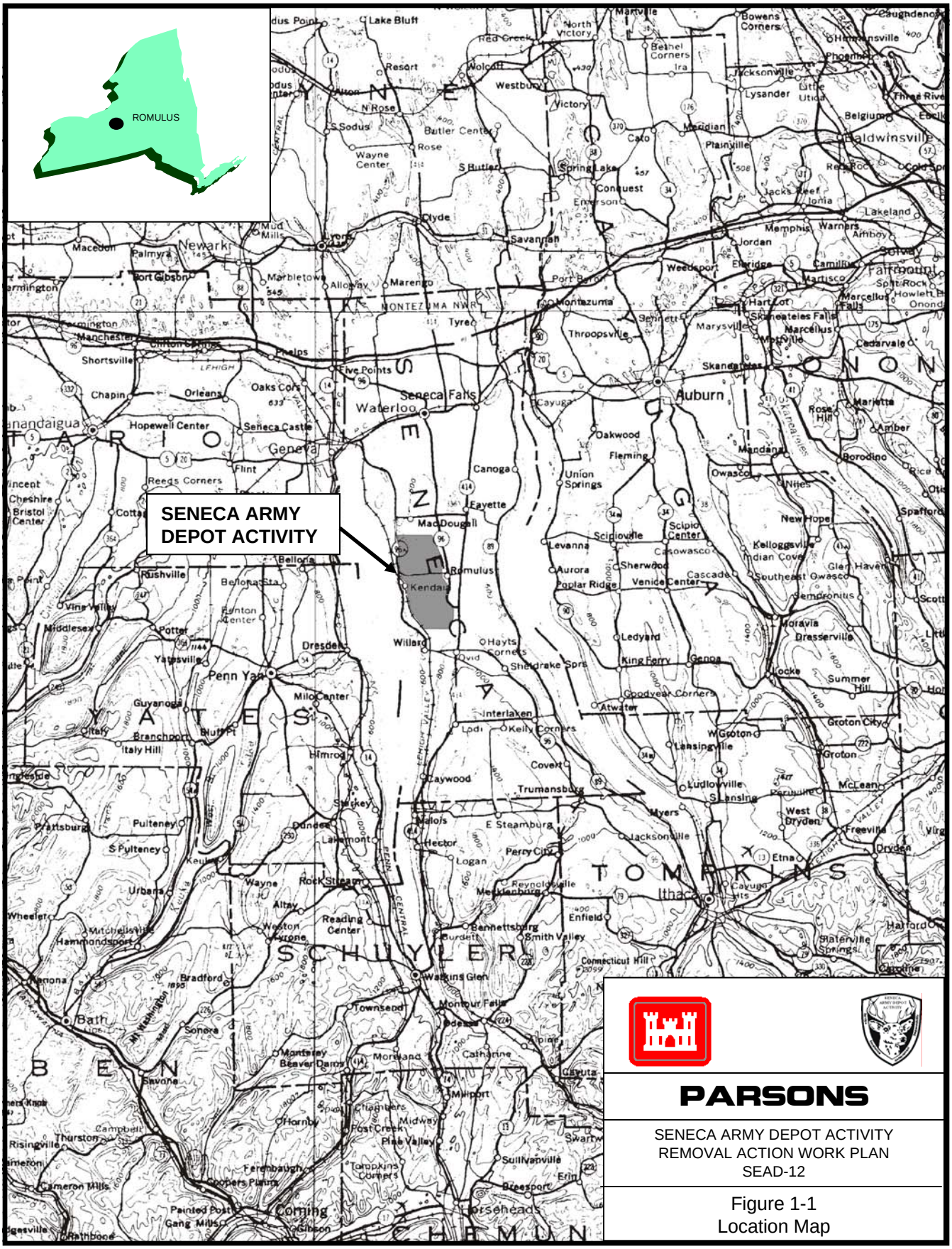
* indicates QA/QC samples collected and analyzed at frequencies of one replicate/duplicate for each 20 field samples per sample delivery group (SDG), one MS and one MSD per 20 samples per media per SDG one (sampling equipment) rinsate blank per day per media (for non-disposable sampling equipment only, one trip blank (VOCs only). No QA/QC samples for disposal characterization.

** indicates the number of field samples to be collected and analyzed will be based on radiological field screening results.

Table 3-2
SAMPLE HANDLING REQUIREMENTS
SEAD-12 Removal Action Work Plan
Seneca Army Depot Activity

Sample Matrix	Field Screening/Laboratory Analysis Parameter(s)	Laboratory Analytical Methods	Container Information			Maximum Holding Time
			Type	Quantity	Preservative	
Limits of Disposal Pit Excavation - Bottom and Side Walls of Disposal Pits						
	TCL VOCs	USEPA 8260B	EnCore™ Samplers	3	4º C	14 days
	TCL SVOCs	USEPA 8270C	4 Oz Glass	1	4º C	14 days
	PCBs/Pesticides	USEPA 8082/8081A	4 Oz Glass	1	4º C	14 days
	TAL Metals	USEPA 6010B/7471A	4 Oz Glass	1	None	180 days
	Radioactivity - Gross Alpha/Beta	USEPA 900.0M	4 Oz Glass	1	None	180 days
	Radioactivity - Gamma Spectroscopy with Rn-222 Ingrowth	USEPA 901.0M	8 Oz Glass	1	None	180 days
	Radioactivity - Tritium	USEPA 906.0M	8 Oz Glass	1	None	180 days
Reference Area (Background) Soil samples (72-Hour turn-around time)						
Soil	Radioactivity - Gross Alpha & Beta	USEPA 900.0M	4 Oz Glass	1	None	180 days
Disposal Characterization Analyses - Soil and Debris (5-day turn-around time)						
	TCLP VOCs	USEPA 8260B	4 Oz Glass	1	4º C	14 days
	TCLP SVOCs	USEPA 8270C	4 Oz Glass	1	4º C	14 days
	PCBs/Pesticides	USEPA 8082/8081A	4 Oz Glass	1	4º C	14 days
	TCLP Metals	USEPA 6010B/7471A	4 Oz Glass	1	None	180 days
	Paint Filter Test	USEPA 9095	8 Oz Glass	1	None	N/A
	pH	USEPA 9045	4 Oz Glass	1	None	Immediate
	% Solids	USEPA 160.3	4 Oz Glass	1	4º C	7 days
	Flashpoint	USEPA 1010	4 Oz Glass	1	None	N/A
	Reactivity	SW846 Section 7.3.3/7.3.4	4 Oz Glass	1	None	7 days
	Radioactivity - Gross Alpha & Beta	USEPA 900.0M	4 Oz Glass	1	None	180 days
	Radioactivity - Gamma Spectroscopy	USEPA 901.0M	8 Oz Glass	1	None	180 days
	Radioactivity - Tritium	USEPA 906.0M	8 Oz Glass	1	None	180 days
Debris	TCLP Metals	USEPA 6010B/7471A	4 Oz Glass	1	None	180 days
	Radioactivity - Gross Alpha & Beta	USEPA 900.0M	4 Oz Glass	1	None	180 days
	Radioactivity - Gamma Spectroscopy	HASL 300	8 Oz Glass	1	None	180 days
	Radioactivity - Tritium	USEPA 906.0M	8 Oz Glass	1	None	180 days
Wastewater						
	TCL VOCs	USEPA 8260B	40 mL VOA vials	3	4º C	14 days
	TCL SVOCs	USEPA 8270C	1000 mL Amber Glass	2	4º C	7 days
	PCBs/Pesticides	USEPA 8082/8081A	1000 mL Amber Glass	2	4º C	7 days
	TAL Metals	USEPA 6000/7000	500 mL Plastic	1	HNO3	180 days
	pH	USEPA150.1	250 mL Plastic	1	None	Immediate
	Radioactivity - Gross Alpha/Beta	USEPA 900.0	500 mL Plastic	1	pH < 2, HNO3	180 days
	Radioactivity - Ra-226 by Emanation	USEPA 903.1M	1 Liter Plastic	2	pH < 2, HNO3	180 days
	Radioactivity - Ra-228	USEPA 904.0M	1 Liter Plastic	1	pH < 2, HNO3	180 days
	Radioactivity - Total Uranium	ICPMS 6020	250 mL Plastic	1	pH < 2, HNO3	180 days
	Radioactivity - Tritium	USEPA 906.0M	250 mL Glass	1	None	180 days
Imported Fill Characterization						
	TCL VOCs	USEPA 8260B	EnCore™ Samplers	3	4º C	14 days
	TCL SVOCs	USEPA 8270C	4 Oz Glass	1	4º C	14 days
	PCBs/Pesticides	USEPA 8082/8081A	4 Oz Glass	1	4º C	14 days
	TAL Metals	USEPA 6010B/7471A	4 Oz Glass	1	None	180 days
Soil	Radioactivity - Gross Alpha/Beta	USEPA 900.0M	4 Oz Glass	1	None	180 days
	Radioactivity - Gamma Spectroscopy with Rn-222 Ingrowth	USEPA 901.0M	8 Oz Glass	1	None	180 days
	Radioactivity - Tritium	USEPA 906.0M	8 Oz Glass	1	None	180 days

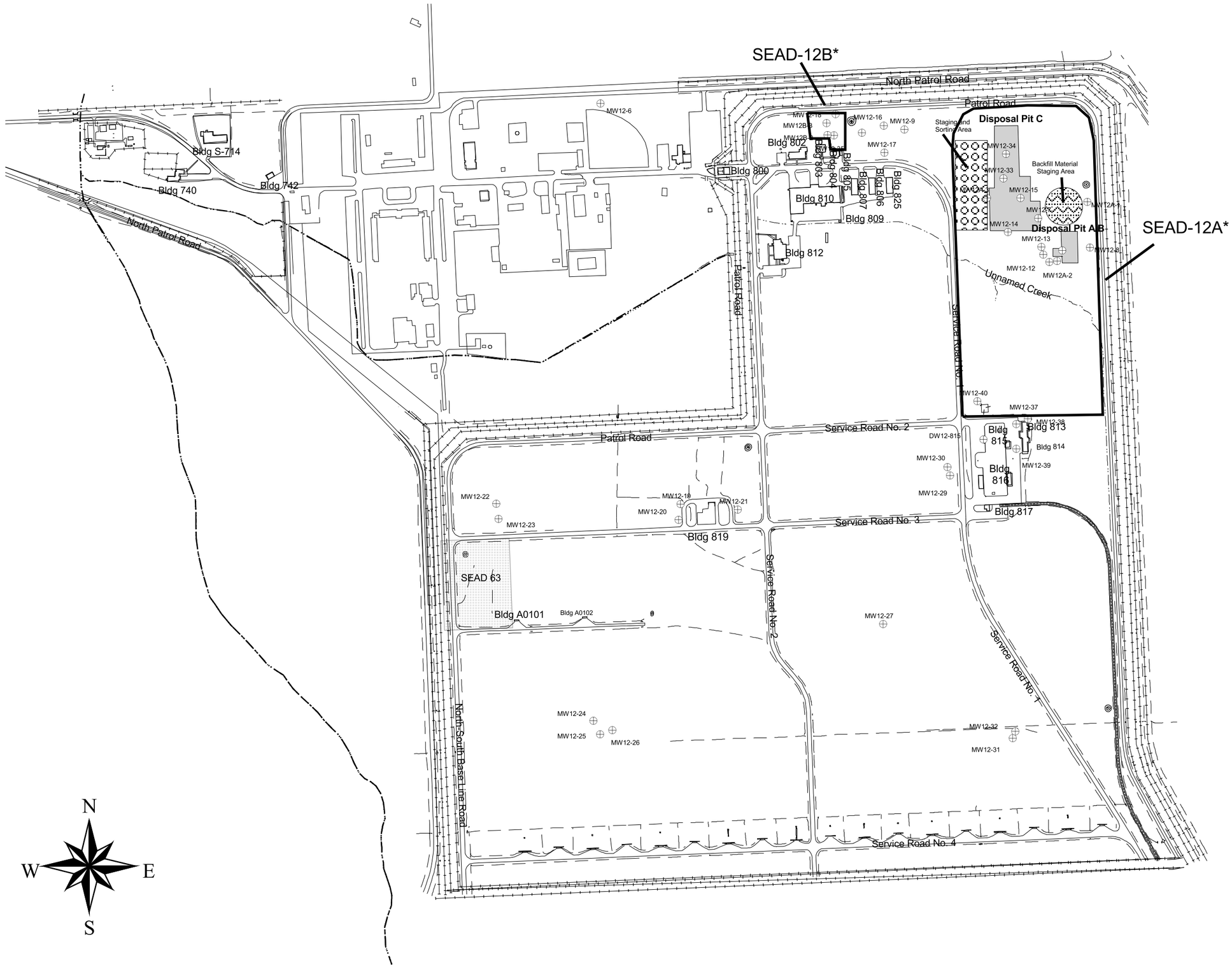
FIGURES



PARSONS

SENECA ARMY DEPOT ACTIVITY
REMOVAL ACTION WORK PLAN
SEAD-12

Figure 1-1
Location Map



LEGEND

MW12-15
MONITORING WELL LOCATION

DISPOSAL PIT AREA

SEAD-63

BUILDINGS (bldgs)

BACKFILL MATERIAL STAGING AREA

STAGING AND SORTING AREA

FENCE

ROADS

SURFACE WATER

Note:
* The SEAD-12 site boundary was expanded from the original site boundary which only consisted of two seperate areas, known as SEAD-12A and SEAD-12B.

500 0 500 Feet

PARSONS

SENECA ARMY DEPOT ACTIVITY
REMOVAL ACTION WORK PLAN
SEAD-12

Figure 1-2
Disposal Pits A/B and C Site Location Plan

March 2009

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ATTACHMENT A

RADIOLOGICAL PROCEDURES

1.0 PURPOSE

The purpose of this procedure is to establish the framework and to define the requirements for Cabrera Services, Inc., (CABRERA) personnel performing radiological surveys. Adherence to this procedure will provide reasonable assurance that the radiological surveys performed maintain reproducible results. In addition, adherence to this procedure will provide adequate control of radiation exposures As Low As Reasonably Achievable (ALARA).

2.0 APPLICABILITY

This procedure provides the requirements for identifying, scheduling, and performing routine, clean area, radiation, contamination, and airborne surveys by radiation safety personnel. All remediation and facility areas that are radiologically controlled as well as non-radiologically controlled areas containing fixed contamination and areas adjacent to contaminated areas are within consideration for routine survey performance. This procedure does not include survey requirements for radiation generating devices and survey requirements specified in radiation work permits (RWP's).

This procedure will be also used by CABRERA personnel to perform radiation and contamination surveys at customer facilities. The following types of surveys may be performed using this procedure.

- Surveys performed for shipping radioactive materials.
- Surveys performed to characterize facilities, sites, and items contaminated with radioactive materials.
- Surveys performed to provide direction in decontamination and decommissioning facilities and sites.

3.0 PRECAUTIONS, LIMITATIONS AND REQUIREMENTS

3.1 Precautions

3.1.1 Instruments used to perform routine surveys shall be operated in accordance with the respective operating procedure.

3.1.2 Large area smears may be used to augment (but not replace) the 100 cm^2 smear survey. Large area wipes may be counted with the Ludlum Model-3 or equivalent. Large area smears are used to obtain immediate information concerning loose contamination for the purpose of radiological protection and to minimize time spent performing disc smears on an item easily identified as contaminated.

3.1.3 Personnel performing routine surveys shall be logged in on a Radiation Work Permit in accordance with AP-012 (if applicable).

3.1.4 Audible response instruments should be used during direct scan surveys.

3.1.5 The instruments used for routine surveys shall be within current calibration and shall have had a performance test check performed daily or before use in accordance with the instrument's operating procedure.

3.2 Limitations

3.2.1 The maximum probe speed during direct scan surveys of surfaces shall be 3 cm/sec.

3.2.2 The probe face shall be held within ¼ inch of the surface being surveyed for alpha radiation, and within ½ inch of the surface being surveyed for beta-gamma radiation.

3.2.3 If an instrument used to perform routine surveys fails any operational check, it shall be removed from service. All data collected during the period of instrument failure must be evaluated by the RSO or duly authorized representative.

3.2.4 Posting of radiological control areas shall be performed in accordance with OP-019.

3.3 Requirements

3.3.1 Obtain and review any previous surveys performed in the area to determine radiation conditions which will be encountered.

3.3.2 Before performing any survey using this procedure, the HPT shall be trained. The training shall allow the HPT to perform surveys independently.

3.3.3 To ensure achieving the required sensitivity of measurements, survey samples will be analyzed in a low-background area.

3.3.4 Dose rate surveys, at a minimum, should be performed in locations where workers are exposed to radiation levels that might result in radiation doses in excess of 10% of the occupational dose limits or where an individual is working in a dose rate area of 2.5 mrem/hr or more.

3.3.5 If contamination is found in unrestricted areas, prevent access to the area and immediately notify the RSO or duly authorized representative.

4.0 REFERENCES

- 10 CFR 20, Subpart E Radiological Criteria for License Termination
- 10 CFR 20, Subpart F Surveys and Monitoring
- 10 CFR 20.2103 Records of Surveys
- RSP Radiation Safety Program
- AP-001 Record Retention
- AP-010 Personnel Protective Equipment
- OP-020 Operation of Contamination Survey Meters
- OP-021 Alpha-Beta Counting Instrumentation
- OP-022 Operation of Micro-R Meters
- OP-023 Operation of Ionization Chambers
- NUREG-1556 Consolidated Guidance About Material Licenses (Vol.11)

5.0 DEFINITIONS AND ABBREVIATIONS

5.1 Restricted Area – An area to which access is controlled to protect individuals against undue risks from exposure to radiation and radioactive materials.

5.2 Contamination Survey – A survey technique to determine fixed and removable radioactive contamination on components and facilities.

5.3 Radiation Survey – is defined as an evaluation of the radiological conditions and potential hazards incident to the production, use, transfer, release, disposal, or presence of radioactive material or other sources of radiation.

5.4 ALARA – (acronym for “as low as is reasonably achievable”) An approach to radiation exposure control to maintain personnel exposures as far below the federal limits as technical, economical and practical considerations permit.

6.0 EQUIPMENT

All instruments used to perform routine surveys shall be used in accordance with the applicable CABRERA administrative and operational procedures. Authorized suppliers of properly calibrated and maintained equipment will supply all instruments.

Radiation and Contamination survey meters will be selected based on job specific requirements and will be identified in the Site Specific Work Plan.

7.0 RESPONSIBILITIES

7.1 Project Manager (PM) – the PM is responsible for ensuring that personnel assigned the task of performing routine surveys are familiar with this procedure, adequately trained in the use of this procedure, and have access to a copy of this procedure.

7.2 Radiation safety Officer (RSO) – The RSO is responsible for monitoring compliance with this procedure and training personnel in performing radiation and contamination surveys. The RSO can also assist in the interpretation of the results obtained during surveys.

7.3 Radiological Field Supervisor (RFS) – During field assignments, the RFS is responsible for ensuring that this procedure is implemented. When the RSO is not on site, the RFS will act as the RSO's duly authorized representative for radiological issues.

7.4 Health Physics Technicians (HPT) – The HPT performing radiation and contamination surveys are responsible for knowing and complying with this procedure.

8.0 INSTRUCTIONS

8.1 Safety Considerations

The safety requirements specified in the job specific HASP and Work Plans, along with the Radiation Safety Program, and other safety documentation must be adhered to when performing surveys.

8.2 Initial Preparations

Obtain and review any previous surveys performed in the area to determine radiation conditions, which will be encountered.

8.2.1 Obtain appropriate survey instruments and prepare the instruments for use.

8.2.2 Obtain necessary forms, smears, and protective clothing, which will be used during the survey.

8.2.3 Plan the strategy for performing the survey before entering the area to reduce exposure time within the area.

8.2.4 If smearable contamination is expected to be above allowable limits, set up an anticipate entry into the area which will prevent the spread of contamination in the area.

8.3 Radiation Surveys

8.3.1 If radiation levels are unknown or previous surveys remain in question, first measure general area radiation levels using a Micro-R Meter or equivalent dose rate meter to determine if elevated radiation levels exist in the survey area.

8.3.2 Small Areas/Items/Waste Containers – This survey technique is used to establish exposure rates from small areas, items, or containers, which contain radioactive materials.

8.3.2.1 Scan the entire surface area of the area, item, or container with a Micro-R or equivalent meter and record locations and readings on OP-001-02 or equivalent form.

8.3.2.2 Measure the exposure rate at 30 centimeters from all surfaces or sides of the area, item, or container and record the location and readings on OP-001-02 or equivalent form.

8.3.3 Facility Surveys – This survey technique is used to release facilities (buildings etc.) to “unrestricted” status or determine status of facilities requiring decontamination and decommissioning. Final release of a facility will be established using MARSSIM guidance.

8.3.3.1 Establish a 1 meter by 1 meter grid system of the facility surfaces using a marking system that assigns a unique number/letter system to the center of each grid. Graphically illustrate the location of the grid system on OP-001-02 or equivalent form.

8.3.3.2 Using a Micro-R Meter, obtain radiation levels at 1 meter from the grid center point and at contact with the grid center point. Record reading on OP-001-02 or equivalent Form. If elevated readings are noted, scan the surface of the grid and note location of any elevated readings with a marker and on OP-001-02 or equivalent Form.

8.3.3.3 Obtain 4 Micro-R readings from locations surrounding the facility or within the facility, which do not contain activity. This establishes a background level for comparison to the reading taken in step 8.2.3.2 above.

8.3.4 Area Surveys – This survey technique is used to release land masses to “unrestricted” status or determine status of areas requiring decontamination before release. Final release of a site area will be established using MARSSIM guidance

8.3.4.1 Establish a 10 meter by 10 meter grid system of the area to be surveyed using surveyor stakes or equivalent, which are numbered with a unique number/letter system to identify the center of each grid. List the locations of the "gridded" system on OP-001-02 or equivalent form.

8.3.4.2 Using a Micro-R meter, obtain radiation levels at 1 meter from the grid corner point and at contact with the surface of the ground. Record all readings on OP-001-02 or equivalent Form.

8.3.4.3 Survey the remainder of the grid at the surface using an "S" walking pattern. If elevated readings are noted above or below the grid center point reading, subdivide the grid into 9 subgrids (3 subgrids X 3 subgrids) and obtain readings at 1 meter above the ground surface, and obtain contact readings in the center of the each subgrid. Record all readings on OP-001-02 or equivalent.

8.4 Contamination Surveys

8.4.1 If removable contamination is suspected or previous surveys are in question, first scan likely contaminated area with an α and/or β probe to determine if elevated areas of contamination exists. Obtain smear samples from any elevated areas and count smears in sample counter. If smearable contamination is found, use appropriate protective clothing and entry control techniques to prevent the spread of contamination.

8.4.2 Small Areas/Items/Waste Containers – This survey technique is used to establish contamination levels on small areas, items, or containers, which contain radioactive materials.

8.4.2.1 If the area, item, or waste container contains alpha activity, scan the area with an alpha probe at ¼ inch above the surface. Note readings on OP-001-02 or equivalent Form.

8.4.2.2 If the area, item, or waste container contains beta activity, scan the area with a beta probe at approximately ½ inch above the surface to be surveyed and obtain reading following meter stabilization. Record meter reading on OP-001-02 or equivalent form. The surface of the waste container can be surveyed for beta activity only if the radiation level from the container does not elevate the beta probe background. If the background level is below 200

CPM, scan the surface of the container and note readings on appropriate survey form.

8.4.2.3 To determine the removable surface contamination on area or items, first take a large area smear (LAS) using a paper hand towel or Masslin cloth and count the smear in a low background area using the alpha and beta probes. If no contamination is found on the LAS, take 100 cm^2 smear for every 2 square foot of surface area and count smears for alpha and beta activity. Record results on OP-001-02 or equivalent form.

8.4.2.4 For waste containers, a LAS should be taken from the bottom, top, and sides of the container. If no contamination is found on the LAS, take 300 cm^2 smears for every 2 square foot of surface area and count smears for alpha and beta in a sample counter. Take one smear each from the container sealing area, lid, and container contact points with ground or floor. Record all results of smear activity on OP-001-02 or equivalent Form. If contamination levels are above limits, decontaminate the surface of the container and repeat survey.

8.4.2.5 Facility Surveys – This survey technique is used to aid in the release of facilities (buildings etc.) to “unrestricted” status or determine status of facilities requiring decontamination and decommissioning.

8.4.2.6 The grid system established in section 8.3.3.1 will also be utilized for contamination surveys.

8.4.2.7 Hold the beta probe at approximately ½ inch above the grid center point and obtain reading following meter stabilization. Record the meter reading on OP-001-02 or equivalent form.

8.4.2.8 If the readings are at background levels, randomly scan the remainder of the grid, concentrating on cracks, floor/wall joints, top of horizontal surfaces, ventilation ducts and grills, and other areas that might collect radioactive materials. Mark any locations above the release criteria on OP-001-02 or equivalent form.

8.4.2.9 If readings are at or near the release levels, scan grid surface and identify portion of the grid that is above the release criteria. Note these areas on the survey form and

mark the area of the grid with spray marker (or equivalent) on OP-001-02 or equivalent form.

8.4.2.10 Repeat steps 8.4.2.7 through 8.4.2.9 with an alpha probe at ¼ inch above the grid center point. If sufficient documentation of previous history is known about the facility, the alpha survey may not be required if:

- The alpha contamination is known not to be present, or
- The alpha measurements can be randomly taken of every 10^{th} grid.

8.4.2.11 One smear sample from a $100cm^2$ area will be taken in each grid. If the above survey found no elevated readings in the grid, the smear sample will be taken in the center of the grid. If elevated levels readings are identified the smear sample will be taken from the area where the highest reading was obtained.

8.4.2.12 Each smear sample will be labeled with the grid location and counted for alpha and beta activity in the sample counter. The smear sample results will be recorded on OP-001-02 or equivalent Form.

8.4.3 Area Surveys – This survey technique is used to aid release of land masses to "unrestricted" status or determine status of area requiring decontamination before release.

8.4.3.1 The grid system established in section 8.2.4, step 8.2.4.1 will also be utilized for contamination surveys.

8.4.3.2 Hold the beta probe at ½ inch above the grid center point and obtain reading following meter stabilization. Record the meter reading on OP-001-02 or equivalent form.

8.4.3.3 If readings are at background levels, randomly scan the remainder of the grid. Mark any locations above release criteria on OP-001-02 or equivalent form.

8.4.3.4 If readings are at or near the release levels scan the grid surface and identify portion of the grid that is above release criteria. Note these areas on OP-001-02 or equivalent form.

8.4.3.5 Areas contaminated with radioactive materials may require soil sample analysis to determine the activity concentration.

The quantity and location of samples will be determined on a case-by-case basis.

8.5 Frequency and Requirements for Routine Surveys

Appropriate routine radiological surveys shall be performed at the following frequencies as a minimum:

8.5.1 Radiation Surveys

- Upon initial entry after extended periods of closure
- Daily, at contamination control points, where the potential exists for personnel to be exposed to radioactive contamination
- Daily, during continuous operation, and when levels are expected to change in High Radiation Areas
- Weekly, in routinely occupied areas adjacent to radiological control areas
- Weekly for operating HEPA-filtered ventilation units
- Weekly, for any temporary Radiation Area boundaries to ensure that the Radiation Areas do not extend beyond posted boundaries
- Monthly, or upon entry if entries are less than monthly, for Radioactive Material Storage Areas
- Monthly, for potentially contaminated ducts, piping, and hoses in use outside the radiological facilities

8.5.2 Contamination Surveys

- Daily, at contamination control points, personnel protective equipment change out areas, or step-off pads, when in use or once per shift in high use situations
- Daily, in office spaces located in the radiological control areas
- Daily, in lunchrooms or eating areas adjacent to radiological control areas
- Weekly, for all designated lunchrooms supporting the project
- Weekly, in routinely occupied locker rooms or the shower areas

adjacent to radiological control areas

- Weekly, or upon entries, if entries are less frequent, in radiological control areas
- Weekly, or upon entries, if entries are less frequent, in the areas where radioactive materials are handled or stored
- Weekly for all project offices on site
- Monthly, in areas with fixed contamination

8.5.3 Airborne Surveys:

Airborne survey frequency, locations, and methods are determined by the radiation work permits (RWP's) and by the RSO.

8.6 Identifying and Scheduling Routine Radiological Surveys

8.6.1 The RSO or duly authorized representative shall identify and schedule routine surveys as required by the radiological conditions and work activities.

8.6.2 Routine Survey Schedules shall be developed using a standard system for designating surveys as follows:

Frequency of Survey

• Daily	D
• Weekly	W
• Monthly	M
• Quarterly	Q
• Semi-Annually	S
• Annually	A
• Upon Entry	U

Type of Survey

• Radiation	R
• Contamination	C
• Area TLD	T
• Air Sample	A

Example: DRC-1
Where:

D: is the survey frequency (Daily in this example)
R: is the type of survey (Radiation in this example)

C: is a type of survey (Contamination)
1 corresponds to the numerical sequence of the survey

8.6.3 Routine survey schedules shall be submitted to and approved by the RSO or duly authorized representative.

8.6.4 Prepare routine survey tracking forms using the approved routine survey schedules.

8.6.5 Changes to any routine survey schedule shall be submitted to and approved by the RSO or duly authorized representative.

8.6.6 Routine Survey Schedules should be indicated on form OP-001-01or equivalent form. Task Leaders may elect alternate forms of containing, as a minimum, the information included on the OP-001-01 form.

8.7 Using As Low As is Reasonably Achievable (ALARA) Principles for Scheduling and Performing Surveys

8.7.1 Routine surveys should not be performed in High Radiation Areas unless other work necessitates entry. Boundary verification surveys would be appropriate if an entry is not required.

8.7.2 Routine surveys should be performed in conjunction with other work surveys as much as practicable.

8.8 Performance of Routine Surveys

8.8.1 HPT's shall perform routine surveys in accordance with the applicable operational procedure.

8.8.2 Upon completion of a routine survey, the HPT shall initial the appropriate Routine Survey Tracking Form.

8.9 Periodic Evaluation of Routine Surveys

8.9.1 Routine survey schedules shall be reviewed and updated periodically to ensure that all areas within the project boundaries are receiving the appropriate routine survey coverage.

8.9.2 Changes of conditions within the project area will be reported to the RSO or duly authorized representative and may require a modification of the routine radiological survey schedule.

8.10 Management Notification

8.10.1 The RSO shall be notified, in writing by the project manager, of any failure to complete a routine survey as scheduled. The missed survey will be completed within 24 hours of discovering the inconsistency.

9.0 QUALITY ASSURANCE/RECORDS

9.1 Quality Assurance

9.1.1 Instruments used to perform routine radiological surveys will be inspected for serviceability each day and checked against check sources to verify they are in proper working condition per the applicable Operational Procedure.

9.1.2 Radiation and Contamination surveys will be reviewed by the RSO or duly authorized representative for accuracy and completeness.

9.2 Records

9.2.1 At a minimum, each survey record should include the following:

- A diagram of the area surveyed, if applicable.
- A list of items and equipment surveyed.
- Specific locations on the survey diagram where wipe test were taken.
- Ambient radiation levels with appropriate units.
- Contamination levels with appropriate units.
- Make and model number of instruments used.
- Background levels, if applicable.
- Name of the person making the evaluation and recording the results and date.

9.2.2 Radiological Survey Records, routine survey schedules, and tracking forms are generated during the performance of this procedure.

9.2.3 Documented information shall be legibly written in ink.

9.2.4 Data shall not be obliterated by erasing, using white-out, or by any other means. Incorrect entries shall be corrected by striking a single

line across the entry. The correction shall be entered, initialed, and dated.

9.2.5 The health physics technician performing the survey shall ensure that this procedure is the most current and approved revision.

9.2.6 The health physics technician performing the survey shall review Forms and any other applicable forms for accuracy and completeness.

9.2.7 Entries on Forms and any other pertinent forms must be dated and initialed by the health physics technician performing the survey to be valid.

9.2.8 The RSO or duly authorized representative shall review any applicable completed forms. The review shall be for accuracy and completeness.

10.0 ATTACHMENTS

- OP-001-01 Routine Survey Schedule
- OP-001-02 Survey Form

OP-001-01
ROUTINE SURVEY SCHEDULE

Survey Designation	Location of Survey

Prepared By: _____ Date: _____

Reviewed By: _____ Date: _____

OP-001-02 Radiological Survey Sheet

Location:	RWP#	Survey #	Survey Type:	pg. 1 of 1

Smear Results DPM/100cm^2					
No.	α	β	No.	α	β
1			26		
2			27		
3			28		
4			29		
5			30		
6			31		
7			32		
8			33		
9			34		
10			35		
11			36		
12			37		
13			38		
14			39		
15			40		
16			41		
17			42		
18			43		
19			44		
20			45		
21			46		
22			47		
23			48		
24			49		
25			50		

Comments

Surveyed By: Date:

Reviewed By: Date:

Instrument	Serial #	α Eff.	β Eff.	α Bkg.	β Bkg	Cal. Due

Key			
⬭	Smear	*-*	Boundary
▭	Dose Rate mr/hr	■	A/S Location
*	Direct Reading DPM/100 cm^2		
△	Grab Sample		

1.0 PURPOSE

This procedure provides the methods Cabrera Services, Inc. (CABRERA) uses in operation of air samplers and calculation of radioactive particulate activity in air sample. This procedure describes the methods used to calculate Derived Air Concentration (DAC) DAC-hour exposures to workers. Adherence to this procedure will provide reasonable assurance that the surveys performed have accurate and reproducible results.

2.0 APPLICABILITY

This procedure will be used by CABRERA personnel to operate air samplers during surveys and work activities at customer facilities, calculate, and record DAC-Hour exposures to workers. Air samples are performed when the average alpha and beta contamination on facility surfaces, equipment and waste packages exceed the contamination limits specified in Table 1 of the Radiation Protection Manual (RPM) and included as Attachment OP-002-03 of this procedure. Air monitoring shall be performed in areas where there exists potential to exceed 10 percent of any DAC.

3.0 PRECAUTIONS, LIMITATIONS AND REQUIREMENTS

3.1 Precautions

Not Applicable

3.2 Limitations

Not Applicable

3.3 Requirements

3.3.1 Air samplers should only be operated in temperatures between -4^0 F to 122^0 F.

3.3.2 Air sampler inspections shall be performed by qualified Health Physics personnel.

4.0 REFERENCES

- RSP Radiation Safety Program
- AP-001 Record Retention
- OP-021 Alpha-Beta Sample Counting Instrumentation
- Reg Guide 8.25 Air sampling in the Workplace
- NUREG-1556 Consolidated Guidance About Material Licenses (Vol.11)

5.0 DEFINITIONS AND ABBREVIATIONS

5.1 Restricted Area – An area, access to which is limited by the licensee for the purpose of protecting individuals against undue risks from exposure to radiation and radioactive materials. Restricted area does not include areas used as residential quarters, but separate rooms in a residential building may be set apart as a restricted area.

5.2 Smear Sample Survey – A survey technique using filter paper smears to determine quantities of alpha and beta emitting radioactive material which can be removed from facility surfaces and waste packages.

5.3 Air Sample Survey – A survey technique which collects particulates from a known volume of air and determines the concentrations of radioactive materials associated with the airborne particulates.

5.4 Annual Limit on Intake (ALI) – The annual limit on intake (ALI) of radioactive materials is the smaller amount of radioactive material taken into the body of an adult worker by inhalation or ingestion in a year (40 hours per week for 50 weeks) that would result in a committed effective dose equivalent (CEDE) of 5 rem or a committed dose equivalent (CDE) of 50 rems to any individual organ or tissue.

5.5 Derived Air Concentration (DAC) – Derived air concentration is the concentration of a given radionuclide in air which, if breathed by “reference man” for a working year (40 hours per week for 50 weeks) under the conditions of light work (inhalation rate of 1.2 cubic meters of air per hour), results in an air intake of one ALI.

5.6 DAC-Hour – The product of the concentration of radioactive material in air (expressed as a multiple of the derived air concentration for each nuclide) and the time of exposure to that nuclide, in hours, 2000 DAC-Hours represents one ALI.

5.7 Airborne Radioactivity Area – A room, enclosure or area in which the radioactive material is dispersed in the form of dusts, fumes, mists, particulates, vapors and the concentration of the dispersed radioactive materials in excess of:

5.7.1 The derived air concentrations (DAC’s) specified in Table 1, column 3 of Appendix B, Title 10 Part 20 of the Code of Federal Regulations, or

5.7.2 Concentrations such that an individual present in the area without respiratory protective equipment could exceed, during the hours the individual is present in a week, an intake of 0.6 percent on the annual limit on intake (ALI) or 12 DAC-hrs.

6.0 EQUIPMENT

6.1 None

7.0 RESPONSIBILITIES

7.1 Project Manager (PM) – the PM is responsible for ensuring that personnel assigned the task of air sampling and air sampling analysis are familiar with this procedure, adequately trained with the specific instrument being used to perform surveys.

7.2 Radiation Safety Officer (RSO) – The RSO is responsible for monitoring compliance with this procedure and training personnel in the use of the air sampling and air sampling analysis. The RSO can also assist in the interpretation of the results obtained during surveys.

7.3 Radiological Field Supervisor (RFS) – During field assignments, the RFS is responsible for ensuring that this procedure is implemented. When the RSO is not on site, the RFS will act as the RSO's duly authorized representative for radiological issues.

7.4 Health Physics Technicians (HPT) – The HPT performing air sampling and air sampling analysis are responsible for knowing and complying with this procedure.

8.0 INSTRUCTIONS

8.1 Initial Preparation

8.1.1 Select the air sampler to be used for the type of sample to be used and verify that the instrument has a currently valid calibration. If the work area contains radioiodine or tritium, contact the radiation safety officer for special sampling procedures before proceeding.

8.1.1.1 Area air samples are normally collected with a low volume air sampler having normal airflow of 1 CFM to 5 CFM.

8.1.1.2 Breathing zone air samples are normally collected using lapel air samplers, which have a normal airflow of 1 to 5 liters per minute.

8.1.1.3 All air sampling devices shall be calibrated to ensure accurate sample volumes are collected. The frequency of calibration shall not exceed one (1) year.

8.1.2 Attach the air sampling head to the intake of the low volume sample pump or to the tygon tubing of the Lapel sampler.

8.1.3 Obtain the filter paper to be used in the sample and mark the backside of the filter with a unique number, which will represent the sample. During the collection and handling of air sample filter papers, caution must be used to prevent the samples from being contaminated by other radioactive materials.

8.1.4 Place the filter paper in the holder and position the sampler as indicated below.

8.1.4.1 Area air samples are collected by placing the sample head at a distance of 3 to 6 feet above the floor and as close to the work area as practical. If there is airflow in the work area, the sampler should be placed “down wind” of the area where workers will be resuspending radioactive particulates into the workers atmosphere.

8.1.4.2 Lapel air samples are collected from workers breathing zone. The sample head is attached to the shoulder of the worker with the sample head facing forward. The tygon tubing connecting the sample head to the pump is run down the back of the worker with the sample pump attached to the workers belt.

8.2 Collecting the sample

8.2.1 When the sample head is in position, start the sample pump and adjust the flow rate to the highest flow rate, which can be maintained without flow rate fluctuations.

8.2.2 Record the time the sample was started and the initial flow rate of the sample pump on Form OP-002-01, Air Sample Data Sheet.

8.2.3 If possible, identify the radionuclides, which will be encountered in the work area and record the radionuclides along with the DAC for each radionuclide in the space provided on the Air Sample Data sheet. If a mixture of radionuclides is present, the DAC used in the calculations of DAC-Hours will be the most restrictive concentration.

8.2.4 Collect the sample for the maximum time possible, which represents the exposure encountered by the worker.

8.2.5 At the end of the collection period, note the flow rate of the sample pump and record this flow rate and the time, which the sampling stopped on the Air Sample Data sheet.

CAUTION: Be sure not to remove activity from the sample surface. Handle the filter with care.

8.2.6 Remove the sample filter and place the filter in an individual envelope or poly bag to ensure no possibility of contamination by other sources of radioactivity.

8.2.7 Record the names of workers who were in the area and the time spent in the work area on the Air Sample Data sheet.

8.2.8 Determine the average sample flow rate by adding the initial sample flow rate and the final sample flow rate and dividing by 2. Record the average flow sample flow rate in the space provided on the Air Sample Data sheet.

8.2.9 Calculate the total air volume sampled by multiplying the average flow rate in cubic centimeters per minute by the total minutes the sampler operated using the indicated spaces on the Air Sample Data sheet.

8.3 Determining minimum detectable activity (MDA) – During calculations or air concentrations in the following sections, the MDA for each analysis is calculated to determine the statistical significance of the calculated air concentrations.

8.3.1 For each air concentration calculation (alpha and beta) in the following sections, calculate the MDA using the following formula:

$$MDA\ in\ \mu Ci/cm^3 = \frac{\frac{k_\alpha^2}{T_{s+b}} + 2\left[k_\alpha\right]\sqrt{\frac{R_b}{T_b} + \frac{R_b}{T_{s+b}}}}{(2.22\times10^6)(E)(V)}$$

Where:

E = Counter efficiency in CPM/DPM

R_b = Background Count Rate in CPM

T_b = Background Counting Time in Minutes

T_{s+b} = Sample Counting Time in Minutes

V = Sample Volume in cm^3

$2.22X10^6$ = Disintergrations per minute per microCurie (DPM/uCi)

k_α = 1.645 for a confidence level of 95% and 1.96 for a confidence level of 99%

8.3.2 If the MDA is larger than 10% of the Derived Air Concentration, recount the background for a longer time and/or increase the sample count time to lower the MDA. (The maximum count time should not exceed 1 hour for background and 30 minutes for the sample). Enter the MDA for each air concentration calculated in the space provided on the Air Sample Data sheet.

8.4 Initial Air Sample Analysis – The initial analysis of air sample provides the air concentrations for short-lived radionuclides and a first estimate of the long-lived air concentrations. In situations where there is a potential for worker intakes to exceed 40 DAC-Hours in a week or if the radionuclides of interest are short-lived, air samples should be available before work resumes the following day.

8.4.1 Air particulate samples are to be analyzed as a minimum for gross alpha and gross beta activity using a Ludlum Model 2929 Dual Channel Scaler or equivalent.

8.4.2 Place the air sample collection media in the sample counter with the upstream collection side toward the detector. Count the air sample and calculate the sample activity and record results on appropriate form(s).

8.4.3 Record the Alpha and Beta sample DPM results in the Air Sample Data sheet.

8.4.4 Calculate the alpha and beta air concentrations using the following formula. Adjustment due to alpha self absorption are made as appropriate.

$$\text{Air Concentration } (\mu Ci/cc) = \frac{\alpha \text{ or } \beta \, DPM}{(2.22 \times 10^{6} \, DPM/\mu Ci)(SampleVolume(cm^3))}$$

8.4.5 Enter the alpha and beta air concentrations on the Air Sample Data sheet in the space provided for the initial air concentrations.

NOTE: If the air sample concentration is greater than 10% of the DAC value, notify the RSO or duly authorized representative for further instructions.

8.4.6 If the air concentration is less than 10 percent of the most restrictive DAC, no further analysis of the air sample is required. If the air

concentration exceeds 10% of the DAC concentration, proceed with the analysis in section 8.5.

8.5 Air sample analysis for long-lived radionuclides – This analysis allows for decay of naturally occurring radionuclides and provides for correcting air concentrations for naturally occurring radionuclides.

8.5.1 Air particulate samples are analyzed following 12 hour decay, and again at 72 hours if necessary to allow for decay of radon, for gross alpha and gross beta using a Ludlum Model 2929 Dual Channel Scaler or equivalent.

8.5.2 Place the air sample in the sample counter with the collection side toward the detector. Count the air sample and calculate the sample activity and record results on appropriate form(s).

8.5.3 Record the Alpha and Beta sample DPM results in the Air Sample Data sheet.

8.5.4 Calculate the alpha and beta air concentrations using the following formula. Adjustments due to self absorption are made as appropriate.

$$\text{Air Concentration } (\mu Ci/cc) = \frac{\alpha \text{ or } \beta \, DPM}{(2.22 \times 10^6 \, DPM/\mu Ci)(SampleVolume(cm^3))}$$

8.5.5 Enter the alpha and beta air concentrations on the Air Sample Data sheet in the space provided for the 12-hour decay concentrations. If the 12-hour decay air concentrations is below 10% of the DAC no further analysis is required.

8.5.6 If the 12-hour air concentration is above 10% percent of the DAC value, recount the air sample following 72 hours of decay from the time the sample was stopped. Calculate the air concentration using the formula in step 8.5.4 and record the air concentrations in the space provided for the 72-hour decay air concentration on the Air Sample Data sheet. If the 72-hour air concentration is below 10% of the DAC value, no further analysis is required.

8.5.7 If the air concentrations exceed 10% of the DAC values, notify the RSO or duly authorized representative for further instructions. Save the air sample for possible further analysis. For air samples, which

exceed 10% of the DAC values, an exposure is assigned to the workers residing in the area where the sample was taken.

8.6 Assignment of DAC-Hour exposures to workers

8.6.1 For air samples which exceed 10% of the DAC values, calculate the workers DAC-Hour exposure using the following formula:

$$\text{Exposure in DAC-Hours} = \frac{A \times B}{C}$$

Where:

A = Area or Lapel air sample concentration in uCi/cm^3

B = Hours worker was in the calculated air concentration

C = DAC air concentration in uCi/cm^3 from regulatory reference.

8.6.2 Enter the DAC-Hour exposure on the column provided on the Air Sample Data sheet. If respiratory protection was used during the exposure period, contact the RSO or duly authorized representative for the protection factor used to adjust DAC-Hour exposure.

9.0 QUALITY ASSURANCE/RECORDS

9.1 Quality Assurance

9.1.1 The alpha and beta counter used to count air samples will be calibrated daily when in with a known radioactive source with activity traceable to the National Institute of Standards and Technology (NIST).

9.2 Records

9.2.1 Documented information shall be legibly written in ink.

9.2.2 Data shall not be obliterated by erasing, using white-out, or by any other means. Incorrect entries shall be corrected by striking a single line across the entry. The correction shall be entered, initialed, and dated.

9.2.3 The health physics technician performing air sampling and analysis shall ensure that this procedure is the most current and approved revision.

9.2.4 The health physics technician performing air sampling and analysis shall review all applicable forms for accuracy and completeness.

9.2.5 Entries on and any other pertinent forms must be dated and initialed by the health physics technician performing the air sampling and analysis to be valid.

9.2.6 The RSO or duly authorized representative shall review any applicable completed forms. The review shall be for accuracy and completeness.

10.0 ATTACHMENTS

OP-002-01	Air Sample Data Sheet
OP-002-02	Daily Air Sample Record
OP-002-03	Contamination Limits

OP-002-01

Air Sample Data Sheet

Sample # _____ Date _____

Description: _____

Radionuclides: _____ DAC value: _____

_____ DAC value: _____

_____ DAC value: _____

Initial sample flow rate: _____ Time sampler on: _____

Final sample flow rate: _____ Time sampler off: _____

Average sample flow rate: _____ Total sample time:_____ hours

Total sample volume: _____ cm^3

Initial Air Concentration:

Alpha = _____ $\mu Ci\ \alpha/cm^3$ Beta = _____ $\mu Ci\ \beta/cm^3$

MDA = _____ $\mu Ci\ \alpha/cm^3$ MDA = _____ $\mu Ci\ \beta/cm^3$

12 Hour Decay Air Concentration:

Alpha = _____ $\mu Ci\ \alpha/cm^3$ Beta = _____ $\mu Ci\ \beta/cm^3$

MDA = _____ $\mu Ci\ \alpha/cm^3$ MDA = _____ $\mu Ci\ \beta/cm^3$

72 Hour Decay Concentration:

Alpha = _____ $\mu Ci\ \alpha/cm^3$ Beta = _____ $\mu Ci\ \beta/cm^3$

MDA = _____ $\mu Ci\ \alpha/cm^3$ MDA = _____ $\mu Ci\ \beta/cm^3$

Performed By: _____ Date: _____

OP-002-02

Daily Air Sample Record

Worker Name	Sample Date	Final Count Date	Time In	Time out	Total time (Hrs.)	Concentration (uCi/cm^3)	DAC-Hour Exposure

OP-002-03

Contamination Limits from Table 1 of RPM

RADIONUCLIDE	ALLOWABLE SURFACE CONTAMINATION (DPM/100 CM^2)	
	REMOVABLE	FIXED + REMOVABLE
Transuranics, Ra-226, Ra-228, Th-230, Pa-231, Ac-227, I-125, I-129	20	100
Th-Natural, Th-232, Sr-90, Ra-223 Ra-224, U-232, I-126, I-131, I-133	200	1000
U-Natural, U-235, U-238, and associated Decay products	1000	5000
Beta-Gamma emitters (radionuclides with decay modes other than alpha emission or spontaneous fission) except Sr-90 and others noted above.	1000	5000

1.0 PURPOSE

The purpose of this procedure is to specify requirements for releasing material from controlled areas and to minimize the potential for unintentionally releasing contaminated items to uncontrolled areas in accordance with the provisions stated in Section 4.0, References. This procedure sets forth the specific requirements for release of materials from controlled areas applicable to Cabrera Services, Inc. (CABRERA) field projects.

2.0 APPLICABILITY

2.1 This procedure provides instructions for CABRERA personnel while performing release surveys of items controlled as contaminated or potentially contaminated with radioactive materials.

2.2 The procedure will be used to ensure by survey that materials released from contaminated or potentially contaminated areas will meet the release criteria applicable to the license conditions, facility requirements, or as specified in regulations or guidance provided by applicable regulatory agencies of the federal or state government.

3.0 PRECAUTIONS, LIMITATIONS AND REQUIREMENTS

3.1 Precautions

3.1.1 Instruments used to perform release surveys shall be operated in accordance with the respective operating procedure.

3.1.2 Large area smears may be used to augment (but not replace) the 100 cm^2 smear survey. Large area wipes may be counted with the Ludlum Model-3 or equivalent. Large area smears are used to obtain immediate information concerning loose contamination for the purpose of radiological protection and to minimize time spent performing disc smears on an item easily identified as contaminated.

3.1.3 A release document package, at a minimum, shall include the following forms:

3.1.3.1 The Health Physics daily log.

3.1.3.2 Material Release Log.

3.1.3.3 Radiation and Contamination Survey or an Unconditional Release of Equipment or Items Survey and/or Sample Calculation Worksheet.

3.1.3.4 Daily Instrument Calibration Log.

3.1.4 The release document shall include the following information:

3.1.4.1 The date of the release survey.

3.1.4.2 The number of the release survey.

3.1.4.3 A description or identification of the item.

3.1.4.4 The identity of the Health Physics Technician performing the release survey.

3.1.4.5 The evaluator of the material for release.

3.1.4.6 The release approval of the RSO or duly authorized representative.

3.1.5 Surveys performed for the release of material shall be documented on a Radiation and Contamination Survey and/or on an Unconditional Release of Equipment or Items Survey.

3.1.6 Radiation/contamination surveys shall be performed in accordance with OP-001.

3.1.7 Items identified as radioactive during the release survey shall be controlled in accordance with OP-019.

3.1.8 Personnel performing release surveys shall be logged in on a Radiation Work Permit in accordance with AP-012 (if applicable).

3.1.9 Audible response instruments must be used during direct scan surveys.

3.1.10 The instruments used for release surveys shall be within current calibration and shall have had a response check performed daily or before use in accordance with the instrument's operating procedure.

3.1.11 Items presented for release shall be direct scanned in an area of low background.

3.2 Limitations

3.2.1 The maximum probe speed during direct scan surveys of surfaces shall be 3 cm/sec.

3.2.2 A response check shall be performed at the completion of the workday for instruments used for direct scan surveys in accordance with the instruments operating procedure.

3.2.3 The probe face shall be held within ¼ inch of the surface being surveyed for alpha radiation, and within ½ inch of the surface being surveyed for beta-gamma radiation.

3.2.4 If an instrument used to perform release surveys fails any operational check, it shall be removed from service. All data collected during the period of instrument failure must be evaluated by the RSO or duly authorized representative.

3.2.5 Posting and access control of controlled areas shall be performed in accordance with OP-019.

3.3 Requirements

None

4.0 REFERENCES

- 10 CFR 20 Standards for Protection Against Radiation
- AP-001 Record Retention
- AP-010 Personnel Protective Equipment
- AP-012 Radiation Work Permits
- OP-001 Radiological Surveys
- OP-009 Use and Control of Radioactive Check Sources
- OP-019 Radiological Posting
- OP-020 Operation of Contamination Survey Meters
- OP-021 Alpha-Beta Counting Instrumentation
- OP-023 Operation of Micro-R Survey Meters
- NUREG-1556 Consolidated Guidance About Material Licenses (Vol.11)
- Reg 1.86 Termination of Operating Licenses for Nuclear Reactors

5.0 DEFINITIONS AND ABBREVIATIONS

5.1 Activity – The rate of disintegration (transformation) or decay of radioactive material. The units of activity for the purpose of this procedure are Becquerel (Bq) or micro-Curies (μCi).

5.2 Contamination – Deposition of radioactive material in any place where it is not desired. Contamination may be due to the presence of alpha particle, beta particle or gamma ray emitting radionuclides.

5.3 Restricted Area – An area to which access is controlled to protect individuals against undue risks from exposure to radiation and radioactive materials.

5.4 Fixed Contamination – Radioactive contamination that is not readily removed from a surface by applying light to moderate pressure when wiping with a paper or cloth disk smear, or masslinn.

5.5 Minimum Detectable Activity (MDA) – For purposes of this procedure, MDA for removable radioactive contamination is defined as the smallest amount of sample activity that will yield a net count with a 95% confidence level based upon the background count rate of the counting instrument used.

5.6 Release for Unconditional Use – A level of radioactive material below which it is acceptable for use without restrictions. Under normal circumstances, authorized limits for residual radioactive material are set equal to, or below, the values specified in Regulatory Guide 1.86, Termination of Operating Licenses for Nuclear Reactors.

5.7 Survey – is defined as an evaluation of the radiological conditions and potential hazards incident to the production, use, transfer, release, disposal, or presence of radioactive material or other sources of radiation.

5.8 Survey Exempt Materials – The contents of sealed containers which remain unopened while in a controlled area are exempt, the outside surfaces are not exempt.

6.0 EQUIPMENT

None

7.0 RESPONSIBILITIES

7.1 Project Manager (PM) – the PM is responsible for ensuring that personnel assigned the task of surveying materials are familiar with this procedure, adequately trained in the use of this procedure, and have access to a copy of this procedure.

7.2 Radiation safety Officer (RSO) – The RSO is responsible for verifying that personnel comply with this procedure and are trained in the use of contamination survey meters described in this procedure.

7.3 Radiological Field Supervisor (RFS) – During field assignments, the RFS is responsible for ensuring that this procedure is implemented. When the RSO is not on site, the RFS will act as the RSO's duly authorized representative for radiological issues.

7.4 Health Physics Technicians (HPT) – The HPT are responsible for performing the surveys described in this procedure.

8.0 INSTRUCTIONS

8.1 Release Limits for Gross Activity (Unknown Isotopes)

EMISSION	REMOVABLE dpm/100 cm^2	TOTAL (Fixed and Removable) dpm/100 cm^2
Alpha	20	100
Beta-Gamma	200	1000

NOTE: If all of the constituents of the contamination are known and documented on the release documents, the release limits of Table 1 of Regulatory Guide 1.86, Termination of Operating Licenses for Nuclear Reactors applies.

8.2 Inaccessible Surfaces

8.2.1 Items with inaccessible surfaces should be disassembled as completely as possible to facilitate release surveys. Items with inaccessible surfaces will not be unconditionally released unless evaluated by a designated evaluator who authorizes and documents the release.

8.2.2 The following guidance will be used when performing evaluations:

8.2.2.1 A history of the item should be reviewed.

8.2.2.2 The actual release survey shall be reviewed.

8.2.2.3 Determination of the radiological conditions in the area the item has been used or stored shall be reviewed.

8.2.2.4 Use of gamma radiation sensitive detectors such as NaI(Tl) or equivalent should be considered. (These detectors may indicate internal contamination that a beta sensitive detector may not detect due to the beta detector's lack of sensitivity to photon emissions as well as the inability of beta emissions to penetrate through many surfaces).

8.3 Materials considered dangerous, fragile, or not readily smearable due to their physical or chemical nature shall not be unconditionally released unless evaluated on a case by case basis for release in a manner consistent with Section 8.2.2. Evaluation for release shall be performed by a designated evaluator only.

8.4 Survey Exempt Materials

8.4.1 Items such as briefcases, pens, papers, personal clothing, etc., are exempt from the Health Physics release survey requirements of this procedure, unless deemed appropriate by the HPT.

8.4.2 Individuals shall survey the exempt items in the same manner as a whole body frisk when leaving a controlled area or have a Health Physics Technician perform the survey.

8.5 Survey Procedure

8.5.1 Upon receipt of an item presented for release, attempt to determine the history:

8.5.1.1 Purpose of item.

8.5.1.2 The current and past use of the item.

8.5.1.3 The location(s) in which the item was used or stored.

8.5.1.4 If the item was ever used for work with radioactive material or used in an area where radioactive material was used or stored.

NOTE: This knowledge of the item history should provide the surveyor with information helpful in performing the release survey.

8.5.2 Using protective clothing such as gloves, perform large area smears of 100% of the accessible surfaces of the item using large area wipes (e.g. masslinn).

8.5.2.1 Determine if transferable (loose) radioactive material is present by measuring the amount of activity on the surface of the cloth.

8.5.2.2 If the presence of radioactive material is indicated by a count rate above background, the item shall be treated as contaminated until the results of the disc smear survey are obtained and determination is made concerning the actual 100 cm^2 loose contamination levels. The material shall be controlled in accordance with OP-019.

8.5.3 Perform a direct scan of 100% of all accessible areas of the item, in accordance with the instrument's operating procedure, and OP-001.

NOTE: Items presented for release shall be direct scanned in an area of low background. Preferably $\leq$ 100 CPM. The Health Physics Technician performing the release survey shall determine if the background is acceptable for direct scan of the item.

8.5.4 If the scan indicates radioactive material on the surface of the item is less than the limits of release for total activity, proceed to 8.5.10.

8.5.5 If the scan indicates radioactive material on the surface is greater than regulatory limits for total activity, the item cannot be released.

8.5.6 During the direct scan of the accessible surfaces of the item, a static measurement shall be taken:

8.5.6.1 If an increase in the audible count rate is detected.

8.5.6.2 After each minute of scanning.

8.5.6.3 When the Health Physics Technician determines that an indication of fixed activity in an area less than ten square centimeters may be present.

8.5.6.4 During the static measurement, the meter probe shall be held at the proper distance from the surface being surveyed for the proper response period to allow the meter reading to stabilize, in accordance with the instrument's operating procedure.

8.5.7 Perform disc smears which are representative of 100% of the effective surface area.

8.5.7.1 100% of the effective accessible surface means performing a 100 cm^2 disc smear on all accessible areas of the item suspected of being contaminated.

8.5.8 Count the smears in accordance with reference OP-001 and/or OP-021 as appropriate.

8.5.8.1 Record smear data on the Radiation and Contamination Survey.

8.5.8.2 If the smear results indicate transferable activity below the release limits, proceed to Step 8.5.10

8.5.8.3 If the smear results indicated transferable activity above the release limits, the item cannot be released

8.5.9 If item has internal or inaccessible surfaces, CABRERA personnel will disassemble the item and repeat Steps 8.5.2 through 8.5.5 or have the item evaluated for release by a designated evaluator.

8.5.10 If the item meets the release limits or is evaluated as meeting the unconditional release criteria, complete form OP-004-01. The RSO or duly authorized representative must review the release documents and approve the release before allowing the item to leave the controlled area.

8.5.11 If items are identified as radioactive during the release survey, contact the RSO or duly authorized representative.

8.6 Action level

8.6.1 If direct frisk beta-gamma instrument readings exceed 100 cpm above background (with background less than 200 cpm) or 25 cpm alpha, those areas shall be surveyed as follows:

8.6.1.1 Perform a smearable contamination survey using 100 cm^2 of affected areas, and count the smears for beta-gamma and alpha contamination to determine if contamination is “fixed” or “removable.”

8.6.2 Any vehicle with removable contamination exceeding the site limits listed below shall be brought to the attention of the RSO or duly authorized representative and handled appropriately.

8.6.3 Any vehicle with removable contamination exceeding the DOT limits listed below shall be brought to the attention of the RSO or authorized representative for release or acceptance approval.

8.6.3.1 2,200 dpm/100 cm^2 beta-gamma

8.6.3.2 220 dpm/100 cm^2 alpha.

8.6.4 Dose rate surveys, which exceed 0.2 mR/hr, shall be brought to the attention of the RSO or duly authorized representative for release or acceptance approval.

8.7 The results of the survey shall be documented on Radiation and Contamination surveys.

9.0 QUALITY ASSURANCE/RECORDS

9.1 Quality Assurance

9.1.1 Instrumentation used for surveys will be checked with standards each day prior to use and verified to have current valid calibration.

9.1.2 When releasing a large volume of materials, a program may be established under the discretion of the RSO or duly authorized

representative to ensure by second check that no radioactive material has been released to the public or the environment.

9.1.3 The health physics technician performing the survey shall review Form OP-004-01 and any other applicable forms for accuracy and completeness.

9.2 Records

9.2.1 Documented information shall be legibly written in ink.

9.2.2 Data shall not be obliterated by erasing, using white-out, or by any other means. Incorrect entries shall be corrected by striking a single line across the entry. The correction shall be entered, initialed, and dated.

9.2.3 The health physics technician performing the survey shall ensure that this procedure is the most current and approved revision.

9.2.4 Entries on Form OP-004-01 and any other pertinent forms must be dated and initialed by the health physics technician performing the survey to be valid.

9.2.5 The RSO or duly authorized representative shall review any applicable completed forms. The review shall be for accuracy and completeness.

10.0 ATTACHMENTS

OP-004-01 Unconditional Release of Equipment or Items Report

OP-004-01
UNCONDITIONAL RELEASE OF EQUIPMENT AND ITEMS LOG

Project Name _____Project Number_____

Item/ Equipment Released	Comments	Survey #	Date

Reviewed By: _____ Date: _____

1.0 PURPOSE

This procedure establishes the requirements Cabrera Services, Inc. (CABRERA) implements for the collection of volumetric and material samples for analysis.

2.0 APPLICABILITY

The applicability of this procedure is limited to collecting volumetric and material samples on CABRERA field projects. It also applies to volumetric samples taken for the purpose of analysis for radioactivity. This procedure is applicable to all volumetric and material samples taken by CABRERA to fulfill a requirement for sampling.

3.0 PRECAUTIONS, LIMITATIONS AND REQUIREMENTS

3.1 Precautions

3.1.1 Special situations such as evaluating trends or airborne deposition, determining contamination profiles, and measuring non-radiological contaminants, necessitates special sampling procedures. These special situations are evaluated and incorporated into site specific survey plans as the need arises.

The shipping container (e.g., box, cooler, or equivalent) should be lined with plastic and approved absorbent material prior to placing samples inside the shipping container if the samples are to be shipped for analysis. A load rating stamped o the bottom of the shipping container should be noted. This rating shall not be exceeded to prevent degradation of the box during shipment. The PM or designee shall approve packaging material and method.

3.2 Limitations

3.2.1 Do not exceed load rating for containers when shipping samples to prevent degradation of the container during shipping.

3.3 Requirements

3.3.1 Direct surface radiation measurements are to be performed at each location before initiating sampling. This may identify the presence of gross contamination, which may require that samples and equipment be treated as radioactive and handled in accordance with appropriate procedures.

3.3.2 Material sampling requires documentation as follows:

- Record forms
- Sample Chain of Custody forms
- Field Sample Logbook

4.0 REFERENCES

• RSP	Radiation Safety Program
• SHSP	Site Health and Safety Plan
• SWP	Site Work Plan
• NUREG/CR-5512	Residual Radioactive Contamination from Decommissioning
• 40 CFR 192	Code of Federal Regulations
• AP-001	Record Retention
• OP-008	Chain of Custody
• MARSSIM	Multi-Agency Radiation Survey and Site Investigation Manual

5.0 DEFINITIONS AND ABBREVIATIONS

5.1 Sediment – Sediment is solid material that has settled to the bottom of a liquid, usually water (MARSSIM).

5.2 Surface Soil – The top layer of soil that is available for direct exposure, growing plants, re-suspension of particles for inhalation, and mixing from human disturbances (MARSSIM). Surface soil may also be defined as the thickness of soil that can be measured using direct measuring techniques (MARSSIM). Typically, this layer is represented as the top 15 cm (6 inches) of soil (40 CFR 192).

5.3 Subsurface Soil – Subsurface soil is any soil not considered surface soil, typically anything greater than 15 cm (6 inches) below the ground surface (MARSSIM).

5.4 Volumetric Sample – A sample of material, taken for the purpose of determining the radioactivity content in units of activity per unit volume or mass. This does not apply to loose surface material sampled using a cloth smear/swipe, or to activity present only on the surface of solid materials.

6.0 EQUIPMENT

6.1 Volumetric Sampling

The following is a list of the minimum equipment required to perform field volumetric sampling under this procedure.

- A Lietz level log book 8152-50 or the equivalent;
- Survey map(s);
- Chain of Custody and Record Forms;
- Decontamination detergent (e.g., Alconox);
- Sample Containers;
- Indelible marker;
- Distilled Water;
- Clean towels (paper);
- Brushes for decontamination;
- Sample location markers; and
- Digging implement: garden trowel, shovel, spoons, post-hole digger, etc.
- Special sampling apparatus (cup cutter, shelby tube, etc.) as required
- Plastic bags, approximately 10 cm diameter x 30 cm long
- Cardboard “ice cream” containers (1 quart size) or geology sample bags
- Twist-ties
- Masking or duct tape
- Record forms
- Labels and security seals
- Applicable sample collection equipment.

For collecting water samples, the following may also be required:

- pH meter; and
- Nitric acid preservative.

For sample packing and shipping, at a minimum, the following may be required:

- Box, Coolers, or the equivalent;
- Clear packing tape;
- Zipper locking plastic bags;
- Packaging material (vermiculite or use preformed poly-foam liner or equivalent)
- Self adhesive labels;
- “Fragile” and “This Side Up” stickers;
- Chain of Custody and Record Forms as required;
- Ice and;
- Mailing labels.

Equipment is chosen based on the type of material to be sampled. The following list represents some possibilities:

- Paint sampling: heat gun, paint stripper solution, hammer and chisel
- Drains or pipes: plumber’s snake, swabs
- Residues: trowels, scoops
- Concrete or asphalt: core boxes, hammer, and chisel
- Metals: emery cloth or scraping tool
- Dusts: scraping tool and plastic bags

7.0 RESPONSIBILITIES

7.1 Project Manager (PM) – The PM is responsible for ensuring that personnel assigned the task of collecting volumetric and material samples are familiar with this procedure, adequately trained in the use of this procedure, and have access to a copy of this procedure.

7.2 Radiation safety Officer (RSO) – The RSO is responsible for verifying that personnel comply with this procedure and are trained in obtaining material samples described in this procedure.

7.3 Radiological Field Supervisor (RFS) – During field assignments, the RFS is responsible for ensuring that this procedure is implemented. When the RSO is not on site, the RFS will act as the RSO's duly authorized representative for radiological issues.

7.4 Health Physics Technicians (HPT) – The HPT collecting volumetric and/or material samples is responsible for knowing and complying with this procedure.

7.5 Sample Collectors - Sample Collectors are responsible to follow the instructions of the RFS and Health Physics technicians and to ensure compliance with this procedure.

8.0 INSTRUCTIONS

8.1 General - Collection of Samples

This section is applicable to surface subsurface, sediment, surface water, ground water, and other sample collections.

8.1.1 Survey maps shall be used to document soil sample location, and any survey results related to the particular sample (i.e. loose surface activity of sample container or sampling equipment).

8.1.2 Sample locations should be clearly identified with a stake or other appropriate marker, and labeled with a corresponding sample number when available.

8.1.3 Ensure that the sample container is of adequate type and size prior to collecting a sample. The sample size may depend on the type of analysis being performed, and the desired detection sensitivity. Consult with the laboratory performing the analysis for proper sample container type and size.

8.1.4 If multiple samples are taken, bring appropriate cleaning materials along for cleaning the sampling equipment. Refer to the applicable section of this procedure for instructions regarding sampling equipment decontamination.

8.1.5 A field-sampling logbook shall be used to document pertinent information about the sampling event. Note any significant observations during the sampling event in the field-sampling logbook.

8.1.6 Seal the container with a tamper proof seal. The sampling technician shall initial and date the seal.

8.1.7 Initiate the sample chain of custody record for the sample.

8.1.8 Identify the sample location with a stake or other appropriate marker. Document the sample location on a survey in such a manner that the location can be easily and accurately re-identified.

8.1.9 Clean the sampling equipment prior to collecting another sample in accordance with requirements of this procedure.

8.1.10 Survey sampling equipment to ensure no removable contamination exists, which could result in cross-contamination of samples.

8.1.10.1 Samples that require gamma, beta, or alpha spectroscopy or isotopic discrimination of any type shall be sent to an approved laboratory for analysis.

8.1.10.2 Samples that can fit into a 1/8” x 2” planchette that require gross alpha and/or beta/gamma results may be counted in a Ludlum 2929 or equivalent.Ensure that minimum counting system sensitivity requirements are met by calculating MDA values for alpha and beta, as applicable.

8.1.10.2.1 Place the sample into a planchette with the surface to be measured facing upward.

8.1.10.2.2 Count sample for an appropriate length of time.

8.1.10.2.3 Record count and counting time data, and calculate activity estimates. Record information and data on appropriate Survey Form.

8.1.11 If the collected sample is suspected to contain radioactivity above background levels, survey the sampling equipment for loose surface activity prior to using the equipment to collect another sample. Document the results on a survey map.

8.2 Collection of Surface Samples

8.2.1 Surface Soil Samples shall be collected using appropriate equipment (stainless-steel hand auger, post-hole digger, shovel, etc.)

8.2.2 Ensure that the sampling equipment which makes contact with the soil (i.e. split-spoon sampler, shovels, post-hole digger, sieves, sample containers, etc.) is free from radioactive material contamination. Perform a loose surface activity survey of the sampling equipment if necessary. Document the results on the survey map corresponding to the sample.

8.2.3 Fill the sample container to the top with surface soil.

8.2.4 Remove large rocks, vegetation, and foreign objects (these items may also be collected as separate samples, if directed). It may be necessary to use a sieve or screen to remove large objects.

8.2.5 Assign a unique sample identification number to the sample. For surface samples, the identifier shall begin with “SS” followed by a series of numbers, where “SS” indicates surface soil as the sample matrix. Additional numerical/alphanumerical designators will be added to indicate the sampling location and number. Label the sample container with the sample number using a permanent marker.

8.2.6 Ensure that the sample is properly labeled and secure the sample container.

8.3 Collection of Subsurface Samples

8.3.1 Subsurface Soil Samples shall be collected using appropriate equipment (stainless-steel hand auger, post-hole digger, shovel, etc.)

8.3.2 Ensure that the sampling equipment which makes contact with the soil (i.e. split-spoon sampler, shovels, post-hole digger, sieves, sample containers, etc.) is free from radioactive material contamination. Perform a loose surface activity survey of the sampling equipment if necessary. Document the results on the survey map corresponding to the sample.

8.3.3 Fill the sample container to the top with surface soil.

8.3.4 Remove large rocks, vegetation, and foreign objects (these items may also be collected as separate samples, if directed). It may be necessary to use a sieve or screen to remove large objects.

8.3.5 Assign a unique sample identification number to the sample. For surface samples, the identifier shall begin with “SS” followed by a series of numbers, where “SS” indicates surface soil as the sample matrix. Additional numerical/alphanumerical designators will be added to indicate the sampling location and number. Label the sample container with the sample number using a permanent marker.

8.4 Collection of Sediment Samples

8.4.1 Sediment samples shall be collected using the appropriate equipment (i.e. stainless steel Ponar dredge, sample containers, etc.).

8.4.2 Ensure that the sampling equipment which makes contact with the sediment (i.e. stainless steel Ponar dredge, sample containers, etc.) is free from radioactive material contamination. Perform a loose surface activity survey of the sampling equipment if necessary. Document the results on the survey map corresponding to the sample.

8.4.3 It is important to minimize disturbance of the sediment caused by sampling activities. Move slowly when approaching the sample location. Approach the sampling location from downstream (for moving water) and downwind (for stationary water).

8.4.4 Remove the sediment slowly and gently from the water using the appropriate sampling equipment. Fill the sample container.

8.4.5 Remove large rocks, vegetation, and foreign objects (these items may also be collected as separate samples, if directed). It may be necessary to use a sieve or screen to remove large objects.

8.4.6 Assign a unique sample identification number to the sample. For surface samples, the identifier shall begin with “SS” followed by a series of numbers, where “SS” indicates surface soil as the sample matrix. Additional numerical/alphanumerical designators will be added to indicate the sampling location and number. Label the sample container with the sample number using a permanent marker.

8.5 Collection of Surface Water Samples

8.5.1 Surface water samples shall be collected using the appropriate equipment (i.e. ladle, scoop, pond sampler, funnel, etc.) or by submerging the sample container.

8.5.2 Ensure that the sampling equipment which makes contact with the surface water (i.e. ladle, scoop, pond sampler, funnel, etc.) is free from radioactive material contamination. Perform a loose surface activity survey of the sampling equipment if necessary. Document the results on the survey map corresponding to the sample.

8.5.3 It is important to minimize disturbance of the sediment caused by sampling activities. Move slowly when approaching the sample location. Approach the sampling location from downstream (for moving water) and downwind (for stationary water).

8.5.4 Rinse the sampling equipment and sampling container with distilled water, or in the same water to be sampled if possible. Remove the water slowly and gently using the appropriate sampling equipment, and fill the sample container. If the water is deep enough, surface water samples can be collected by dipping the polyethylene sample container directly into the water body.

8.5.5 Test the pH of the water sample. If the pH is greater than 2.0, add nitric acid to reduce the pH to 2.0 or less.

8.5.6 Assign a unique sample identification number to the sample. For surface samples, the identifier shall begin with “SS” followed by a series of numbers, where “SS” indicates surface soil as the sample matrix. Additional numerical/alphanumerical designators will be added to indicate the sampling location and number. Label the sample container with the sample number using a permanent marker.

8.6 Collection of Ground Water Samples

8.6.1 Ground water samples shall be collected using the appropriate equipment (i.e. peristaltic pump, bailer, etc.).

8.6.2 Ensure that the sampling equipment which makes contact with the surface water (i.e. tubing, sample containers, pH probe, etc.) is free from radioactive material contamination. It may be helpful to dedicate sampling equipment, such as Teflon tubing, to each monitoring well. Perform a loose surface activity survey of the sampling equipment if necessary. Document the results on the survey map corresponding to the sample.

8.6.3 It is important to minimize disturbance of the sediment caused by sampling activities. Use a low flow peristaltic pump, or slowly sample with a bailer, to avoid increased sample turbidity.

8.6.4 Rinse the sampling equipment and sampling container with distilled water.

8.6.5 Purge standing water in the well until flow from the surrounding aquifer is established. Draw water into an intermediate container and test periodically for pH, conductivity, and temperature during the purging.

8.6.6 Repeat step 8.6.5 until the pH, conductivity, and temperature readings are within ± 10% of the previous reading for three consecutive measurements.

8.6.7 When the criteria in Step 8.6.6 are met, the sample container can be filled.

8.6.8 Test the pH of the water sample. If the pH is greater than 2.0, add nitric acid to reduce the pH to 2.0 or less.

8.6.9 Assign a unique sample identification number to the sample. For surface samples, the identifier shall begin with “SS” followed by a series of numbers, where “SS” indicates surface soil as the sample matrix. Additional numerical/alphanumerical designators will be added to indicate the sampling location and number. Label the sample container with the sample number using a permanent marker.

8.7 Collection of Other Samples

8.7.1 For the purposes of this procedure, “other” refers to any type of sample not previously defined in this document.

8.7.2 Other samples shall be collected using the appropriate equipment (i.e. peristaltic pump, bailer, etc.).

8.7.3 Consult with the analytical laboratory, and the responsible radiological engineer, prior to collecting the sample, for specific instructions on taking any other sample types.

8.7.4 Ensure that the sampling equipment which makes contact with the media is free from radioactive material contamination. Perform a loose surface activity survey of the sampling equipment if necessary. Document the results on the survey map corresponding to the sample.

8.7.5 Obtain the sample using appropriate techniques. Transfer the sample to the appropriate sample container.

8.7.6 Foreign objects, which are not representative of the desired sample matrix, or which may effect the laboratory analysis, shall be removed from the sample.

8.7.7 Assign a unique number to the sample. The unique sample number shall identify the media sampled, the location, and the number as appropriate. Label the sample container with the sample numbers using a permanent marker.

8.8 Material Sampling

Methods for collecting miscellaneous samples should be determined based upon the characteristics of the sample media. Care should be taken to limit the potential for spreading contamination during sample collection. Sample quantities should be determined based upon the following:

8.8.1 Type of analyses required

8.8.2 Number of analyses requested

8.8.3 Detection sensitivity required of analytical result

8.8.4 Estimated activity level of material

8.8.5 Consult with the analytical laboratory, and the responsible radiological engineer, prior to collecting the sample, for specific instructions on taking any other sample types.

8.8.6 Ensure that the sampling equipment which makes contact with the media is free from radioactive material contamination. Perform a loose surface activity survey of the sampling equipment if necessary. Document the results on the survey map corresponding to the sample.

8.8.7 Remove material to be sampled by using the tools required and contamination control techniques to prevent loss of material from the sampled area.

8.8.8 Assign a unique number to the sample. The unique sample number shall identify the media sampled, the location, and the number as appropriate. Label the sample container with the sample numbers using a permanent marker.

8.8.9 Clean all sampling tools before proceeding to the next sampling location.

8.9 Sample Equipment Decontamination

8.9.1 Sample equipment must be clean before use. Used sample equipment must be decontaminated before a sample is taken to prevent cross contamination between samples. Perform the following steps, in order, to properly decontaminate sampling equipment.

8.9.1.1 Remove loose debris from the subject sampling equipment.

8.9.1.2 Wash the sample equipment with an inert detergent solution such as Alconox or the equivalent.

8.9.1.3 Rinse the sample equipment several times with distilled water.

8.9.1.4 Allow the sample equipment to dry prior to use. Perform a loose surface activity survey of the sampling equipment if necessary. Document the results on the survey map corresponding to the sample.

8.9.1.5 Collect the rinsate in a drum or authorized container. Label the drum or container “Rinsate-Awaiting Sampling Results” and “Possible Internal Contamination”.

8.10 Sample Packing and Shipping

8.10.1 Sample Labeling Instructions

8.10.1.1.1 Place self-adhesive labels on appropriate sample containers.

8.10.1.2 Record sample identification, date, and time of sample collection on label.

8.10.1.3 If sample containers contain water (e.g., preserved with ice) place clear plastic tape around the label.

8.10.1.4 Collect sample as per appropriate section of this procedure.

8.10.1.5 If necessary, wipe the outside of the sample container to decontaminate prior to packing.

8.11 Packaging and Shipping

8.11.1 Prepare coolers for shipment as follows:

8.11.1.1 Tape container openings such as box seams and cooler drains (when used) shut.

8.11.1.2 Affix “This Side Up” labels on all four sides, and “Fragile” labels on at least two (2) sides of each shipping container.

8.11.1.3 Place mailing label with laboratory address on the top of container(s).

8.11.1.4 Fill bottom of container(s) with about three inches of absorbent material (e.g.,Vermiculite) or use preformed poly-foam liner or an equivalent and authorized packing material.

8.11.2 Arrange decontaminated sample containers in groups by sample number.

8.11.3 Arrange samples in shipping containers so that they do not touch and the potential for motion is minimized.

8.11.4 If ice is required to preserve the samples, cubes should be repackaged in double zipper locking bags and placed on and around the sample containers.

8.11.5 Fill remaining spaces with absorbent material.

8.11.6 Sign chain-of-custody form (or obtain signature) and indicate air bill number if applicable.

8.11.7 Separate copies of forms. Seal proper copies in large zipper lock plastic bags and tape to the inside of the appropriate container top or lid as necessary.

8.11.8 If a cooler serves as the shipping container, close the lid and secure latch.

8.11.9 Tape the container shut on both ends, making several complete revolutions with strapping tape.

8.11.10 Relinquish samples to the shipper.

8.11.11 Sample collection and shipment documentation is kept for the project file.

8.12 Shipment of Samples

Shipments of samples containing potentially hazardous or radioactive materials may require specific packaging and shipping precautions not specified above. Consult the RSO or duly authorized representative, the analytical laboratory, or other pertinent resources for instruction when shipping these samples.

NOTE: Do not exceed load rating for containers when shipping samples to prevent degradation of the container during shipping.

CAUTION: Samples should be contained within an outer protective cover to prevent cross-contamination of samples.

9.0 QUALITY ASSURANCE/RECORDS

9.1 Quality Assurance

9.1.1 Instruments used for measurements required by this procedure shall be checked with standards and verified to have current calibration.

9.1.2 Surveillance of this procedure (in use) shall be performed at least annually to verify that operations are within the guidelines of this procedure. Any time this procedure is in effect, the PM should ensure by personal observation that samples are collected and controlled appropriately.

9.2 Records

9.2.1 Documented information shall be legible written in ink.

9.2.2 Data shall not be obliterated by erasing or using white-out. Incorrect entries shall be corrected by striking a single line across the entry. The correction shall be entered, initialed and dated.

9.2.3 The HPT shall ensure that the attachments are of the most current.

9.2.4 The HPT shall review completed attachment forms for accuracy and completeness.

9.2.5 Entries on forms must be dated and initialed by the HPT to be valid.

9.2.6 The RSO or duly authorized representative shall review any applicable completed forms. The review shall be for accuracy and completeness.

10.0 ATTACHMENTS

OP-005-01 Sample Status Log

OP-005-01

Sample Status Log

Project/Location:_____

Sample ID #	Sampling Location	Date and Time Sample Was Obtained	Requested Analysis	Technician Initials	Sample Status

Reviewed By: _____
Name Title Date

1.0 PURPOSE

This procedure describes methods for control of instrument check sources and the methods used to evaluate sources for the potential of leaking radioactive material. These sources are used to ensure proper radiation detection instrument operation. Adherence to this procedure will provide reasonable assurance that personnel exposures will be below specified limits, sources will not be lost or misplaced, personnel will remain free of contamination, and contamination will not be spread beyond any designated contaminated areas. In addition, adherence to this procedure will provide reasonable assurance that leak testing of radioactive sources meet the requirements of 10 CFR 20 and NRC license.

2.0 APPLICABILITY

This procedure will be used by Cabrera Services, Inc. (CABRERA) personnel for use and control of radioactive check sources used for portable radiation detectors. This procedure will also be used for leak testing of radioactive sources and also applies to licensed and exempt sources.

3.0 PRECAUTIONS, LIMITATIONS, AND REQUIREMENTS

3.1 Precautions

3.1.1 When performing a leak test on non-exempt quantity sources, use specific license procedures.

3.1.2 If non-exempt quantity sources are used, the RSO or duly authorized representative will determine any additional precautions (i.e., finger rings, etc.).

3.1.3 If licensed quantity sources are leak tested, the RSO or duly authorized representative will determine any additional precautions (i.e., finger rings, etc.).

3.1.4 Sealed sources of activity may exhibit high dose rates, ensure that a thorough dose rate survey has been performed and documented prior to beginning any leak test evaluation.

3.1.5 The window area of a particle detector is covered with a thin window and may be easily punctured. Avoid surveying areas which have protruding fragments that may puncture the detector face. Remove the protruding fragments, if possible, before surveying. Upon removal of the leak test sample, monitor the sample away from the source. If the sample yields a high-count rate compared to

background, assume the source to be leaking and estimate the activity based upon the reading of the portable instrument.

3.2 Limitations

3.2.1 Storage location(s) of instrument check sources will be approved by the RSO or duly authorized representative for protection against loss, leakage, or dispersion by the effect of fire or water.

3.2.2 A Radiation Work Permit must be generated for leak testing of non-exempt sources.

3.3 Requirements

3.3.1 Individual source quantities shall not exceed exempt quantity limits without permission of the RSO or duly authorized representative.

3.3.2 The methods specified in this procedure will be audited annually to ensure compliance with the requirements to control radioactive sources.

3.3.3 The results of leak test samples shall be less than 0.005 microcuries of removable activity in order to comply with NRC requirements.

3.3.4 Ensure accountability and direct control of the source at all times when it is unlocked. Minimize the number of people in the area of the source during the leak test to reduce exposure and maintain work areas as low as is reasonably achievable (ALARA). If high radiation area controls are necessary, the source must either be locked or guarded.

3.3.5 Only qualified Health Physics personnel may use or have possession of CABRERA radioactive check sources.

4.0 REFERENCES

- AP-001 Record Retention
- RSP Radiation Safety Program
- OP-001 Radiological Surveys
- OP-020 Operation of Contamination Survey Meters
- OP-021 Alpha-Beta Sample Counting Instrumentation
- OP-022 Operation of Ionization Chambers
- OP-023 Operation of Micro-R Survey Meters
- NUREG-1556 Consolidated Guidance About Material Licenses (Vol.11)

5.0 DEFINITIONS AND ABBREVIATIONS

5.1 Restricted Area – An area, access to which is limited by the licensee for the purpose of protecting individuals against undue risks from exposure to radiation and radioactive materials. Restricted area does not include areas used as residential quarters, but separate rooms in a residential building may be set apart as a restricted area.

5.2 Leak Test – A survey technique used to determine the presence of removable activity from the surface of a sealed source.

6.0 EQUIPMENT

- Ludlum 2929 or equivalent
- Remote smear handling assembly
- Liquid cleaner (if recommended by source manufacturer)
- Smears
- Portable radiation detection equipment
- Calibration sources

7.0 RESPONSIBILITIES

7.1 Project Manager (PM) – The PM is responsible for ensuring that all personnel assigned the tasks of control and leak testing of sealed sources of radioactive material, are familiar with this procedure, adequately trained in the use of this procedure, and have access to a copy of this procedure.

7.2 Radiation safety Officer (RSO) – The RSO is responsible for verifying that personnel comply with this procedure and are trained with radioactive sources as described in this procedure. The RSO ensures the Health Physics Technicians are qualified by training and experience to perform the requirements of this procedure.

7.3 Radiological Field Supervisor (RFS) – During field assignments, the RFS is responsible for ensuring that this procedure is implemented. When the RSO is not on site, the RFS will act as the RSO's duly authorized representative for radiological issues.

7.4 Health Physics Technicians (HPT) – The HPT are responsible for control and use of radioactive check sources. The HPT conducting leak tests of sealed sources are responsible to comply with the provisions of this procedure.

8.0 INSTRUCTIONS

8.1 Action Levels

- Inventory

  The RSO or duly authorized representative shall be notified immediately if it has been determined that a source is missing and an immediate search shall be conducted.

- Leakage

  If a source is suspected to have lost integrity, the RSO or duly authorized representative shall be notified immediately and a leak test shall be performed.

- Radiation Levels

  Radiation levels shall be maintained at less than 2 millirem per hour on any accessible surface where the radioactive check sources are stored. Notify the RSO or duly authorized representative if radiation levels exceed 2 millirem per hour.

8.2 Inventory

A physical inventory of all instrument check sources will be conducted by the RSO or duly authorized representative at least once each quarter and whenever a new check source is received or an old check source is disposed. The results shall be recorded on Form OP-009-01 and shall be retained in the source file for a period of not less than three years.

8.3 Initial Preparations

8.3.1 Select a work area to conduct the leak test that is free of radioactive contamination.

8.3.2 Select instruments that are capable of detecting at least 0.005 microcuries of the radionuclide of concern.

8.3.3 Prepare distilled water in a nearby container, as appropriate, for the equipment being tested. Specific solutions may be mentioned in vendor documentation. If they are, use the solutions required by the vendor.

8.3.4 Inform the RSO or duly authorized representative of the source to be leak tested. The RSO or duly authorized representative will evaluate the test and provide precautionary measures to ensure protection of people and equipment in the work area.

Caution: Do not touch or get close to an exposed source of high activity. Sealed sources of high activity may cause extremely high dose rates, which may result in physical damage to your body.

8.3.5 Using remote means, smear the outside surface of the source using cloth or paper. This smear will be the leak test sample that is analyzed for activity associated with a potentially leaking source.

8.3.6 Be cautious when handling leak test samples to prevent the spread of contamination, should the sample have loose radioactivity on it from a leaking source.

8.3.7 Minimize the time period for conducting the leak test. In a well planned test, the time should be less than 10 seconds total.

8.3.8 If the source emits particle radiation, a very thin window will typically cover the radioactive material. Take special precautions to prevent damage to the window during leak testing.

8.3.9 Be sure to wear rubber or latex gloves when handling the leak test samples or equipment associated with the test.

8.4 Monitoring Technique

8.4.1 To maintain the calibrated detection efficiency, the detector must be held at the appropriate height, determined during calibration, when surveying. For example, if beta probe's efficiency was calculated at 1/2 inch from the calibration source, the detector must be held at 1/2 inch from the surface being surveyed to maintain calibrated detection efficiency.

8.5 Analysis

The leak test sample shall be analyzed by a method, which will ensure detection of at least 0.005 microcuries of the radionuclide of interest. Existing CABRERA procedures shall be used as practical to ensure appropriate analysis and documentation of results.

Note: If the activity estimation determines the leak test sample to be in excess of the leak test limit of 0.005 microcuries, then label the source as unusable to prevent further spread of activity. Conduct a detailed survey of the leak test work area to ensure that activity from the source has not spread beyond the capsule of the source.

8.6 Performing a Leak Test

8.6.1 Although leak tests are not required for exempt quantity sealed sources, in the event a source is suspected of having a loss of

encapsulation or other possible leakage, the following procedure shall be followed, under the direction of the RSO or duly authorized representative :

8.6.1.1 A visual inspection of the source shall be made for physical damage. If an area of the source is noticeably damaged, perform the leak test in that area, otherwise proceed to step 8.3.1.2.

8.6.1.2 Determine the extent of source leakage by one of the following methods:

CAUTION: High activity sources may have very high exposure rates on contact. Sources containing activity in excess of the exempt limits shall handled by remote means to ensure exposure is maintained As Low As Reasonably Achievable.

8.6.1.3 Dry Wipe Test - This test will be performed on encapsulated sources or adjacent surfaces of plated or foil sources. The sources shall be wiped with a dry disc smear applying moderate pressure. Removal of any radioactive materials from the source or adjacent surfaces (i.e., source leakage) will be determined by counting the filter paper with appropriate instrumentation.

8.6.1.4 Wet Wipe Test - This test will be performed on encapsulated sources only. The entire surface of the source shall be wiped with a disc smear moistened with water, applying moderate pressure. Removal of any radioactive material from the source will be determined by counting the filter paper with appropriate instrumentation after the filter paper has dried out.

8.6.2 When any contamination or leak test reveals the presence of 0.005 μCi or greater of removable contamination, or activity removed is above the critical level of the detecting instrument, the source shall be retested. The source will be either repaired, if possible, or disposed of as radioactive waste if the second test is unsatisfactory. The results of leak tests for the sources are recorded on Form OP-009-02 and shall be retained for a minimum of three years.

8.7 Survey

The on-contact radiation level exterior to where the sources are stored shall be maintained at less than 2 millirem per hour on any accessible surface. A radiation survey of the storage location shall be performed at least quarterly and after the receipt of any additional check sources.

9.0 QUALITY ASSURANCE/RECORDS

9.1 Quality Assurance

9.1.1 The quality of leak test analyses is dependent upon the quality of the wipe, and the quality of analysis. Periodic evaluation of the process and analysis methods shall be conducted to ensure appropriate methods are used and this procedure is followed.

9.2 Records

9.2.1 The RSO or duly authorized representative prepares and maintains a source file which shall, at a minimum, consist of the following:

- Procurement history of each source, including copies of seller certification;
- Status change - damage, sale or transfer, disposal, or recalibration;
- Completed "Sealed Source Inventory and Leak Test" Form ; and,
- Any other correspondence related to the sources.

9.2.2 Documented information shall be legibly written in ink.

9.2.3 Data shall not be obliterated by erasing, using white-out, or by any other means. Incorrect entries shall be corrected by striking a single line across the entry. The correction shall be entered, initialed, and dated.

9.2.4 The health physics technician using this procedure shall ensure that it is the most current and approved revision.

9.2.5 The health physics technician performing inventory shall review Forms OP-009-01 and OP-009-02 for accuracy and completeness.

9.2.6 Entries on Forms OP-009-01 and OP-009-02 and any other pertinent forms must be dated and initialed by the health physics technician performing the inventory to be valid.

9.2.7 The RSO or duly authorized representative shall review completed forms. The review shall be for accuracy and completeness.

10.0 ATTACHMENTS

OP-009-01 Sealed Source Inventory and Leak Test

OP-009-02 Sealed Source Leak Test Data Sheet

OP-009-01
SEALED SOURCE INVENTORY AND LEAK TEST

Inventory Period: First Quarter ☐ Second Quarter ☐ Third Quarter ☐ Fourth Quarter ☐

Isotope	Source (Type/Form)	Serial Number	Location	Initial Activity	Corrected Activity	Leak Test uCi/smear

Comments_____
_____
_____

Date Performed:_____ By:_____
Print/Sign

Reviewed/Approved By:_____ Date:_____
Print/Sign

OP-009-02
Sealed Source Leak Test Data Sheet

Source Information Source ID Number_____

Source Manufacturer:_____ Date of Assay: _____

Source Model Number: _____ Source Serial #_____

Activity of Source at Assay Date:_____Ci Source Today: _____ Ci

Radionuclide name: _____ Half-life of radionuclide_____

Leak Test Sample Information

Location of Leak Test Work Area _____

Describe the method of leak testing:_____

_____

Sample Geometry: _____ Detector: _____

Detection Efficiency:_____c/d Background count time: _____ min.

Background count rate: _____cpm MDA: _____ microcuries

Sample net count rate: _____cpm Sample count time: _____ min.

Leak test sample activity: _____ microcuries

Leak Test Result – Check all boxes that apply

- ❑ The leak test sample is in excess of the 0.005 microcurie limit
- ❑ The leak test sample is below the 0.005 microcurie limit
- ❑ The source has been controlled to prevent the spread of activity from the shield.

Source Leak Test Performed by:_____ Date: _____

Leak Test Analysis Conducted by: _____ Date: _____

Radiation Safety Officer: _____ Date: _____

1.0 PURPOSE

This procedure establishes the requirements for decontamination of equipment, material, and tools used at Cabrera Services, Inc., (CABRERA) field projects that become contaminated with radioactive material.

2.0 APPLICABILITY

This procedure will be used to identify proper decontamination methods, provide instruction for the decontamination of equipment, material, and tools. Each decontamination operation is unique; thus, this procedure provides general, effective domination techniques and guidelines to be use by CABRERA field personnel. This document applies to all CABRERA PERSONNEL involved in the decontamination process.

3.0 PRECAUTIONS, LIMITATIONS AND REQUIREMENTS

3.1 Precautions

3.1.1 Decontamination of contaminated tools or equipment shall be performed under the direction of a HPT. The HPT shall provide direction in accordance with this procedure, and the Radiation Work Permit (RWP).

3.1.2 Decontamination activities shall be performed within a controlled area established in accordance with the provisions of procedure OP-019.

3.1.3 Controls to contain the spread of loose contamination during the decontamination activity shall be planned and established prior to the decontamination of equipment, material, and tools.

3.2 Limitations

3.2.1 Protective clothing worn by the personnel involved in decontamination activities shall be determined in accordance with the RWP.

3.2.2 Decontamination cleaning solvent/solutions shall only be used in accordance with the directions and limitations listed on the manufacturer supplied MSDS.

3.2.3 Respiratory protection devices required by the RWP for decontamination operations shall be selected and used in accordance with the provisions of AP-006.

3.2.4 A pre-job briefing shall be held to instruct Decontamination Technicians of the conditions of the RWP. All personnel performing work in the decontamination work area shall sign the RWP prior to work.

3.2.5 Every effort should be made by CABRERA personnel to avoid re-contamination of decontaminated materials. Contamination controls shall always be observed throughout a decontamination process.

3.2.6 Radiation and contamination surveys shall be performed in accordance with the provisions of procedure OP-001.

3.2.7 Release of equipment, materials, and tools from the decontamination work area shall be performed in accordance with the provision of procedure OP-004.

3.3 Requirements

None

4.0 REFERENCES

- RSP Radiation Safety Program
- AP-001 Records Retention
- AP-006 Respiratory Protection Program
- AP-012 Radiation Work Permits
- AP-013 Packaging Radioactive Material
- AP-014 Classifying Radioactive Waste
- OP-001 Radiological Surveys
- OP-004 Unconditional Release of Material from Radiological Control Areas
- OP-019 Radiological Posting
- OP-020 Operation of Contamination Survey Meters
- OP-021 Operation of Alpha-Beta Sample Counting Instrumentation
- OP-023 Operation of Micro-R Survey Meters

5.0 DEFINITIONS AND ABBREVIATIONS

5.1 Decontamination - The processes whereby contamination can be safely and effectively removed from equipment, tools and materials, to levels required by Reg. Guide 1.86.

5.2 Herculite - A plastic or polyethylene floor covering and containment material use for decontamination operations. HERCULITE is a brand name.

5.3 MSDS - Material Safety Data Sheet provide safety information and limitations and are issued by the manufacturer of the product.

5.4 Radiation Work Permit (RWP) - A document generated by Health Physics to provide:

- A description and scope of the work to be performed.
- Existing radiological conditions in the work area.
- Limitations placed upon the scope of work.
- Maximum radiological limits allowed.
- Measures to be employed to protect the worker(s).
- Period of time the RWP is valid.
- Special instructions to workers and HP personnel for the work.

6.0 EQUIPMENT

None

7.0 RESPONSIBILITIES

7.1 Project Manager (PM) – The PM is responsible for ensuring that personnel assigned the task of decontamination are familiar with this procedure, adequately trained in the use of this procedure, and have access to a copy of this procedure.

7.2 Radiation Safety Officer (RSO) – The RSO is responsible is responsible for training of personnel in decontamination techniques and performing radiation surveys described in this procedure. The RSO ensures that decontamination technicians are qualified by training and experience to perform the requirements of this procedure.

7.3 Radiological Field Supervisor (RFS) – During field assignments, the RFS is responsible for ensuring that this procedure is implemented. When the RSO is not on site, the RFS will act as the RSO's duly authorized representative for radiological issues.

7.4 Health Physics Technicians (HPT) – The HPT is responsible for performing the surveys of decontaminated items, and ensuring that radioactive material is not released to the public or the environment.

8.0 INSTRUCTIONS

8.1 Pre-Decontamination Preparation

8.1.1 The RFS shall initiate decontamination work instructions.

8.1.2 A radiological survey shall be performed by a HPT on any item or object, which is to be removed from a controlled area.

8.1.3 If radiological survey results indicate that an RWP is required for decontamination, the RSO or duly authorized representative shall write the RWP in accordance with the provisions of procedure AP-012.

8.1.4 If a survey indicates that decontamination is required, the item should be bagged, wrapped, or contained under the direction of health physics. The HPT shall label the item with all pertinent information.

8.1.5 The RFS shall approve or disapprove the decontamination operation based on conditions of the RWP and the cost effectiveness of the operation versus disposal costs.

8.2 Establishment of the Decontamination Work Area

8.2.1 The RSO or duly authorized representative and the RFS shall determine a location for decontamination area.

8.2.2 Once a location has been established, the decontamination area shall be set-up by the HPT under the direction of the RFS.

8.2.3 The decontamination area should consist of the following:

- Covered (or equivalent) floor surfaces. A double layer of Herculite (or equivalent) may be laid on the floor at the direction of Health Physics.

- Covered (Herculite or equivalent) wall surfaces, if applicable.

- Engineering controls (HEPA ventilation, vacuum cleaners, containment tent walls glove bags, etc.), if applicable.

- Engineering controls shall be determined on the basis of the ALARA consideration section of the RWP.

NOTE: All possible engineering controls shall be utilizes when feasible to minimize the need for respiratory protection equipment.

- Safe, sturdy workstations with contamination resistant surfaces. Tables that will support decontamination attempts on heavy pieces of equipment.

- Adequate supply of overhead light, adequate electrical/compressed air supply for the operation of electrical/pneumatic driven decontamination equipment.

- Overhead lifting equipment, if applicable.

- Adequate supply of CABRERA approved cleaning solutions and solvents; adequate supply of decontamination equipment such as:

1. Light duty decontamination equipment such as paper wipes, paper towels, massllin towels, etc.

2. Medium to Heavy-duty decontamination equipment such as scrub pads, wire brushes steel wool, files, sandpaper, etc.

3. Fully stocked hand tool kit for disassemble of contaminated equipment.

4. Power tools, such as drills, saws, electric screwdrivers, etc.

5. Radioactive material storage bags, stickers, etc.

6. Buckets, barrels or drums for the storage of contaminated liquids, sludges, or slurries, if applicable.

7. Blotter paper or sorbent, if applicable.

8. Approved absorbent material such as oil dry, etc., if applicable.

- Storage drums/bags for the storage of contaminated protective clothing under direction of Health Physics.

- Proper surveillance instruments (air monitor/sampler, contamination monitor, friskers, dose rate meter, etc.) in accordance with the RWP.

- Adequate supply of personal protective clothing gloves respiratory equipment, etc.

- Step-Off or Double Step-Off Pad in accordance with the provision of the RWP.

- A designated area within the decontamination area for the segregation of radioactive waste.

- Fire extinguisher(s), if required

8.2.4 Once the decontamination area has been established and stocked for operation, the bagged and/or wrapped contaminated or controlled equipment should be placed in the decontamination work area by the decontamination technician under the direction of the RFS and the HPT. Contaminated or controlled items should always be escorted under the direction of a HPT to the decontamination area.

8.3 Decontamination

8.3.1 After the decontamination area has been posted, and area access controls established, all requirements of the RWP shall be observed.

8.3.2 The preparation for decontamination of a particular tool, material, or piece of equipment shall be performed as follows:

- Position the wrapped item so that the written information on the label/wrapping is visible.

NOTE: Junior Health Physics/Decontamination Technicians may operate survey instruments for decontamination monitoring purpose. HPTs shall oversee Junior Health Physics/Decontamination Technicians when survey instruments are in use.

CAUTION: Survey instruments to be used in a known or suspected contaminated area should be protected (wrapped in plastic, poly, etc.) against possible contamination before use.

- The HPTs shall direct the removal of the item from the wrapping in such a manner (rolling plastic, poly, etc.) to control the spread of contamination.

- An item that is highly contaminated with smearable contamination should be misted with an approved liquid such as demineralized water. The water vapor will wet down the particulate contamination and help prevent the possibility of generating airborne contamination.

- Once the item has been removed from the wrapping and has been properly positioned, discard the wrapping as radioactive waste.

8.3.3 The following decontamination techniques should be considered for the decontamination of equipment, materials, and tools:

- Any equipment with inaccessible areas shall be dismantled so that all surfaces are accessible for decontamination and for survey.

- Decontamination shall be performed in a safe, effective manner.

- The HPT shall be notified immediately if the job conditions change (e.g. suspected asbestos found, presence of mercury in a switch or a light bulb, a fluid leak, or any other special circumstances).

- An HPT (or qualified individual) shall be assigned as a fire watch if any spark creating decontamination techniques (grinding, etc,) are used and there are combustible materials in the area. There shall be a dedicated fire extinguisher located within the decontamination work area.

- In order to secure a safe cleaning surface, the item should be positioned on the worktable (if size and weight permits) and locked into a vise or secured by other approved methods as determined by the RFS.

- The decontamination area shall remain organized and free of debris. The HPT shall enforce the "clean-as-you-go" policy whenever necessary.

- A HEPA vacuum cleaner may be used during the decontamination operation.

8.3.4 Smearable Contamination Removal

When the item is properly positioned for decontamination and the pre-survey has been completed, perform the following:

- Moisten the surface of the item with an approve liquid (e.g. demineralized water).

- Fold a paper or cloth wipe into sections, using one surface of the wipe gently and wipe contamination off in one direction away from the user's body. This should reduce the possibility of personnel contamination.

- Re-fold the paper or cloth wipe so that a clean surface is available (this should prevent cross-contamination) and continue until item is ready for survey.

- For some materials, duct tape will effectively remove smearable contamination. Wrap the duct tape loosely around the gloved hand. Adhesive side out. Roll the tape over the contaminated area. Re-survey.

8.3.5 Fixed Contamination Removal

There are many techniques that can be use to remove fixed contamination. The general idea is to remove the material, which is fixing the activity to the surface, or remove a very thin layer of the surface material. The techniques selected for a particular decontamination operation is at the discretion of the RFS and the HPT. The techniques can be divided into the following categories:

- Light hand decontamination
- Abrasive hand decontamination
- Power tool decontamination
- Machine decontamination (use of abrasive bead blasters, grit blasters, high pressure water wash systems, etc.). The specific implementation of these techniques is not included within the scope of this procedure.
- Cleaning solutions/solvents (use of ultrasonic cleaners, acid baths, electropolishing, etc.). The specific implementation of these techniques is not included within the scope of this procedure.

8.3.6 Light hand decontamination consists of using many of the same techniques as 8.3.4 of this procedure.

8.3.7 Abrasive hand decontamination shall be performed in the following manner:

- Remove as much smearable contamination as possible.
- Moisten the surface of the item(s) to contain contamination.

CAUTION: Abrasive measure should only be applied to surfaces, which are not critical for operation of devices, which must be restored to working condition. Abrasion of machined surfaces should be minimized if the device is intended to provide its designed operation.

- Use an abrasive cleaning tool (e.g. sandpaper, steel wool, steel brush, hand grinder, etc.) to loosen fixed contamination. Clean in one direction only and clean Away from the body to prevent personnel contamination.
- Continue to moisten the surface of the item(s) to contain contamination.
- Remove as much smearable contamination as possible.
- Re-survey.

8.3.8 Power tool decontamination shall be performed in the following manner only under the direction of the HPT.

NOTE: When using power tools, always consider the potential of injury due to the hazards involved. Power tools shall be use cautiously and in accordance with the manufacturer's recommendations.

- Some of the electric power tools that can be use in decontamination operations are:

  - Drills - used to drill out contaminated areas, to disassemble contaminated components and when used with grinding wheels or disks, may be used as an abrasive tool.

  - Saws - used to separate contaminated pieces from clean pieces.

  - Grinders - used to grind fixed contamination form surfaces.

  - Electric screwdrivers - used in the disassembly of component parts

8.3.9 Power tool decontamination shall be performed in the following manner:

- Remove as much smearable contamination as possible as per Section 8.3.4 of this procedure.

- Moisten the surface of the item lightly to contain contamination. Use a spray bottle for moistening.

CAUTION: Do not use electric power tools on a wet working surface. Keep liquids away from electric power tools.

- Whenever feasible the use of containment device (e.g. glove box, etc.) should be used to contain the spread of contamination when using power tools for decontamination operations.

- Use the power tool to remove fixed contamination. Clean in one direction only and clean away from the body to prevent personnel contamination.

- Re-survey.

8.4 Post Decontamination

8.4.1 If the decontamination was successful, the decontamination technician shall notify the HPT who shall perform a release survey in accordance with OP-004.

- If the item satisfies the criteria for release as in OP-004, remove the item to

a holding area for disposal and document results. When prepared for disposal, ensure compliance with the provisions of AP-014 and AP-013.

- If the item remains contaminated, attempt a second decontamination.
- If the item remains contaminated, attempt a third decontamination only at the direction of the RSO or duly authorized representative.

8.4.2 If an item cannot be effectively or economically decontaminated, the RFS may direct the CABRERA work crew to volume-reduce (reduce to component parts) the equipment, material, or tools as much as possible. If the item is expendable, the individual parts may be surveyed and released in accordance with step 8.4.1.

8.4.3 If an item is volume-reduced to its component parts and decontamination is not feasible, and the item is not needed, the item parts shall be considered radioactive waste. Radioactive waste is to be segregated into similar material for shipment purposes by the direction of the Project Manager. The RFS shall direct the segregation of radioactive waste into the following categories:

- Steels, hard metals
- Wood
- Fiber products
- Paper
- Rubber
- Cloth (duct tape is considered a cloth)
- Aluminum, soft metals (brass)
- Glass
- Questionable items (e.g. light bulbs pipe with lead solder, electronic component parts) which could be considered mixed or hazardous waste.
- Other categories, if applicable.

8.4.4 After all decontamination operation have been completed a HPT shall perform a release survey of the decontamination area and de-post the area in accordance with procedures OP-001 and OP-019.

9.0 QUALITY ASSURANCE/RECORDS

9.1 Quality Assurance

9.1.1 Instrumentation used in the surveys will be checked with standards daily and verified to have current valid calibration.

9.1.2 Operations conducted using this procedure shall be reviewed for compliance at least annually.

9.2 Records

9.2.1 The records generated by the use of this procedure are documented in accordance with the provisions of referenced CABRERA procedures. No new records are created.

9.2.2 Documented information shall be legible written in ink.

9.2.3 Data shall not be obliterated by erasing or using white-out. Incorrect entries shall be corrected by striking a single line across the entry. The correction shall be entered, initialed, and dated.

10.0 ATTACHMENTS

None

1.0 PURPOSE

This procedure provides the methods Cabrera Services, Inc. (CABRERA) uses to control radioactive materials. Adherence to this procedure will provide reasonable assurance that personnel will remain free of contamination, contamination will not spread beyond the designated contamination area, and personnel exposures will be maintained As Low As Reasonably Achievable (ALARA).

2.0 APPLICABILITY

This procedure will be used by CABRERA personnel to control and contain radioactive materials. The following are types of controls methods that will be employed:

- Posting requirements for radioactive materials.
- Establishing and posting radiation areas.
- Establishing and posting contaminated areas.
- Establishing and posting airborne radioactivity areas.

3.0 PRECAUTIONS, LIMITATION, AND REQUIREMENTS

3.1 Precautions

3.1.1 If a HPT is unable to perform this procedure due to errors, extenuating circumstances, or for any reason, the HPT shall immediately stop and notify the RSO.

3.2 Limitation

None

3.3 Requirements

None

4.0 REFERENCES

• 10 CFR 20, Subpart F	Surveys and Monitoring
• 10 CFR 20.2103	Records of Surveys
• RSP	Radiation Safety Program
• AP-001	Record Retention
• AP-010	Personal Protective Equipment
• AP-015	Radioactive Materials Brokering

- OP-020 Operation of Contamination Survey Instrument
- OP-021 Alpha-Beta Sample Counting Instrument
- OP-022 Operation of Ionization Chambers
- OP-023 Operation of Micro-R Survey Meters

5.0 DEFINITIONS AND ABBREVIATIONS

5.1 Restricted Area – An area to which access is controlled to protect individuals against undue risks from exposure to radiation and radioactive materials.

5.2 Contamination Survey – A survey technique to determine fixed and removable radioactive contamination on components and facilities.

5.3 Radiation Survey – is defined as an evaluation of the radiological conditions and potential hazards incident to the production, use, transfer, release, disposal, or presence of radioactive material or other sources of radiation.

5.4 ALARA – (acronym for “as low as is reasonably achievable”) An approach to radiation exposure control to maintain personnel radiation exposures as far below the federal limit as technical, economical and practical considerations permit.

5.5 Radioactive Materials – Materials containing or capable of emitting alpha particles, beta particles, gamma rays, X-rays, neutrons and/or other ionizing radiations.

5.6 Airborne Radioactivity Area – A room, enclosure or area in which radioactive material is dispersed in the form of dusts, fumes, mists, vapors, or gases and the concentration of the of the dispersed radioactive materials in excess of:

5.6.1 The derived air concentrations (DAC’s) specified in Table 1, Column 3 of Appendix B, Title 10 Part 20 of the Code of Federal Regulations.

5.6.2 Concentrations such that an individual present in the area without respiratory protective equipment could exceed, during the hours the individual is present in a week an intake of 0.6 percent of the annual limit on intake (ALI) or 12 DAC-hours.

6.0 EQUIPMENT

None Required

7.0 RESPONSIBILITIES

7.1 Project Manager (PM) – the PM is responsible for ensuring that personnel assigned the task of establishing and posting restricted areas are familiar with this procedure, adequately trained in the use of this procedure, and have access to a copy of this procedure.

7.2 Radiation safety Officer (RSO) – The RSO is responsible for monitoring compliance with this procedure and training personnel in establishing and posting restricted areas. The RSO can also assist in the interpretation of the results obtained during surveys.

7.3 Radiological Field Supervisor (RFS) – During field assignments, the RFS is responsible for ensuring that this procedure is implemented. When the RSO is not on site, the RFS will act as the RSO's duly authorized representative for radiological issues.

7.4 Health Physics Technicians (HPT) – The HPT establishing and posting restricted areas are responsible for knowing and complying with this procedure.

8.0 INSTRUCTIONS

8.1 Posting Requirements for Radioactive Materials

8.1.1 Any area or room in which there is used or stored an amount of licensed material exceeding 10 times of the quantity of such material specified in Appendix C, Title 10 Part 20 of the Code of Federal Regulations shall be posted with a sign or signs "Caution Radioactive Materials Area" or "Danger, Radioactive Materials".

8.1.2 When posting a room as required in step one, a sign should be placed on each entrance door to the room. If the area to be posted is not a room, the area containing the license material shall be bounded by a yellow and magenta/black rope or ribbon securely fastened to stanchions, posts or other durable devices and signs shall be displayed in all accessible directions.

8.1.3 Any container, which contains licensed material in quantities equal to or greater that the quantities listed in Appendix C, Title 10 Part 20 of the Code of Federal Regulation shall be posted with a sign or label bearing the radiation symbol and the words "CAUTION, RADIOACTIVE MATERIALS" OR "DANGER, RADIOACTIVE MATERIALS".

8.1.4 When posting a container as required by step three, the label should also state the radionuclide present in the container, the activity in the container, the date at which the activity was determined, the radiation levels emanating from the unshielded radioactive source, and the levels from the container holding the radioactive source. The label shall also state the mass enrichment if different from natural enrichment and the kind of material (encapsulated source, liquid, powder. etc.).

8.1.5 Posting of containers is not required if the containers are in transport and packages and labeled in accordance with the regulations of the Department of Transportation. (Title 49 Parts 172 and 173 of the Code of Federal Regulations). Containers, which are awaiting shipment at a facility, are subject to posting requirements as specified in 8.1.1

8.2 Establishing and Posting Radiation Areas

8.2.1 Any area accessible to personnel in which there exists ionizing radiation at dose rate levels such that an individual could receive a deep dose equivalent in excess of 5 mrem in 1 hour at 30 cm from the source of from any surface that the radiation penetrates shall be identified and posted with a sign “CAUTION RADIATION AREA”.

8.2.2 A Micro-R Meter or other calibrated dose rate meter is used to identify the boundary location of the 5 mrem/hr dose rate.

8.2.3 If an entire room or most of the room is at or above the 5 mrem/hr level, a sign should be placed on each entrance door to the room. If the area to be posted is not a room, the area at or above the 5 mrem/hr level shall be bounded by a yellow and magenta/black rope or ribbon securely fastened to stanchions, posts or other durable device and signs shall be displayed in all accessible directions.

8.2.4 An exemption to this posting requirement is allowed in areas or rooms containing radioactive materials for periods less than 8 hours, if each of the conditions is met:

8.2.4.1 The materials are constantly attended to during these periods by an individual who takes the precautions necessary to prevent the exposure to radiation or radioactive materials in excess of the limits specified in the RSP; and

8.2.4.2 The area or room subject to the licensee’s control. For example, the area around the truck loading radioactive waste does not require posting if the above conditions are met.

8.2.5 If the dose rates above 100 mrem/hr are encountered, control access to the area and contact the RSO or duly authorized representative for posting instructions.

8.3 Establishing and Posting Contaminated Areas

8.3.1 A restricted area that has fixed and removable radioactive materials in the form of dusts, particulates or sorbed contaminants which are above the limits specified in the RSP shall be identified and posted with a “CONTAMINATED AREA” sign.

8.3.2 Contamination levels are determined using procedure OP-001 (Radiological Surveys) and the results of the survey measurements compared to the contamination limits specified in the RSP.

8.3.3 If an entire room or most of the room is above the contamination criteria, a sign should be placed on the entrance door to the room. If the area to be posted is not a room, the above area contamination criteria shall be bounded by a yellow and magenta/black rope or ribbon securely fastened to stanchions, posts or other durable device and signs displayed in all accessible directions.

8.3.3.1 A single entry point shall be established to access the contaminated area. A step-off pad is placed at the entry point, which provides a defined boundary between contaminated and restricted areas.

8.3.3.2 Receptacles for protective clothing and waste materials shall be placed just inside the entry point to collect protective clothing from personnel exiting the area.

8.3.3.3 If work activities in the work areas are likely to generate significant dusts containing radioactive materials, the area should be enclosed within a containment to prevent the spread of contamination beyond the identified contaminated area.

8.4 Establishing and Posting Airborne Radioactivity Areas

8.4.1 CABRERA’s policy is to minimize (and protect, if practical) the amount of radioactive materials taken into a workers body. In order to accomplish this, Airborne Radioactivity Areas are posted at 10% DAC, as specified in Table 1, Column 3 of Appendix B of 10 CFR 20. Maintaining the airborne activity below these limits will eliminate any posting requirements.

8.4.2 To verify that these limits are not exceeded, an air sample is taken during each work activity, which could create an airborne radioactivity hazard. The results of these samples are compared with the above limits to verify the limits are not exceeded. If these limits are exceeded, immediately contact the RSO or duly authorized representative.

8.4.3 A room, enclosure or area shall be posted with a “CAUTION, AIRBORNE RADIOACTIVITY AREA” or “DANGER, AIRBORNE RADIOACTIVITY AREA” if radioactive material is dispersed in the form of fumes, dusts, mists, vapors, or gases and the contamination of the dispersed radioactive materials is in excess of:

8.4.3.1 The derived air concentration (DAC) specified n Table 1, Column 3 of Appendix B, Title 10 Part 20 of the Code of Federal Regulations.

8.4.3.2 Concentration such that an individual present in the area without respiratory protective equipment could exceed, during the hours the individual is present in a week, an intake of 0.6 percent of the annual limit on intake (ALI) or 12 DAC-hours.

8.4.4 If a room, enclosure or area requires posting as specified in 8.4.3, immediately stop work activities and contact the RSO or duly authorized representative for instructions.

9.0 QUALITY ASSURANCE/RECORDS

9.1 Quality Assurance

9.1.1 Instrumentation used in the surveys will be checked with standards daily and verified to have current valid calibration.

9.2 Records

9.2.1 Record any radioactive materials posting made in the project logbook. Include the date, location, and all information posted.

9.2.2 Record the date and the location of any radiation areas established in the project logbook. Include a sketch of the area and radiation area boundary on survey forms.

9.2.3 Record the date and location of any contaminated areas established in the project logbook. Include a sketch of the area and contaminated area boundary on survey forms.

9.2.4 Record the date and location of any airborne radioactivity areas established in the project logbook. Include a sketch of the area on survey forms. Indicate time and date of any notifications required by this procedure.

9.2.5 Radiological survey records, routine survey schedules, and tracking forms are generated during the performance of this procedure.

9.2.6 Documented information shall be legibly written in ink.

9.2.7 Data shall not be obliterated by erasing, using white-out, or by any other means. Incorrect entries shall be corrected by striking a single line across the entry. The correction shall be entered, initialed, and dated.

9.2.8 The HPT performing the posting shall ensure that this procedure is the most current and approved revision.

9.2.9 The HPT performing the posting shall review Forms and any other applicable forms for accuracy and completeness.

9.2.10 Entries on Forms and any other pertinent forms must be dated and initialed by the HPT performing the posting to be valid.

9.2.11 The RSO or duly authorized representative shall review any applicable completed forms. The review shall be for accuracy and completeness.

10.0 ATTACHMENTS

None

1.0 PURPOSE

This procedure provides the methods for operating alpha/beta survey meters when performing contamination surveys. Adherence to this procedure will provide reasonable assurance that the surveys performed have reproducible results.

2.0 APPLICABILTY

This procedure will be used by Cabrera Services, Inc. (CABRERA) personnel to measure fixed and removable alpha and/or beta emitting radioactive material on facility surfaces, equipment, waste packages, personnel, personnel protective clothing, etc.

3.0 PRECAUTIONS, LIMITATIONS, AND REQUIREMENTS

3.1 Precautions

3.1.1 Ensure that the thin Mylar or mica window on the probe face is protected from punctures during survey operations.

3.1.2 If any instrument inconsistencies are observed (e.g., unusually high or low background readings, source checks outside the acceptable range, etc.), remove the instrument from use, label it "OUT OF SERVICE" and report the condition to the Radiation Safety Officer (RSO) or duly authorized representative.

3.2 Limitations

None

3.3 Requirements

3.3.1 Calibration sources shall be traceable to the National Institutes of Science and Technology (NIST).

3.3.2 A battery check, general observation of instrument condition and source check shall be performed each day before instrument use and daily following work activities as a final verification.

3.3.3 Survey instrument calibrations shall be performed by an NRC or Agreement State licensed calibration facility.

4.0 REFERENCES

- RSP Radiation Safety Program
- AP-001 Record Retention
- OP-001 Radiological Surveys
- OP-009 Use and Control of Radioactive Check Sources

5.0 DEFINITIONS AND ABBREVIATIONS

5.1 Restricted Area - An area containing radioactive material(s) to which access is controlled to protect individuals from exposure to ionizing radiation.

5.2 Alpha/Beta Contamination Survey - A survey technique to determine fixed and removable alpha/beta contamination.

5.3 Acceptance Range - A range of values that describe an acceptable daily instrument source check result.

6.0 EQUIPMENT

6.1 For Alpha Surveys Ludlum Model 43-5 probe and Ludlum Model 3 survey meter or equivalent meter/probe combination.

6.2 For Beta Surveys Ludlum Model 44-9 probe and Ludlum Model 3 survey meter or equivalent meter/probe combination.

7.0 RESPONSIBILITIES

7.1 Project Manager (PM) – the PM is responsible for ensuring that personnel assigned the task of operating contamination survey meters are familiar with this procedure, adequately trained in the use of this procedure, and have access to a copy of this procedure.

7.2 Radiation safety Officer (RSO) – The RSO is responsible for verifying that personnel comply with this procedure and are trained in the use of contamination survey meters described in this procedure.

7.3 Radiological Field Supervisor (RFS) – During field assignments, the RFS is responsible for ensuring that this procedure is implemented. When the RSO is not on site, the RFS will act as the RSO's duly authorized representative for radiological issues.

7.4 Health Physics Technicians (HPT) – The HPT operating contamination survey meters are responsible for knowing and complying with this procedure.

8.0 OPERATION

8.1 Instrument Inspection

8.1.1 Select the contamination survey meter and probe to be used in the survey.

8.1.2 Before each use, perform the following checks:

8.1.2.1 Verify the instrument has a current calibration label.

8.1.2.2 Visually inspect the instrument for physical damage or defects.

8.1.2.3 Position the meter switch to "BAT". Check to see that the needle falls within the "Bat Test" checkband.

- If the needle falls below the "Bat Test" checkband, install new battery(s).
- If the needle still falls outside the "Bat Test" checkband after the installation of new battery(s), tag the instrument "Out of Service" and notify the RSO or duly authorized representative.

8.1.2.4 Check alpha detectors for light leaks by pointing the mylar window of the detector toward a light source and observing no change in the meter indication.

8.1.3 Remove and tag the instrument "Out of Service" if it fails any of the criteria in Step 8.1.2.1 through 8.1.2.44 and notify the RSO or duly authorized representative.

NOTE: Any defects, damages or other physical abnormalities require that the instrument be removed from service and the RSO or duly authorized representative be notified.

8.2 Pre-operation of instrument

8.2.1 Position the meter fast/slow ("F/S") switch to "S".

8.2.2 Position the meter switch to the appropriate range scale.

8.2.3 Obtain an OP-020-01 Form.

8.2.4 If a Quality Control (Q.C.) acceptance range has not already been calculated on the OP-020-01 Form, then follow the instructions below, other wise proceed to step 8.2.5.

8.2.4.1 Ensure the source and detector are in documented reproducible positions, which will be used each time this check is performed. Document this position on Form OP-020-01.

8.2.5 Place the QC check source and detector in the documented position on Form OP-020-01.

8.2.6 Allow the instrument reading to stabilize (approximately 30 seconds). Compare the reading to the response check criteria on Form OP-020-01. If the response reading falls outside of the acceptance range, tag the instrument "Out of Service" and notify the RSO or duly authorized representative.

8.3 Contamination Survey Techniques

Caution: The window area of alpha detectors are covered with a very thin (1 mg/cm^2) aluminized Mylar window and beta detector windows are 1.7 mg/cm^2 mica. Either window can be easily when surveying areas, which have protruding fragments that might puncture the detector face. Remove these fragments before performing surveys.

Note: To maintain the calibrated detection efficiency, the detector must be held at the appropriate height, determined during calibration, when surveying. For example, if a beta probe's efficiency was calculated at 1/2 inch from the calibration source, the detector must be held at 1/2 inch from the surface being surveyed to maintain calibrated detection efficiency.

Note: Avoid contacting the detector probe to the area being surveyed. This potentially could contaminate the probe.

8.3.1 Verify the instrument selector switch is in the X 0.1 position.

8.3.2 For a stationary reading, place the detector over the area to be measured and allow meter to stabilize. Record the average meter indication in either CPM α/PA (probe area) or CPM β/PA on applicable forms.

8.3.3 For a scan survey move the detector slowly over the surface (less than one detector width per second). Observe meter indication. If increased readings are observed return to the area and obtain a stationary reading. Record maximum area meter indication in either CPM α/PA or CPM β/PA, on applicable forms.

8.4 Final Verification

Upon completion of work activities, repeat steps 8.1.2.1 through 8.2.2.4 and

8.2.5 through 8.2.6, as a final verification that the instrument is working properly

8.5 Interpretation of Results

The meter reading on the alpha and beta survey meters must be corrected for detector efficiency and detector surface area before comparing results with the contamination units in Section 3.6 of the Radiation Safety Program. The conversion from CPM α/PA or CPM β/PA to DPM α/100 cm^2 or β/100 cm^2 is performed using the following equation.

$$(\text{DPM} / 100\ \text{cm}^2) = \frac{(\text{AxB})}{\text{C}}$$

Where: A = Alpha or Beta survey meter indication in net CPM α/PA or β/PA (i.e. Gross Alpha or Beta Survey Counts minus background counts = Net CPM/PA)

B = 100 cm^2 divided by the effective detector surface area in cm^2. With an effective surface area of 50 cm^2 for the Ludlum 43-5 alpha detector, the value of B is approximately 2 or for the 15 cm^2 for the Ludlum 44-9 beta detector, the value of B is approximately 6.7.

C = Detector efficiency (expressed as decimal).

9.0 QUALITY ASSURANCE/RECORDS

9.1 Quality Assurance

9.1.1 The health physics technician performing the survey shall ensure that this procedure is the most current and approved revision.

9.2 Records

9.2.1 Documented information shall be legibly written in ink.

9.2.2 Data shall not be obliterated by erasing, using white-out, or by any other means. Incorrect entries shall be corrected by striking a single line across the entry. The correction shall be entered, initialed, and dated.

9.2.3 The HPT performing the survey shall review Form OP-020-01 and any other applicable forms for accuracy and completeness.

9.2.4 Entries on Form OP-020-01 and any other pertinent forms must be dated and initialed by the HPT performing the survey to be valid.

9.2.5 The RSO or duly authorized representative shall review any applicable completed forms. The review shall be for accuracy and completeness.

10.0 ATTACHMENTS

OP-020-01 Survey Meter Source Check

Survey Meter Source Check Form

Instrument: _____ Serial No.: _____

Source: _____ Acceptable Range: _____ to _____

Date	Cal Due	Reading	H.P. Technician	H.P. Technician Initial

Review By: _____ Date: _____

1.0 PURPOSE

This procedure provides instruction on the operation and setup of an alpha/beta sample counter. Adherence to this procedure will provide reasonable assurance that the surveys performed have reproducible results.

2.0 APPLICABILITY

This procedure will be used by Cabrera Services, Inc., (CABRERA) personnel operating an alpha/beta sample counter during surveys. Types of surveys that may use an alpha/beta sample counter are:

- Smear surveys performed to determine the removal of alpha and beta contamination on facility surfaces, equipment, waste, and source packages, etc.

- Air sample surveys performed in a workers breathing zone to determine alpha and beta air concentrations.

3.0 PRECAUTIONS, LIMITATIONS, AND REQUIREMENTS

3.1 Precautions

3.1.1 If any instrument inconsistencies are observed (e.g., unusually high or low background counts, source checks outside the tolerance range, etc.), remove the instrument from use and report the condition to the RSO or duly authorized representative.

3.1.2 Individuals performing work with an alpha/beta counter shall be familiar with the requirements set forth in the current and approved version of this procedure.

3.2 Limitations

3.2.1 This instrument should be set up for use in low background area as determined by the RSO or duly authorized representative.

3.3 Requirements

3.3.1 Calibration sources shall be traceable to the National Institutes of Science and Technology (NIST).

3.3.2 Survey instrument calibrations shall be performed by an NRC or Agreement State licensed calibration facility.

3.3.3 A battery check, general observation of instrument condition and source check shall be performed each day before instrument use and daily following work activities as a final verification.

4.0 REFERENCES

- RSP Radiation Safety Program
- AP-005 ALARA Program
- AP-001 Record Retention
- AP-013 Packaging Radioactive Material
- OP-001 Radiological Surveys
- NUREG-1556 Consolidated Guidance About Material Licenses (Vol.11)

5.0 DEFINITIONS AND ABBREVIATIONS

5.1 Restricted Area – An area to which access is controlled to protect individuals against undue risks from exposure to radiation and radioactive materials.

5.2 Smear sample survey – a technique using a two-inch diameter filter papers to determine removable contamination of alpha and/or beta emitting radioactive material.

5.3 Air sample survey – a technique in which particulates are collected from a known volume of air drawn through a filter paper and concentrations of airborne alpha and beta activity associated with the particulates is determined by sample counting.

5.4 Plateau – portion of a voltage curve where changes in operating voltage introduce minimum changes in the counting rate.

5.5 Chi-square test – A statistical test to evaluate the operation of a sample counter by determining how data fit a series of counts to a Poisson distribution.

5.6 Daily calibration – A determination of alpha and beta sample counting efficiency by counting National Institute of Standard Technologies (NIST) radioactive standards.

6.0 EQUIPMENT

Ludlum model 2929 or equivalent

7.0 RESPONSIBILITIES

7.1 Project Manager (PM) – the PM is responsible for ensuring that personnel assigned the task of operating alpha/beta sample counters are familiar with this procedure, adequately trained in the use of this procedure, and have access to a copy of this procedure.

7.2 Radiation Safety Officer (RSO) – The RSO is responsible for verifying that personnel comply with this procedure and are trained in the use of alpha/beta sample counters described in this procedure.

7.3 Radiological Field Supervisor (RFS) – During field assignments, the RFS is responsible for ensuring that this procedure is implemented. When the RSO is not on site, the RFS will act as the RSO's duly authorized representative for radiological issues.

7.4 Health Physics Technicians (HPT) – The HPT using alpha/beta sample counters are responsible for knowing and complying with this procedure.

8.0 OPERATION

8.1 Instrument Inspection

8.1.1 Before each use, perform the following checks:

8.1.1.1 Verify the instrument has a current calibration label.

8.1.1.2 Visually inspect the instrument for physical damage or defects.

8.1.2 Remove and tag the instrument "Out of Service" if it fails any of the criteria in Step 8.1.1.1 through 8.1.1.2 and notify the RSO or his duly authorized representative.

NOTE: Any defects, damages or other physical abnormalities require that the instrument be removed from service and the RSO or his duly authorized representative be notified.

8.2 Initial Startup.

8.2.1 Turn high voltage potentiometer to its lowest position (fully counterclockwise).

8.2.2 Turn instrument on.

8.2.3 The operator can select one of four operational procedures depending on the function to be performed. Before performing any of the following complete steps 8.1.1 to 8.1.2.

a) Plateau Curve – The Plateau Curve is used to find the proper operating voltage of the instrument and will be performed at the discretion of the RSO or duly authorized representative. This test shall be documented on the attached Form OP-021-01 or equivalent.

b) Chi–square Test – The Chi-Square Test will be performed at the discretion of the RSO or duly authorized representative in order to test the operational adequacy of the instrument and will be recorded on Form OP-021-02. This test statistically evaluates the sample counter against a poisson distribution.

c) Daily Calibration Check – This portion of the procedure is performed before samples are counted on any day the instrument is in use.

8.3 Plateau Curve

NOTE: Before beginning, record the previous calibration high voltage values.

8.3.1 Set up the instrument in a low background area.

8.3.2 Rotate the high voltage potentiometer slowly clockwise until the meter indicates proper voltage. This proper voltage is approximately 500 volts.

8.3.3 Set time multiplier switch to “x1.”

8.3.4 Set the instrument-preset timer to one (1) minute.

8.3.5 Insert an alpha calibration standard into the center of the sample tray, slide the sample tray under the detector and depress the “COUNT” button to obtain a one minute count.

8.3.6 Upon completion of the count, record high voltage reading and digital counts appearing in the instrument alpha display in the indicated columns on Form OP-021-01(Plateau Data Sheet)

8.3.7 Continue increasing high voltage by 50-volt increments, as described above, obtaining counts and recording data until the end of the plateau is reached. If rapid increase in count rate is observed, proceed to step 8.3.8. If not, notify the RSO or duly authorized representative.

8.3.8 Remove the alpha source and replace with a beta source.

8.3.9 Reduce high voltage reading to the voltage level chosen during Step 8.3.2 by turning potentiometer counterclockwise.

8.3.10 Perform one-minute counts at 50-volt increments and record the data on Form OP-020-01, until the end of the plateau is reached. If a rapid increase in count rate is observed reduce the high voltage.

8.3.11 Using linear graph paper or equivalent plotting system, plot alpha and beta counts on the "Y" axis and the voltage for the indicated count on the "X" axis.

8.3.12 Select an operating voltage 1/3 the distance beyond the knee of the plateau curve by marking the voltage on the graph and on the plateau data sheet.

8.3.13 Sign and date Form OP-021-01 and forward the results along with any graphs produced to the RSO or duly authorized representative for review.

8.4 Chi-Square Test

8.4.1 Set up the Instrument in a low background area.

8.4.2 Ensure the high voltage potentiometer is positioned according to the posted instrument label. Adjust if necessary.

8.4.3 Set the time multiplier switch to "x1".

8.4.4 Set the instrument-preset timer to one (1) minute.

8.4.5 Insert the alpha calibration standard into center of the sample tray, slide the sample tray under the detector and depress the "COUNT" button to obtain a one minute count.

8.4.6 Upon completion of the count, record digital counts appearing in the alpha display in the "X_i" column on Form OP-021-02 (Chi -Square Data Sheet).

8.4.7 Repeat counting sequence without changing settings until a total of 20 counts have been taken and recorded in the "X_i" column on Form OP-021-02.

8.4.8 Add the 20 counts recorded in the "X_i" column and record in the "Sum" column. Then divide by 20 to obtain the mean number of counts (X_m) and record on the line "X_m".

8.4.9 Calculate the individual count "X_i" difference from the mean (X_m) value and record in the "(X_i-X_m)" column on Form OP-021-02 for all 20 values.

8.4.10 Calculate $(X_i-X_m)^2$, sum the "$(X_i-X_m)^2$ " column, and record on Form OP-020-02.

8.4.11 Calculate the value of Chi- Square using the following formula.

$$X^2 = \frac{\sum (X_i - X_m)^2}{X_m}$$

8.4.12 The value of Chi-square should be between 8.91 and 32.8 (represents a probability between 0.025 and 0.975). Record this value at "X^2". If the Chi-square value falls outside this range, contact the RSO or duly authorized representative for further instructions.

8.4.13 Sign and date Form OP-021-02 and forward the results to the RSO or duly authorized representative for review.

8.5 Daily Calibration Check

8.5.1 Ensure the high voltage potentiometer is positioned according to the posted instrument label. Adjust, slowly, if necessary.

8.5.2 Set time multiplier switch to "x1".

8.5.3 Set the instrument-preset timer to five (5) minutes.

8.5.4 Record the source type to be used and corresponding serial number on the proper line indicated on Form OP-021-03. Use separate rows of the form for each source efficiency to be calculated.

8.5.5 Insert a blank sample into the center of the sample tray, slide the sample tray under the detector and depress the "COUNT" button to obtain a five minute background count.

8.5.6 Calculate and record the background total counts and count rate in the columns labeled "Total Counts" and "BKG CPM" respectively, under Background Information on Form OP-021-03. The background count rate in CPM (counts per minute) can be calculated as follows:

$$CPM = \frac{\text{Total Counts}}{\text{Total Time}}$$

8.5.7 Remove the blank sample and insert the alpha or beta calibration standard into the center of the sample tray, slide the sample tray under the detector and depress the “COUNT” button to obtain a five minute count.

8.5.8 Upon completion of the measurement, calculate and record the total counts and count rate in the columns labeled “Total Counts” and “CPM” respectively, under Source Information on Form OP-021-03. The count rate (CPM) can be calculated as listed in Step 8.5.6.

8.5.9 Calculate Net Source CPM as below and record on Form OP-021-03 under “Net CPM”.

Net Source CPM = CPM – BKG CPM

NOTE: Obtain activity (DPM) value from the source certification paperwork. Decay correct activity, if needed.

8.5.10 Use the source disintegration per minute (DPM) to calculate the efficiency as shown below and record as a decimal on Form OP-021-03.

$$\%\ Efficiency = \frac{Net\ Source\ CPM}{DPM} * 100$$

8.5.11 To calculate the efficiency for the next source, remove the current source standard, insert a new source standard and repeat steps 8.5.1 through 8.5.10, as necessary.

8.5.12 Remove calibration standards and place in source holders.

8.5.13 Generate a control chart tracking the daily efficiencies and notify the RSO or duly authorized representative if any point falls outside of 2σ variance.

NOTE: For the first day on control chart use five data points to begin trend line.

9.0 QUALITY ASSURANCE/RECORDS

9.1 Quality Assurance

9.1.1 The alpha/beta sample counter will be checked for proper calibration daily with a NIST traceable source when in use.

9.1.2 Chi-square and plateau tests are verified and noted as currently valid.

9.1.3 The HPT shall ensure that the attachments are of the most current.

9.2 Records

9.2.1 Documented information shall be legible written in ink.

9.2.2 Data shall not be obliterated by erasing or using white-out. Incorrect entries shall be corrected by striking a single line across the entry. The correction shall be entered, initialed and dated.

9.2.3 The HPT shall review completed attachment forms for accuracy and completeness.

9.2.4 Entries on forms must be dated and initialed by the HPT to be valid.

9.2.5 The RSO or duly authorized representative shall review any applicable completed forms. The review shall be for accuracy and completeness.

10.0 ATTACHMENTS

- OP-021-01 Plateau Data Sheet
- OP-021-02 Chi–Square Data Sheet
- OP-021-03 Daily Calibration Check

OP-021-01

Plateau Data Sheet

Date:_____ Recommended Operating Voltage:_____

Instrument:_____ Serial Number:_____

Alpha Source Serial No._____ Activity (dpm)_____

Beta Source Serial No._____ Activity (dpm)_____

Voltage Setting	Alpha Counts	Voltage Setting	Alpha Counts	Voltage Setting	Beta Counts	Voltage Setting	Beta Counts

Prepared By:_____ Date:_____
Print/Sign

Reviewed By:_____ Date:_____
Print/Sign

OP-021-02

Chi-Square Data Sheet

Date:_____Instrument:_____Serial Number:_____ X^2_____

Alpha Source No./Activity:_____Beta Source No./Activity:_____

Count Number	X_i	(X_i-X_m)	$(X_i-X_m)^2$
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
Sum		\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	
X_m		\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\

Prepared By: _____ Date: _____
Print/Sign

Reviewed By: _____ Date: _____
Print/Sign

OP-021-03

Daily Calibration Check

Instrument_____ Serial No._____

Alpha Source No./Activity_____ Beta Source No./Activity_____

Background Information				Source Information				
Date/Time	**Total Time**	**Total Counts**	**BKG CPM**	**Total Time**	**Total Counts**	**CPM**	**Net CPM**	**% Eff.**

Prepared By: _____ Date: _____
Print/Sign

Reviewed By: _____ Date: _____
Print/Sign

1.0 PURPOSE

This procedure provides the methods for operating ion chamber instruments for dose rate surveys. Adherence to this procedure will provide reasonable assurance that the radiological surveys performed have reproducible results.

2.0 APPLICABILITY

This procedure will be used by Cabrera Services, Inc. (CABRERA) CABRERA personnel to operate Ionization chambers during dose rate surveys.

3.0 PRECAUTIONS, LIMITATIONS, AND REQUIREMENTS

3.1 Precautions

3.1.1 During surveys, exercise care not to puncture the thin Mylar window.

3.1.2 If any instrument inconsistencies are observed (e.g., unusually high or low background readings, source checks outside the acceptable range, etc.), remove the instrument from use, label it "OUT OF SERVICE" and report the condition to the RSO.

3.2 Limitations

Not Applicable

3.3 Requirements

3.3.1 Calibration sources shall be traceable to the National Institutes of Science and Technology (NIST).

3.3.2 Survey instrument calibrations shall be performed by a NRC or Agreement State recognized and licensed calibration facility.

3.3.3 A battery check, general observation of instrument condition and source check shall be performed each day before instrument use and daily following work activities as a final verification.

4.0 REFERENCES

- RSP Radiation Safety Program
- ALARA ALARA Program
- AP-001 Record Retention
- OP-001 Radiological Surveys
- OP-009 Use and Control of Radioactive Check Sources
- NUREG-1556 Consolidated Guidance About Material Licenses (Vol.11)

5.0 DEFINITIONS AND ABBREVIATIONS

5.1 Restricted Area – An area to which access is controlled to protect individuals against undue risks from exposure to radiation and radioactive materials.

5.2 Radiation Area - Any area accessible to personnel where dose rate levels from ionizing radiation are such that an individual could receive a deep dose equivalent in excess of 5 mrem in one hour at 30 centimeters from the radiation source or from any surface that the radiation penetrates.

5.3 Dose – The deposition of energy in matter. Equivalent to the radiation dose times the quality factor for the type of radiation.

5.4 Quality Factor – The factor, which is radiation dependent and identifies the relative biological effectiveness of a radiation type and energy. The quality factor is multiplied times the Dose to yield the Dose Equivalent.

5.5 TEDE – The Total Effective Dose Equivalent – The sum of the Deep Dose Equivalent (external dose) and the Committed Effective Dose Equivalent (internal dose).

5.6 CDE – Committed Dose Equivalent – The dose equivalent to organs or tissues that will be received from an intake of radioactive material by an individual during the 50-year period following the intake.

5.7 CEDE – Committed Effective Dose Equivalent – The sum of the products of all organs or tissues with CDE and their respective weighting factors.

5.8 SDE – Shallow Dose Equivalent – Applies to the skin and to any extremity, it is used for external radiation which cause primary energy deposition in the first 0.007 cm of tissue averaged over one square centimeter.

5.9 EDE- Eye Dose Equivalent – The dose delivered to a thickness of tissue 300 mg/cm^2 by external radiation.

5.10 DDE – Deep Dose Equivalent – The dose equivalent delivered by external radiation to tissues deeper than 1 centimeter.

5.11 Daily calibration – A determination of alpha and beta sample counting efficiency by counting National Institute of Standard Technologies (NIST) radioactive standards.

6.0 EQUIPMENT

Ludlum model 9 Ionization Chamber or equivalent

7.0 RESPONSIBILITIES

7.1 Project Manager (PM) – the PM is responsible for ensuring that personnel assigned the task of operating ionization chambers are familiar with this procedure, adequately trained in the use of this procedure, and have access to a copy of this procedure.

7.2 Radiation Safety Officer (RSO) – The RSO is responsible for verifying that personnel comply with this procedure and are trained in the use of ionization chambers described in this procedure.

7.3 Radiological Field Supervisor (RFS) – During field assignments, the RFS is responsible for ensuring that this procedure is implemented. When the RSO is not on site, the RFS will act as the RSO's duly authorized representative for radiological issues.

7.4 Health Physics Technicians (HPT) – The HPT using ionization chamber survey meters are responsible for knowing and complying with this procedure.

8.0 OPERATION

8.1 Instrument Inspection

8.1.1 Select the ion chamber to be used in the survey.

8.1.2 Before each use, perform the following checks:

8.1.2.1 Verify the instrument has a current calibration label.

8.1.2.2 Visually inspect the instrument for physical damage or defects.

8.1.2.3 Position the meter switch to "BAT". Check to see that the needle falls within the "Bat Test" check-band.

- If the needle falls below the "Bat Test" check-band, install new battery(s).
- If the needle still falls outside the "Bat Test" check-band after the installation of new battery(s), tag the instrument "Out of Service" and notify the RSO or duly authorized representative.

8.1.3 Remove and tag the instrument "Out of Service" if it fails any of the criteria in Step 8.1.2.1 through 8.1.2.3 and notify the RSO or duly authorized representative.

NOTE: Any defects, damages or other physical abnormalities require that the instrument be removed from service and the RSO or duly authorized representative be notified.

8.2 Pre-operation of instrument

8.2.1 Position the meter fast/slow ("F/S") switch to "S".

8.2.2 Position the meter switch to the appropriate range scale.

8.2.3 Obtain an OP-020-01 Form.

8.2.4 If a Quality Control (Q.C.) acceptance range has not already been calculated on the OP-020-01 Form, then follow the instructions below, other wise proceed to step 8.2.6.

8.2.5 Enter the QC check source, probe, and meter numbers on Form OP-020-01.

8.2.5.1 Ensure the source and detector are in a reproducible geometry, which will be used each time this check is performed.

8.2.5.2 Obtain ten separate measurements in a low background area.

8.2.5.3 Calculate the average of the ten measurements by adding the measurements and dividing the sum by ten.

8.2.5.4 Multiply the average measurement value established in 8.2.5.3 by 0.8 and record on Form OP-020-01 as the lower QC acceptance range.

8.2.5.5 Multiply the average measurement value established in 8.2.5.3 by 1.2 and record on Form OP-020-01 as the upper QC acceptance range.

8.2.6 Place the QC check source and detector in the proper geometry established for QC check.

8.2.7 Allow the instrument reading to stabilize (approximately 30 seconds). Compare the reading to the response check criteria on Form OP-020-01. If the response reading falls outside of the acceptance range, note Fail on Form OP-020-01, tag the instrument "Out of Service" and notify the RSO or duly authorized representative. If the reading falls inside the acceptance range, note Pass on Form OP-020-01; the instrument is ready for performing surveys.

8.3 Operation of Instrument

8.3.1 Gamma Survey Techniques

8.3.1.1 Switch the audio toggle switch to the "ON" position.

8.3.1.2 Ensure the beta shield is covering the Mylar window.

8.3.1.3 When entering a radiation area of unknown radiation levels turn the range selector switch to the highest scale or the highest scale for the dose rate expected. Rotate the range selector switch downscale until an upscale meter needle deflection is observed.

8.3.1.4 When obtaining a gamma exposure rate place the entire detector volume in and perpendicular to the radiation field.

8.3.1.5 Gamma exposure rates are obtained in the area where a worker will be located during work activities. If only a position of the workers body will be exposed to the field, the highest exposure rate will be used to determine working time.

8.3.1.6 Gamma exposure rates on waste packages are obtained by placing the centerline of the detector at the indicated distance from the package and perpendicular to the radiation field.

8.3.1.7 Record the highest meter indication in mR/hr and its location on the forms provided in procedure OP-001.

8.3.2 Survey techniques for Lens of Eye Dose

For lens of eye equivalent doses, record the dose for the beta shield in the closed configuration if the shield is 300 mg/cm^2 thick or less. If the beta shield is greater than 300 mg/cm^2, then conservatively use the beta shield in the open configuration to record equivalent dose for the lens of the eye.

8.3.3 Beta Survey Technique

Caution: The window area of the detector is covered with a 7 mg/cm^2 aluminized Mylar covering and can be easily punctured. Avoid protruding fragments that might puncture the detector face.

8.3.3.1 When a higher reading is obtained with the beta shield open compared with the beta shield closed, this indicates the presence of beta radiation.

8.3.3.2 To obtain the beta dose first obtain a reading with the beta shield closed (CW) as described in Section 8.3.1. Next, obtain a reading with the beta shield open (OW) at the same location holding the meter in the same configuration.

8.3.3.3 Determine the beta dose using the following formula:

$$\text{True } \beta \text{ Dose} = (OW - CW) \times BCF$$

Where: OW = Open Window reading (beta shield open)

CW = Closed Window reading (beta shield closed)

BCF = Beta Correction Factor (5 for reading taken at 4 centimeters - use with caution this is isotope dependent)

8.3.3.4 Beta dose rates to the skin or lens of the eye are obtained in the area where workers will be located during work activities. If only a portion of the workers body will be exposed to the field, the highest exposure rate will be used to determine working time.

8.3.3.5 Beta dose rates to the skin are obtained by obtaining measurement at 4 centimeters from the surface contacted by the worker.

8.3.3.6 Record the beta dose rates in mrad/hr (β) and location on the forms provided in procedure OP-001.

9.0 QUALITY ASSURANCE/RECORDS

9.1 Quality Assurance

9.1.1 The health physics technician performing the survey shall ensure that this procedure is current.

9.2 Records

9.2.1 Documented information shall be legibly written in ink.

9.2.2 Data shall not be obliterated by erasing, using white-out, or by any other means. Incorrect entries shall be corrected by striking a single line across the entry. The correction shall be entered, initialed, and dated.

9.2.3 The HPT shall ensure that the attachments are of the most current.

9.2.4 The HPT shall review completed attachment forms for accuracy and completeness.

9.2.5 Entries on forms must be dated and initialed by the HPT to be valid.

9.2.6 The RSO or duly authorized representative shall review any applicable completed forms. The review shall be for accuracy and completeness.

10.0 ATTACHMENTS

None