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# REMEDIAL ACTION OPERATIONS PLAN

## INHIBITED RED FUMING NITRIC ACID (IRFNA) DISPOSAL SITE (SEAD-13)
## SENECA ARMY DEPOT ACTIVITY, ROMULUS, NEW YORK

**Prepared for:**

**U.S. ARMY CORPS OF ENGINEERS, ENGINEERING AND SUPPORT CENTER**

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**and**

**SENECA ARMY DEPOT ACTIVITY**

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**Contract Number W912DY-08-D-0003**
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## TABLE OF CONTENTS

## LIST OF FIGURES



## LIST OF TABLES

# 1.0 INTRODUCTION

This Remedial Action Operations Plan (RAOP) presents and describes the objectives and details of the implementation of the remedy detailed in the *Final Record of Decision For Seventeen SWMU Requiring Land Use Controls (SEADs 13, 39, 40, 41, 43/56/69, 44A, 44B, 52, 62, 64B, 64C, 64D, 67, 122B, and 122E), Seneca Army Depot Activity* (Parsons, 2007) (ROD) for the Inhibited Red Fuming Nitric Acid (IRFNA) Disposal Site (SEAD-13) located at the former Seneca Army Depot Activity (SEDA or the Depot), in Seneca County, New York. The remedy for SEAD-13 is No Action (NA) combined with the implementation of a Land Use Control (LUC) in the form of a groundwater use/access restriction for the geographical area of SEAD-13 until concentrations of hazardous substances in the groundwater have been reduced to levels that allow for unlimited exposure and unrestricted use of the groundwater. This RAOP has been prepared to (1) describe the decommissioning procedures for the monitoring wells presently located at SEAD-13 and to (2) supplement the Land Use Control Remedial Design (LUC RD) Addendum 2 as part of the implementation of the remedy prescribed in the ROD. This RAOP includes a summary of the approved remedy in the ROD, a summary of historic site conditions as was presented in the ROD, the well abandonment plan, and the final reporting requirement.

This RAOP has been prepared for the US Army, Seneca Army Depot Activity, and the U.S. Army Corps of Engineers under Contract No. W912DY-08-D-0003, Task Order No. 2. The Seneca Army Depot Activity is identified as USEPA CERCLIS Site No.: NY0213820830 and New York Inactive Waste Site No.: 8-50-006.

## 1.1 Background

SEDA lies between Cayuga and Seneca Lakes in New York's Finger Lake Region, in the communities of Romulus and Varick, NY as shown on **Figure 1-1**. The SEAD-13 disposal site is located in the northeastern portion of SEDA as shown in **Figure 1-2** and comprises approximately 3 acres of the 10,587 acres of land that once comprised the SEDA. SEAD-13 includes two IRFNA disposal areas, SEAD-13 East and SEAD-13 West, located on the eastern and western sides of the south end of the Duck Pond, respectively, near the entrance of its source tributary. The ground surface for both areas is less than 2 feet higher than the water level of the Duck Pond. SEAD-13 East is bound by mostly deciduous trees and the East-West Baseline Road to the north, by deciduous trees and grassland to the east and south, and by the Duck Pond to the west. SEAD-13 West is bound by grassland and low brush to the north, west and south, and by the Duck Pond to the east. The extension of East-West Baseline Road is located approximately 100 feet north of the western area of SEAD-13 West.

## 1.2 Historic Operations

Historically, SEAD-13 was used during the early 1960s to dispose of unserviceable IRFNA, an oxidizer used in missile liquid propellant systems. It was originally thought that both areas (e.g., SEAD-13 East and SEAD-13 West) had disposal pits but information recorded during the geophysical survey performed in 1993/1994 indicated that SEAD-13 East was the only area that contained disposal pits,

with six (possibly seven) elongated pits being observed. The pits were each generally 20 to 30 feet (ft.) long, oriented east to west and marked by sparse vegetation, crushed shale, and 1-inch limestone pieces at the surface. The SEAD-13 West area exhibited no visible evidence of disposal pits at the surface as found at SEAD-13 East; however, there was an area within SEAD-13 West that was characterized by sparse vegetation and some crushed shale.

During the operation of the disposal sites, the pits were utilized as a neutralization area for the unserviceable IRFNA. Barrels of unserviceable IRFNA were brought to the site from other locations within the Depot, and were temporarily staged on pallets near the disposal pits. Each barrel of unserviceable IRFNA was emptied through a water pressure powered stainless steel ejector that was fitted onto one barrel at a time while water was flowing through the ejector. The mixture of IRFNA and water was then discharged to the disposal pit through a long polyethylene hose that discharged beneath the surface of the pit being used. The discharged IRFNA/water solution mixed with the limestone in the pit to facilitate the neutralization of the acid. Ten barrels were typically discharged into each pit during one day of operation.

## 1.3 Geology

SEDA is located within one 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 only a few feet thick. This 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 SEAD 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.

## 1.4 Hydrogeology

The saturated thickness of the till/weathered shale overburden aquifer ranges between 1 and 8.5 feet below the 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 begins increasing. Depth to groundwater, which varies by season and location, ranges from 1 foot to 10 feet bgs.

The geophysical survey performed at SEAD-13 indicated that groundwater flows west on the east side of the pond and east on the west side of the pond (i.e., groundwater discharges directly into Duck Pond). The groundwater flow direction based on the groundwater data collected during the April 2002 sampling event at SEAD-13 is presented on **Figure 1-3** and shows the presumed direction of groundwater flow is to the west for SEAD-13-East.

All groundwater in the State of New York, including that underlying SEAD-13, is classified as Class GA, which designates its best use as a suitable source for drinking water. Most shallow groundwater

samples collected from the shallow aquifer at the former Depot including SEAD-13 contain entrained soil particles that may contribute to elevated concentrations of selected metals and minerals found in unfiltered water samples.

Surface drainage from SEDA flows to four primary creeks and as well as several lesser creeks. In the southern portion of the Depot, the surface drainage flows through man made drainage ditches and streams into Indian and Silver Creeks. These creeks then 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. 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 known as Duck Pond drains into Kendig Creek and then flows north into the Cayuga-Seneca Canal and to Cayuga Lake.

### 1.5 Soil Investigation and Analytical Results Summary

Five soil borings were advanced within each of the two reported disposal areas (East and West) for a total of ten borings during the 1993 ESI. Three samples were collected from each boring (one surface soil sample and two subsurface samples) and submitted for analytical analysis. A supplemental investigation was conducted at SEAD-13 in August 2001. The investigation included the drilling of four new soil borings (SB13-11, SB13-12, SB13-13, and SB13-14), and the collection of surface soil samples. Two samples were collected from each of the 2001 borings (one surface and one subsurface) and submitted for analytical analysis. In addition to the borings, seven more surface soil samples were collected at other locations through out the site.

The soil samples from the 1993 and 2001 investigations 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 explosives, herbicides, nitrates, and fluoride.

The soil samples were analyzed for nitrate/nitrite nitrogen and fluoride, which were considered indicator compounds based on the types of materials disposed at SEAD-13. Nitrate/nitrite-nitrogen concentrations ranged from 0.02 mg/kg to 176 mg/kg, with the highest concentration found in subsurface soils located in the central portion of SEAD-13-East. The nitrate/nitrite nitrogen concentrations found in the soil are likely the source of the nitrates detected in the groundwater at SEAD-13 East, as discussed in **Section 1.6**.

The soil data are presented in the Final Decision Document, Mini Risk Assessment, SEAD-13, Inhibited Red Fuming Nitric Acid Disposal Area, Seneca Army Depot Activity, Romulus, New York Decision (Parsons, 2004) and a summary is included in the ROD (Parsons, 2007). Based on the chemical concentrations, the low frequency of detections, and the baseline human health risk assessment, contaminants of concern (COC) were not identified in soils, and soil is not a media of concern.

## 1.6 Groundwater Investigation and Analytical Results Summary

Seven monitoring wells were installed at SEAD-13 during the ESI in 1993. Four wells (MW13-1, MW13-2, MW13-3, and MW13-7) were installed in SEAD-13 East. Well MW13-1 is located upgradient of the disposal area; well MW13-2 is located within the disposal area; and wells MW13-3 and MW13-7 are installed near the downgradient edge of the disposal area. Three wells (MW13-4, MW13-5, and MW13-6) were installed in SEAD-13 West. The three wells were installed on the west side to investigate rumors that a disposal area had once been located on the west side. The Army investigated the assumed west disposal area due to the presence of the aboveground piping which apparently was installed in the event that it might be required at a later date. The locations of the groundwater monitoring wells are shown on **Figure 1-4**.

During the ESI, groundwater samples were collected from only five wells of the seven wells since two of the wells (MW13-3, and MW13-7) were dry at the time of sampling. Sample were collected using a high-flow sampling method, and they were analyzed for VOCs, SVOCs, pesticides/PCBs, metals, cyanide, herbicides, nitrate/nitrite-nitrogen, and fluoride.

Four additional monitoring wells were installed during the 2001 Supplemental Investigation and are shown on **Figure 1-4**. Three wells (MW13-9, MW13-10, and MW13-11) were installed in SEAD-13 East and one well (MW13-12) was installed SEAD-13 West. Well MW13-11 is located along the downgradient edge of the high conductivity area detected during the geophysical survey and was also located to replace wells MW13-3 and MW13-7 since they have been consistently dry. Well MW13-11 is located north of wells MW13-3 and MW13-7.

Two rounds of groundwater sampling were conducted in 2001 and 2002 once the four new wells were installed. Only nine of the 11 wells were sampled because two of the wells (MW13-3 and MW13-7) were dry for both events. Groundwater samples were collected in 2001 and 2002 were sampled using a low-flow sampling method. Samples were analyzed for SVOCs, metals, cyanide and nitrates. A summary of the results are provided below.

VOCs, PCBs, herbicides, and nitroaromatics were not detected in the groundwater samples collected from SEAD-13 during the ESI sampling.

One SVOC, bis(2-ethylhexyl)phthalate was detected in the groundwater during the ESI investigation. Five SVOCs (2-methylnaphthalene, bis (2-ethylhexyl) phthalate, butylbenzylphthalate, diethyl phthalate, and pyrene) were detected in the groundwater samples collected during the 2001 and 2002 sampling events. Only one SVOC, bis(2-ethylhexyl)phthalate exceeded the NYSDEC Ambient Water Quality Class GA Standards. This phthalate is a common laboratory contaminant and can be potentially attributed to the laboratory and not to site conditions.

During the 2001 sampling round, nine metals (aluminum, arsenic, chromium, iron, lead, magnesium, manganese, nickel, and sodium) were found in the groundwater samples at concentrations above their respective Class GA standards. Seven metals (aluminum, antimony, iron, magnesium, manganese, selenium, and sodium) were found in the groundwater samples from the 2002 sampling round at concentrations above their respective GA standards.

A review of the data indicates that the elevated metals concentrations appear to correlate with the higher turbidity levels. The turbidity in the samples collected in 2001 was elevated, with a maximum turbidity level reading of 999 Nephelometric Turbidity Units (NTUs). Elevated metal concentrations for chromium, iron, magnesium, and manganese were detected during the 2001 sampling round when turbidity was high. Meanwhile the turbidity readings for the groundwater samples collected in 2002 were low, ranging in from 1.25 to 13.7 NTUs and showed a significant decrease in concentrations detected in the groundwater samples although concentrations still exceeded the Class GA standards. In general, it appears that the metals results are significantly lower when turbidity values are lower.

The groundwater samples were also analyzed for nitrate/nitrite, nitrate, nitrite and fluoride, which were considered indicator compounds based on the types of materials disposed at SEAD-13. Groundwater samples collected from the four monitoring wells located in SEAD-13 West had concentrations of nitrate/nitrite (expressed as nitrogen (N)) and nitrate (expressed as N) significantly below the respective GA standard of 10 mg/L for each. The nitrite (expressed as N) concentrations detected in the groundwater samples from SEAD-13 West were all below the Class GA standard of 1 mg/L. Fluoride concentrations were also below the Class GA standard of 1.5 mg/L.

Groundwater samples collected from four of the five monitoring wells located in SEAD-13 East had concentrations of nitrate/nitrite (expressed as N) and nitrate (expressed as N) above the respective GA standard of 10 mg/L for each. The nitrite (expressed as N) concentrations found in the groundwater samples collected from SEAD-13 East were below the criteria value of 1 mg/L, except for concentrations at MW13-11 and MW13-14, which were slightly above the Class GA standard.

## 1.7 Surface Water and Sediment Investigation and Analytical Results Summary

Sediment and surface water sample sets were collected from within the Duck Pond in 1993 to assess the potential impact of the IRFNA disposal pits on adjacent surface water bodies. The locations were selected based on stressed vegetation and proximity to the pits and were tested for VOCs, SVOCs, explosives, pesticides/PCBs, herbicides, metals, cyanide, fluoride, and nitrate/nitrite-nitrogen.

Surface water samples (SW13-7, SW13-8, and SW13–9) were collected upgradient of SEAD-13 in January 2000. The samples collected in January 2000 were only analyzed for aluminum, pH, turbidity, and specific conductivity. No sediment samples were collected during this time.

In 2001, surface water samples were collected at five of the six surface sample locations adjacent to SEAD-13 (SW13-1, SW13-2, SW13-3, SW13-4, and SW13-5). Sediment samples were collected with the surface water samples from all locations (SD13-1, SD13-2, SD13-3, SD13-4, SD13-5, and SD13-6). The surface water and sediment samples were analyzed for SVOCs, metals, cyanide, and nitrate/nitrite-nitrogen.

Nitrate/nitrite-nitrogen was detected in six out of nine of the surface water samples at SEAD-13, with the maximum concentration (0.11 J mg/L) found in sample SW13-5 located near the point of groundwater discharge to Duck Pond. In the sediment samples nitrate/nitrite-nitrogen was detected in seven of the ten sediment samples with the maximum concentration (6.4 mg/kg) found in sample SD13-6.

## 1.8 Purpose

The selected remedy for SEAD-13, as presented and approved in the Final ROD, consists of a LUC that will be implemented, inspected, maintained, reported, and enforced until the concentrations of hazardous substances remaining in groundwater will allow for the unlimited exposure and unrestricted use of the site.

The groundwater use/access restriction for SEAD-13 is intended to eliminate human contact with groundwater, thereby reducing risk to within acceptable levels for potential human receptors. The risk is associated with the use of the groundwater at SEAD-13, driven by the concentrations of nitrate, aluminum, and manganese. However, the risk from the presence of metals is presumed to be associated with the suspended solids contained in the collected groundwater samples and not from the groundwater itself. Chemical analysis of surface water in the Duck Pond indicated that the nitrate/nitrite-nitrogen concentrations are below the levels established for drinking water sources nationally and within the State of New York.

The LUC is to be implemented over the geographic area of SEAD-13 to prohibit access to or use of the groundwater. This restriction will remain in effect until the concentrations of hazardous substances in groundwater beneath the AOC have been reduced to levels that allow for unlimited exposure and unrestricted use. Once groundwater cleanup standards are achieved, the groundwater the groundwater use/access restriction may be eliminated, with USEPA and State of New York approvals.

As a means to ensure that the groundwater use restriction is in place and that human contact to groundwater is eliminated, the monitoring wells currently located at SEAD-13 will be abandoned. This RAOP describes the steps required to decommission the existing monitoring wells at SEAD-13.

## 2.0 GROUNDWATER MONITORING WELL ABANDONMENT PLAN

Groundwater monitoring wells MW13-1, MW13-2, MW13-3, MW13-4, MW13-5, MW13-6, MW13-7, MW13-9, MW13-10, MW13-11, and MW13-12, listed in **Table 2-1**, will be abandoned in accordance with the procedures outlined and approved in *Monitoring Well Abandonment Work Plan, Seneca Army Depot Activity, Romulus, New York* (Parsons, 2005) and in accordance with the *Final Sampling and Analysis Plan for Seneca Army Depot Activity (SAP)* (Parsons, 2006). The decommissioning will be completed by using one of the three decommissioning methods listed in the referenced well abandonment plan: over drilling, case pulling, or grouting in-place.

## 3.0 REPORT

A Final Report shall be prepared to document the closure of the wells, any problems encountered, and the final site status.

## 4.0 REFERENCES

Parsons, 2007. Final Record of Decision For Seventeen SWMU Requiring Land Use Controls (SEADs 13, 39, 40, 41, 43/56/69, 44A, 44B, 52, 62, 64B, 64C, 64D, 67, 122B, and 122E) Seneca Army Depot Activity. March 2007.

Parsons, 2006. Sampling and Analysis Plan, Seneca Army Depot Activity, Romulus, New York. July 2006.

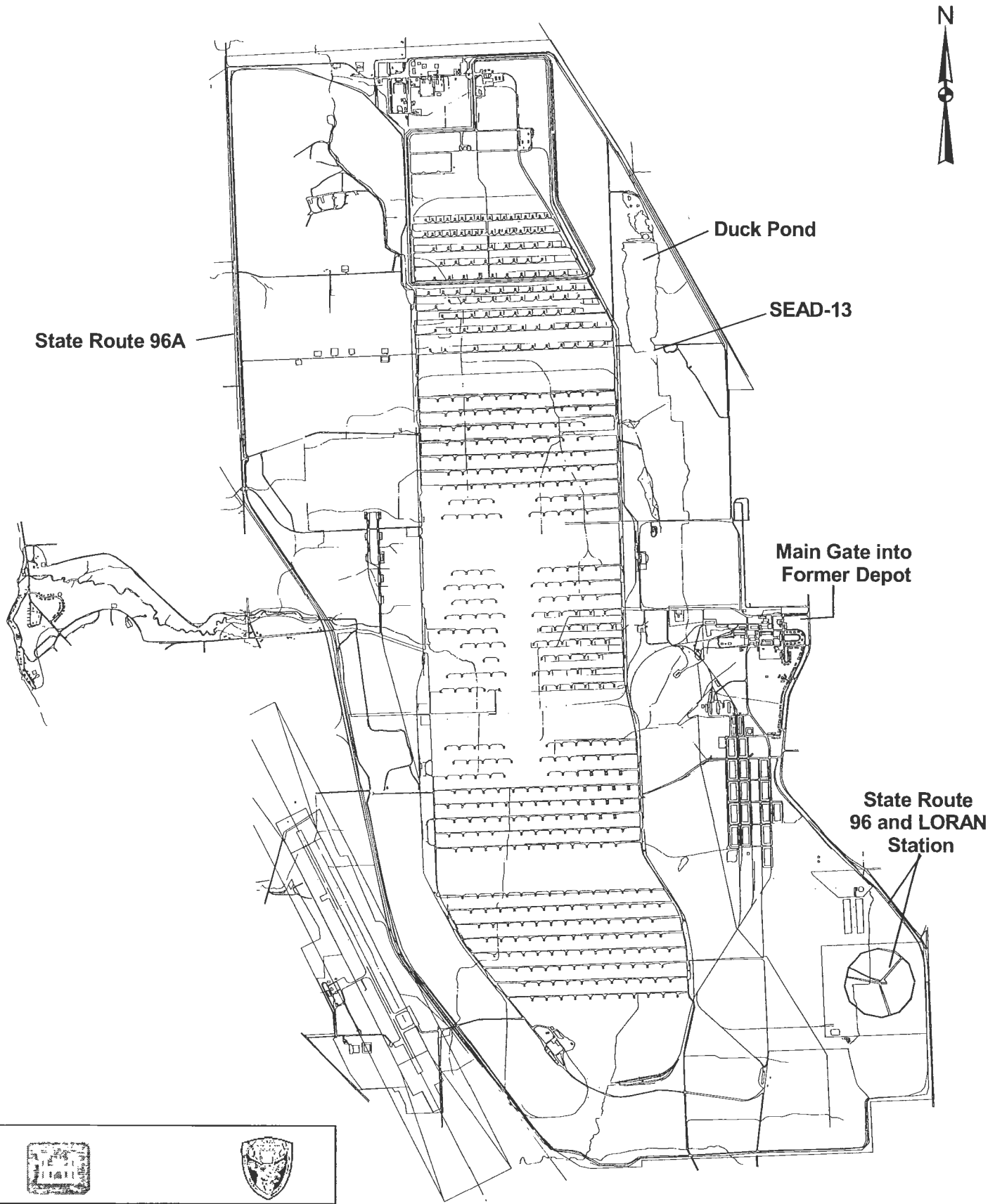
Parsons, 2005. Monitoring Well Abandonment Work Plan, Seneca Army Depot Activity, Romulus, New York. March 2005.

Parsons, 2004. Final Decision Document, Mini Risk Assessment, SEAD-13, Inhibited Red Fuming Nitric Acid Disposal Area, Seneca Army Depot Activity, Romulus, New York. July 2004.

**Table 2-1**
**Wells to be Abandoned - SEAD-13**
**Remedial Action Operations Plan (RAOP)**
**Seneca Army Depot Activity**

| Site | Well ID | Depth of Well from Ground (ft) | Construction |
|---|---|---|---|
| SEAD-13 | MW13-1 | 12 | PVC |
| SEAD-13 | MW13-2 | 16 | PVC |
| SEAD-13 | MW13-3 | 24 | PVC |
| SEAD-13 | MW13-4 | 8.5 | PVC |
| SEAD-13 | MW13-5 | 16 | PVC |
| SEAD-13 | MW13-6 | 10 | PVC |
| SEAD-13 | MW13-7 | 8 | PVC |
| SEAD-13 | MW13-9 | 15 | PVC |
| SEAD-13 | MW13-10 | 15 | PVC |
| SEAD-13 | MW13-11 | 15 | PVC |
| SEAD-13 | MW13-12 | 11.3 | PVC |
| | | **150.8** | |


ROMULUS
SENECA ARMY DEPOT ACTIVITY
Approximate Location of SEAD-13
Seneca Falls
Waterloo
Auburn
Romulus
Penn Yan
Watkins Glen
Bath
Corning
SENECA
YATES
SCHUYLER
TOMPKINS
CHEMUNG
PARSONS
SENECA ARMY DEPOT ACTIVITY
SEAD-13, IRFNA Disposal Site
REMEDIAL ACTION OPERATIONS PLAN
Figure 1-1
Location Map

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SENECA ARMY DEPOT ACTIVITY
SEAD-13 IRFNA Disposal Site
Remedial Action Operations Plan (RAOP)

Figure 1-2
SEAD-13 IRFNA Disposal Site
Location Map

March 2009

5000 0 5000 10000 Feet

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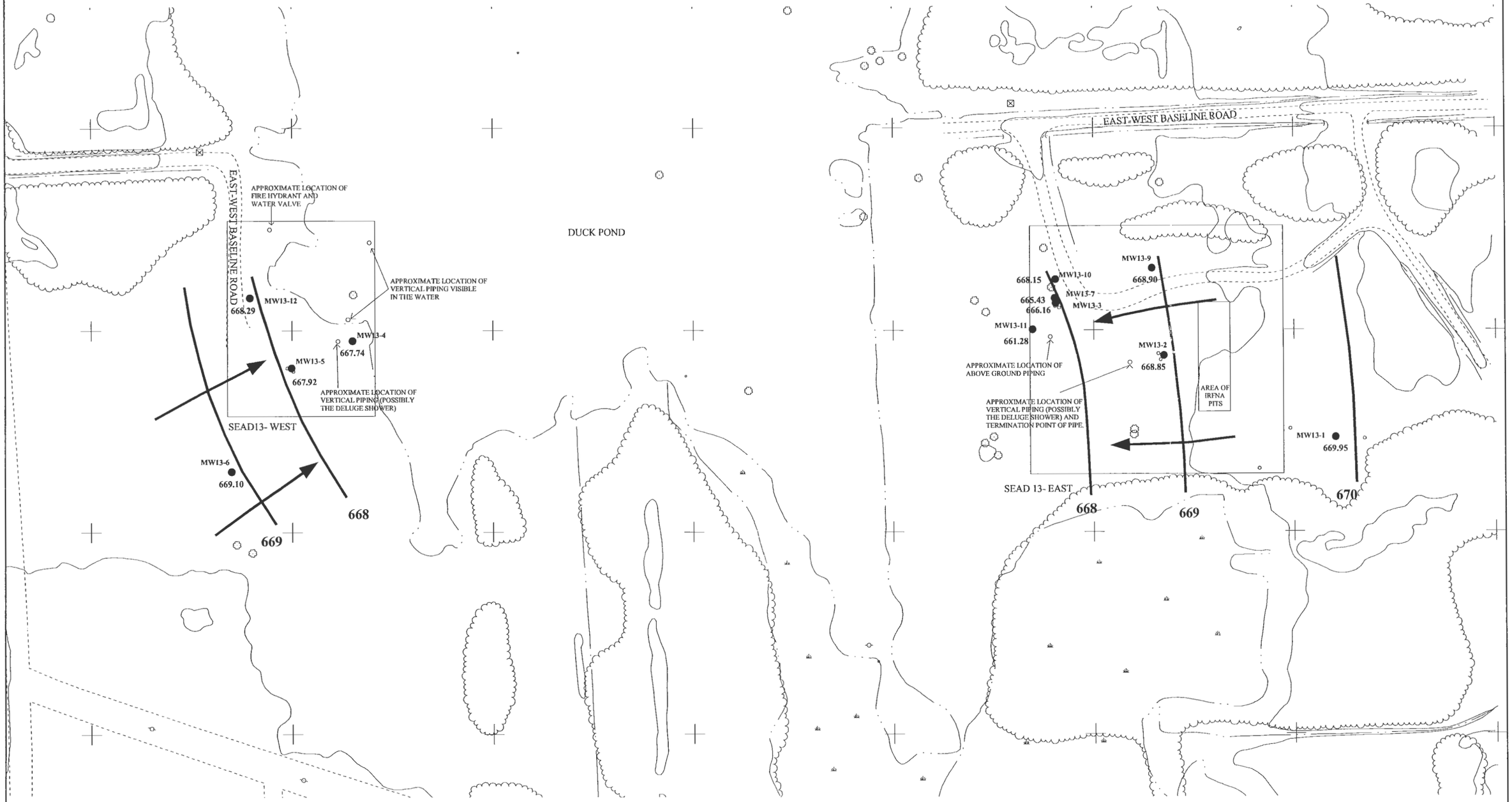


**LEGEND**

MW-13
670.00 — Monitoring Well Location wiith Water Table Elevation

670 — Groundwater elevation contour
Arrow indicates direction of flow

100 0 100 200 Feet

N

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SENECA ARMY DEPOT ACTIVITY
SEAD-13 IRNFA DISPOSAL SITE
REMEDIAL ACTION OPERATIONS PLAN (RAOP)

FIGURE 1-3
SEAD-13 IRFNA Disposal Site
Historical Groundwater Elevation Plan
April 2002

| SCALE | DATE | |
|---|---|---|
| 1:120 | MAR. 2009 | Sheet 1 of 1 |

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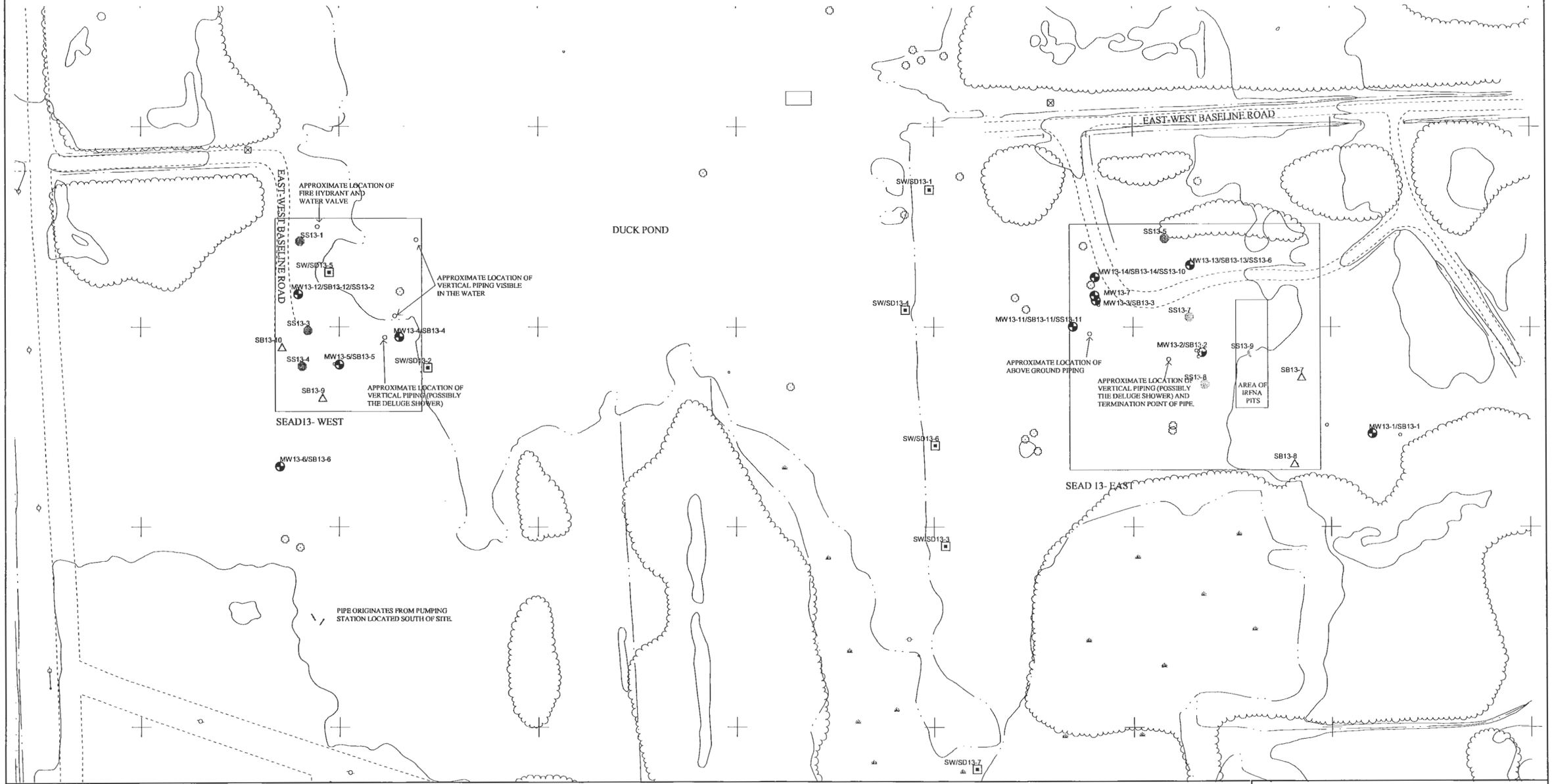


**LEGEND**

- Monitoring Well Location
- Soil Boring Location
- Surface Water/Sediment Location
- Surface Soil Location

100 0 100 200 Feet

N

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SENECA ARMY DEPOT ACTIVITY
SEAD-13 IRNFA DISPOSAL SITE
REMEDIAL ACTION OPERATIONS PLAN (RAOP)

FIGURE 1-4
SEAD-13 IRFNA Disposal Site
Historical Sampling Locations

| SCALE | DATE: | |
|---|---|---|
| 1:130 | MAR. 2009 | Sheet 1 of 1 |

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