US Army Engineering & Support Center Huntsville, AL

WELL ABANDONEMENT PLAN FOR IRFNA DISPOSAL SITE (SEAD-13)
SENECA ARMY DEPOT ACTIVITY

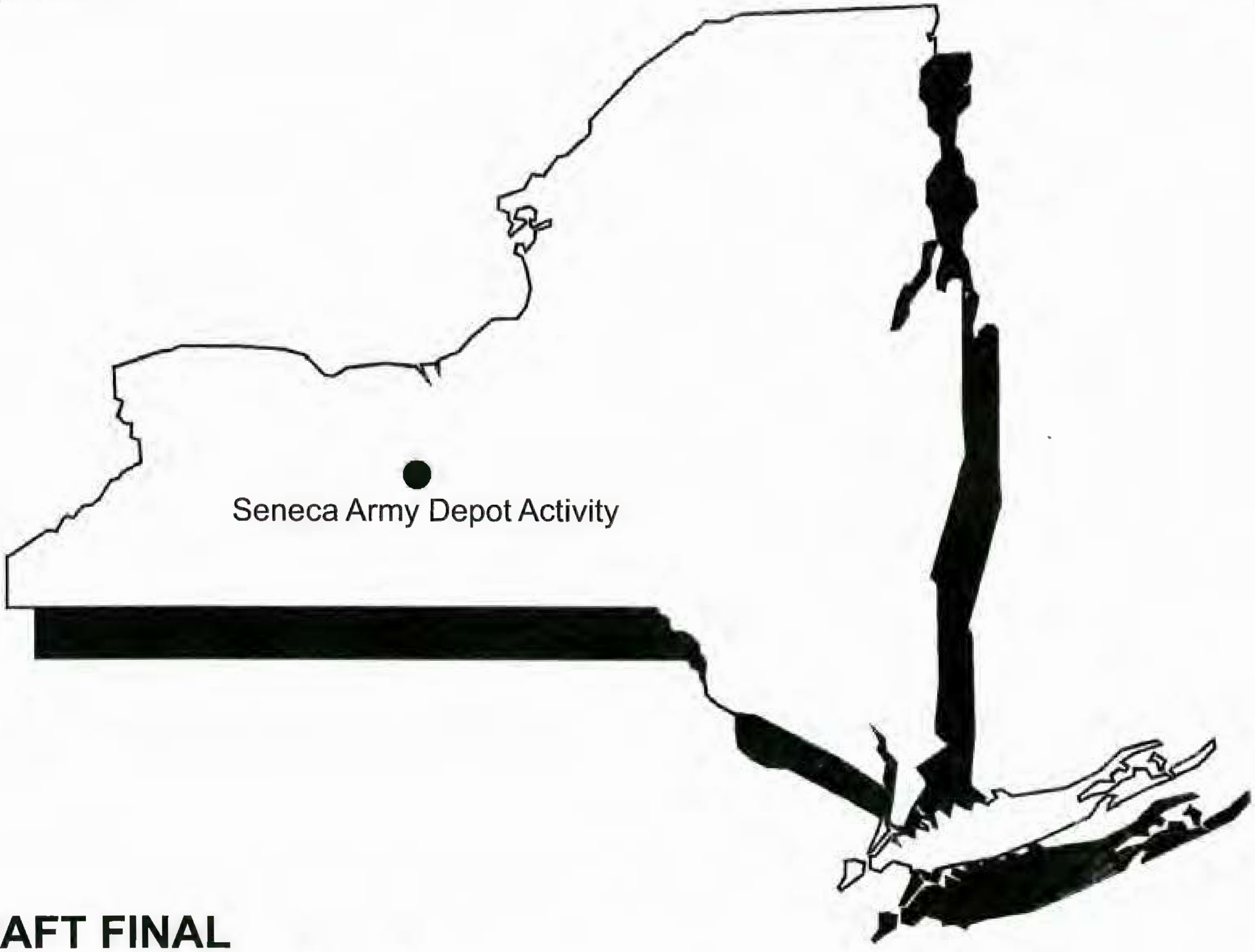
DRAFT FINAL

PARSONS

JUNE 2009

US Army, Engineering & Support Center
Huntsville, AL

Seneca Army Depot Activity
Romulus, NY



DRAFT FINAL
WELL ABANDONMENT PLAN
INHIBITED RED FUMING NITRIC ACID (IRFNA) DISPOSAL SITE (SEAD-13)
SENECA ARMY DEPOT ACTIVITY

Contract No. W912DY-08-D-0003
Task Order No. 0002
EPA Site ID# NY0213820830
NY Site ID# 8-50-006

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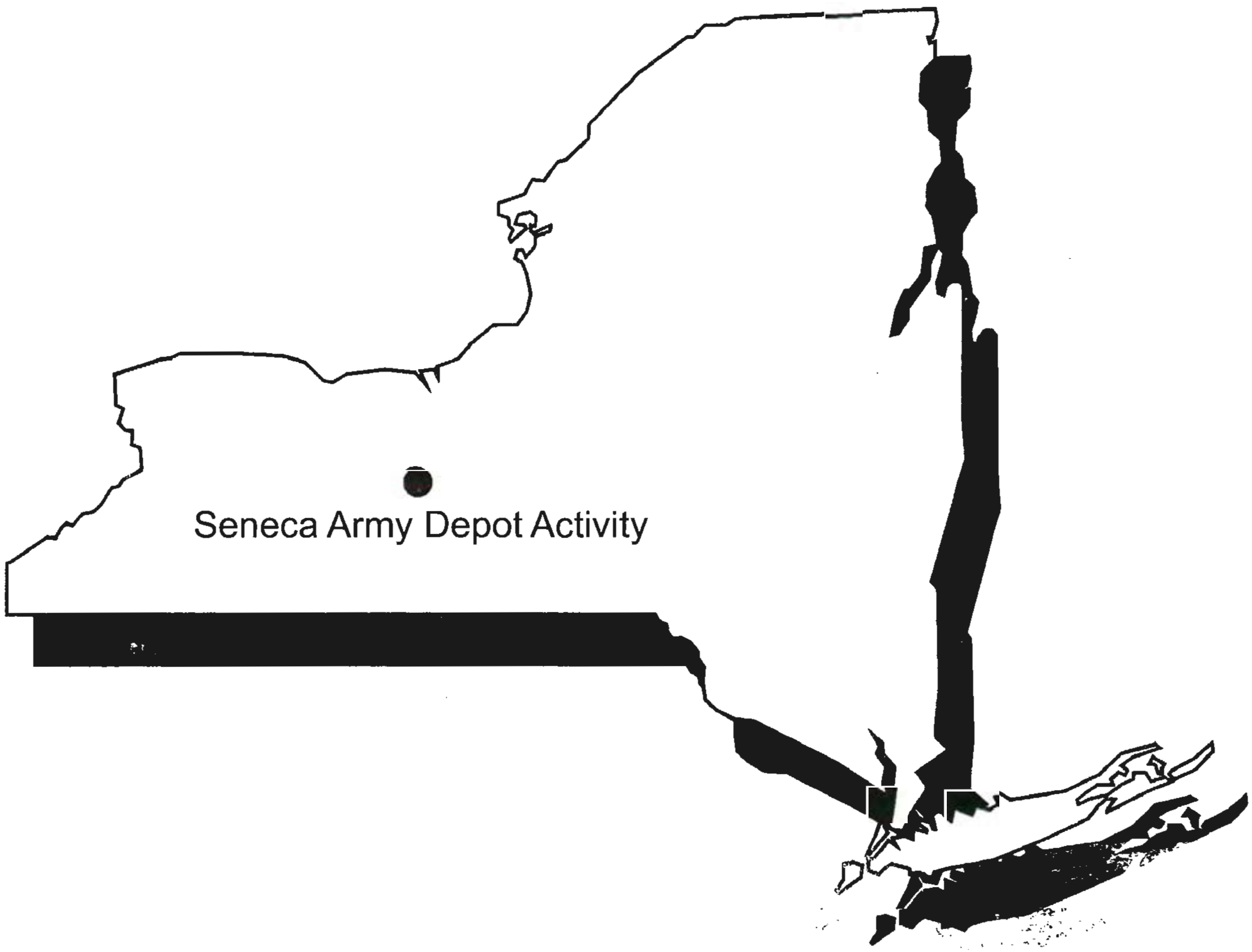

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WELL ABANDONMENT PLAN

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

HUNTSVILLE, ALABAMA

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SENECA ARMY DEPOT ACTIVITY

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Contract Number W912DY-08-D-0003
Task Order No. 0002
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June 2009

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1.0 INTRODUCTION

The remedy selected for the former Inhibited Red Fuming Nitric Acid (IRFNA) Disposal Site (SEAD-13) at the Seneca Army Depot (SEDA or the Depot) specifies the implementation, monitoring, maintenance, enforcement, and periodic documentation of a Land Use Control (LUC) that prohibits access to and use of groundwater at SEAD-13 until concentrations of hazardous substances or constituents in the groundwater have been reduced to levels that allow for unlimited exposure and unrestricted use. This remedy is documented in the *Final Record of Decision For Seventeen SWMUs 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).

The details of implementing the SEAD-13 remedy and LUC are provided in the Land Use Control Remedial Design (LUC RD) Addendum 2. The LUC RD for SEAD 27, 66, and 64A dated December 2006 was amended on April 4, 2008 to include SEADs 13, 39, 40, 41, 43/56/69, 44A, 44B, 52, 62, 64B, 64C, 64D, 67, 122B, and 122E each of which require LUCs. The LUC objective for SEAD-13, as identified in the amendment, is to prevent access or use of groundwater until cleanup levels are met. LUC RD Amendment 2 details that the LUC implementation actions at the affected sites (i.e., SEADs 13, 39, 40, 41, 43/56/69, 44A, 44B, 52, 62, 64B, 64C, 64D, 67, 122B, and 122E) may include lease restrictions, an environmental easement, deed restrictions, zoning, annual certification, and a five-year review. The annual certification will be submitted to the New York State Department of Environmental Conservation (NYSDEC) and United States Environmental Protection Agency (USEPA) to document that the LUC at SEAD-13 is unchanged and that no activities have occurred that impair or violate the ability of the LUC to protect the public health and environment. Additionally, a five-year review will be conducted to evaluate the effectiveness of the selected remedy for SEAD-13.

As a means to ensure that the groundwater access/use restriction is implemented and that human contact to affected groundwater is eliminated, the Army will abandon monitoring wells currently located in SEAD-13. The Army's decision is based on the fact that SEAD-13 is located within an area currently identified by the State of New York as a regulated freshwater wetland which will affect and probably limit any future redevelopment of the property. If a future decision is made to redevelop the land that includes SEAD-13, examination of the groundwater quality beneath SEAD-13 might be warranted if access to or use of the groundwater was desired/required. However, until such time as a potential reuse is identified and developed, access to and use of the groundwater beneath SEAD-13 is not needed. Furthermore, the available information and data for SEAD-13 demonstrates that releases that are presumed to have occurred in the 1960s have not spread to a point where they affect either areas outside of the designated SWMU or other media (i.e., adjacent surface water and sediment in the Duck Pond). Therefore, the Army believes that that the planned abandonment of the monitoring well network at SEAD-13 provides that best term mechanism for preventing access to the groundwater at the Solid Waste Management Unit (SWMU).

The balance of this document, hereafter identified as the "Well Abandonment Plan" or merely the "Plan", presents and describes the Army's plan and approach for abandoning the monitoring well network that currently exists at SEAD-13. Specific information pertinent to the environmental conditions that are present in SEAD-13 and that are associated with the wells that are scheduled to be abandoned by the Army at SEAD-13 are presented, discussed, and summarized in the following material.

It is also the Army's intention to use this document as the basis and model that will be used for the abandonment of wells at other SWMUs within the Depot where Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) decisions have been reached and recorded, and where historic monitoring wells are no longer needed. This Plan has been prepared in accordance with the procedures and recommendations provided in the NYSDEC's Draft guidance issued January 8, 2009, titled *Groundwater Monitoring Well Decommissioning Procedures*.

This Plan 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 Expanded Site Investigation (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 MW13-10, 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 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 Area of Concern (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.

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 in NYSDEC's Draft guidance document, issued January 8, 2009, titled *Groundwater Monitoring Well Decommissioning Procedures*. A tentative schedule for abandoning the SEAD-13 wells is provided in **Figure 2-1**.

2.1 Selection of Decommissioning Method

The monitoring well decommissioning will be completed using one of NYSDEC's four recommended decommissioning methods: (1) Grouting in place; (2) Perforating the casing followed by grouting in place; (3) Grouting in place followed by case pulling; and (4) Over-drilling and grouting with or without a temporary casing. NYSDEC's method selection decision chart is provided as **Figure 2-2** to aid in the determination of the abandonment method. The guidance document is included for reference in **Appendix A**. Generally, NYSDEC's preferred approach to well abandonment is grouting in place if the well seal has not been compromised; and, in cases where the well seal has been compromised, perforating the well casing and grouting the perforated well in place.

The selection of the decommissioning method will be based on field inspections of the condition of the well and a review of the geologic and hydrogeologic conditions at the site. The depths of the SEAD-13 wells are presented in **Table 2-1**. The review of the historical well data indicates that there are a number of broad similarities for all of the wells planned for decommissioning or abandonment. The lithologic properties identified around all of the wells are fairly similar, as all of them extend through two or three similar lithologic units; fill, glacial till, and/or extremely weathered shale bedrock. Other than those areas on the Depot where competent bedrock is exposed, a single distinct unit of glacial till covers the site, and all of the wells in question pass though this till. All of the wells are classified as overburden wells rather than bedrock wells. Also, none of the three lithologic units are considered a confining layer, so all of the wells are considered to have been constructed in an unconfined aquifer.

2.2 Preliminary Inspection

Prior to decommissioning a well, the condition and construction of the well will be inspected, and the available well construction information will be reviewed. The inspection of each well will ensure that they are accessible to the equipment needed in the decommissioning process and that there are no other issues (i.e. bees/wasps in the protective casing, excessive mud or standing water) that need to be resolved. Any necessary brush cutting and removal will be competed prior to the decommissioning contractor's arrival on-site. A sample inspection daily report and monitoring well field inspection log are provided as **Tables 2-2** and **2-3**, respectively.

2.3 Decommissioning Procedures

Procedures for the four preferred decommissioning methods (i.e., grouting in place, perforating the casing followed by grouting in place, grouting in place followed by case pulling, and over drilling and grouting) are outlined in detail in the guidance document, which is presented in **Appendix A**.

A well decommissioning record to document the abandonment of each well is provided as **Table 2-4**. If needed, a corrective measure report and a problem identification report will be completed, shown in **Tables 2-5** and **2-6**.

2.4 Backfilling and Site Restoration

The top 5 feet of the abandon well's borehole will be backfilled with fill material physically similar to the native soils. Concrete and asphalt locations will be repaired using equivalent materials of the same thickness; vegetated areas will be reseeded, and top soil will be used in other areas. Any solid waste generated during the well abandonment process will be disposed of properly.

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

New York State Department of Environmental Conservation, 2009. Draft Groundwater Monitoring Well Decommissioning Procedures. January 2009.

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, 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.

Seneca Army Depot Activity, 2006. Final Land Use Control Remedial Design for SEAD 27, 66, and 64A, Seneca Army Depot Activity, Romulus, New York. December 2006.

Seneca Army Depot Activity, 2008. Addendum 2, SEAD 13, 39, 40, 41, 43/56,69, 44A, 44B, 52, 62, 64B, 64C, 64D, 67, 122B, and 122E – Land Use Control Remedial Design for SEAD 27, 66, and 64A, Seneca Army Depot Activity, Romulus, New York. April 2008.

TABLES

Table 2-1
Wells to be Abandoned
Well Abandonment Plan for SEAD-13
Seneca Army Depot Activity

Site	Well ID	Depth of Well from Ground (ft)	Well Diameter (in)	Construction	Northing	Easting
SEAD-13	MW13-1	12	2	PVC	1007366	749052
SEAD-13	MW13-2	16	2	PVC	1007469	748837
SEAD-13	MW13-3	24	2	PVC	1007533	748703
SEAD-13	MW13-4	8.5	2	PVC	1007487	747826
SEAD-13	MW13-5	16	2	PVC	1007453	747750
SEAD-13	MW13-6	10	2	PVC	1007325	747675
SEAD-13	MW13-7	8	2	PVC	1007539	748702
SEAD-13	MW13-9	15	2	PVC	1007577	748822
SEAD-13	MW13-10	15	2	PVC	1007562	748702
SEAD-13	MW13-11	15	2	PVC	1007501	748675
SEAD-13	MW13-12	11.3	2	PVC	1007540	747698
		150.8				

Table 2-2
Inspector's Daily Report
Well Abandonment Plan for SEAD-13
Seneca Army Depot Activity

CONTRACTOR: ______________________________
ADDRESS: ______________________________

TELEPHONE: ______________
LOCATION: ______________ FROM ______________ TO ______________
WEATHER: ________ TEMP________ A.M. ______________ P.M. DATE ______________

CONTRACTOR'S WORK FORCE AND EQUIPMENT											
DESCRIPTION	*H*	#	*DESCRIPTION*	*H*	#	*DESCRIPTION*	*H*	#	*DESCRIPTION*	*H*	#
Field Engineer						Equipment			Front Loader Ton		
Superintendent			Ironworker			Generators			Bulldozer		
						Welding Equip.					
Laborer Foreman			Carpenter								
Laborer									Backhoe		
Operating Engineer			Concrete Finisher								
Carpenter						Paving Equip & Roller					
						Air Compressor					

SEE REVERSE SIDE FOR SKETCH YES___ NO____
WORK PERFORMED: ______________________________

PAY ITEMS

CONTRACT		STA		DESCRIPTION	QUANTITY	REMARKS
Number	Item	FROM	TO			

TEST PERFORMED: ______________________________
PICTURES TAKEN: ______________________________
VISITORS: ______________________________

QA PERSONNEL
SIGNATURE

REPORT NUMBER______________
SHEET ________Of________

Table 2-2
Inspector's Daily Report
Well Abandonment Plan for SEAD-13
Seneca Army Depot Activity

MEETING HELD AND RESULTS ______________________

REMARKS ______________________

REFERENCES TO OTHER FORMS ______________________

SKETCHES ______________________

SAMPLE LOG ______________________
SAMPLE NUMBER ______________________
APPROXIMATE LOCATION OF STOCKPILE ______________________
NUMBER OF STOCKPILE ______________________
DATE OF COLLECTION ______________________
CLIMATIC CONDITIONS ______________________
FIELD OBSERVATION ______________________

SHEET ____________ Of ____________

Table 2-3
Monitoring Well Field Inspection Log
Well Abandonment Plan for SEAD-13
Seneca Army Depot Activity

SITE NAME: ______________________

SITE ID: __________
INSPECTOR: __________
DATE/TIME: __________
WELL ID: __________

MONITORING WELL FIELD INSPECTION LOG

	YES	NO
WELL VISIBLE? (If not, provide directions below)..		
WELL ID VISIBLE?..		
WELL LOCATION MATCH SITE MAP? (if not, sketch actual location on back).....................		

WELL I.D. AS IT APPEARS ON PROTECTIVE CASING OR WELL:

	YES	NO
SURFACE SEAL PRESENT?..		
SURFACE SEAL COMPETENT? (if cracked, heaved, etc., describe below)...........................		
PROTECTIVE CASING IN GOOD CONDITION? (if damaged, describe below).....................		

HEADSPACE READING (ppm) AND INSTRUMENT USED.. __________
TYPE OF PROTECTIVE CASING AND HEIGHT OF STICKUP IN FEET (if applicable).......... __________
PROTECTIVE CASING MATERIAL TYPE:.. __________
MEASURE PROTECTIVE CASING INSIDE DIAMETER (inches):...................................

	YES	NO
LOCK PRESENT?...		
LOCK FUNCTIONAL?..		
DID YOU REPLACE THE LOCK?..		
IS THERE EVIDENCE THAT THE WELL IS DOUBLE CASED? (if yes, describe below)..........		
WELL MEASURING POINT VISIBLE?...		

MEASURE WELL DEPTH FROM MEASURING POINT (Feet):.. __________
MEASURE DEPTH TO WATER FROM MEASURING POINT (Feet):................................ __________
MEASURE WELL DIAMETER (Inches):... __________
WELL CASING MATERIAL:.. __________
PHYSICAL CONDITION OF VISIBLE WELL CASING:... __________
ATTACH ID MARKER (if well ID is confirmed) AND IDENTIFY MARKER TYPE................ __________
PROXIMITY TO UNDERGROUND OR OVERHEAD UTILITIES.................................... __________

DESCRIBE ACCESS TO WELL: (include accessibility to truck mounted rig, natural obstructions, overhead power lines, proximity to permanent structures, etc.); ADD SKETCH OF LOCATION ON BACK, IF NECESSARY.

____
____
____

DESCRIBE WELL SETTING: (for example, located in a field, in a playground, on pavement, in a garden, etc.); AND ASSESS THE TYPE OF RESTORATON REQUIRED.

____
____
____

IDENTIFY ANY NEARBY POTENTIAL SOURCES OF CONTAMINATION, IF PRESENT (e.g. gas lines, salt pile, etc.):

____
____
____

REMARKS:

____
____
____

Table 2-4
Well Decommissioning Record
Well Abandonment Plan for SEAD-13
Seneca Army Depot Activity

WELL DECOMMISSIONING RECORD

Site Name:	Well ID:
Site Location:	Driller:
Drilling Company:	Inspector:
	Date:

DECOMMISSIONING DATA
(Fill in all that apply)

<u>OVERDRILLING</u>

Interval Drilled	
Drilling Method(s)	
Borehole Dia. (in.)	
Temporary Casing Installed? (y/n)	
Depth temporary casing installed	
Casing type/dia. (in.)	
Method of installing	

<u>CASING PULLING</u>

Method employed	
Casing retrieved (feet)	
Casing type/dia. (in.)	

<u>CASE PERFORATING</u>

Equipment used	
Number of perforations/foot	
Size of perforations	
Interval perforated	

<u>GROUTING</u>

Interval grouted (FBLS)	
# of batches prepared	

<u>For each batch record:</u>

Quantity of water used (gal.)	
Quantity of cement used (lbs.)	
Cement type	
Quantity of bentonite used (lbs.)	
Quantity of calcium chloride used (lbs.)	
Volume of grout prepared (gal.)	
Volume of grout used (gal.)	

WELL SCHEMATIC*

Depth
(feet)

COMMENTS:

* Sketch in all relevant decommissioning data, including: interval overdrilled, interval grouted, casing left in hole, well stickup, etc.

Drilling Contractor

Department Representative

Table 2-5
Corrective Measures Report
Well Abandonment Plan for SEAD-13
Seneca Army Depot Activity

CORRECTIVE MEASURES REPORT

Date_______________________

Project ______________________ Job Number__________

Day

Su	M	T	W	Th	F	Sa

Contractor ______________________________

Subject ______________________________

Sky/Precip.	Clear	Partly Cloudy	Cloudy	Rainy	Snow
Temp.	<32F	32-40F	40-70F	70-80F	80-90F
Wind	No	Light	Strong		
Humidity	Dry	Mod.	Humid		

CORRECTIVE MEASURES TAKEN (Reference Problem Identification Report No.):______________________

RETESTING LOCATION:______________________

SUGGESTED METHOD OF MINIMIZING RE-OCCURRENCE:______________________

SUGGESTED CORRECTIVE MEASURES: ______________________

APPROVALS:

QA ENGINEER:______________________

PROJECT MANAGER: ______________________

Distribution:
1. Project Manager
2. Field Office
3. File
4. Owner

QA Personnel
Signature: ______________________

Table 2-6
Problem Identification Report
Well Abandonment Plan for SEAD-13
Seneca Army Depot Activity

PROBLEM IDENTIFICATION REPORT

Date______________________________

Project ______________________ Job Number__________

Day

Su	M	T	W	Th	F	Sa

Contractor ____

Subject ____

Sky/Precip.	Clear	Partly Cloudy	Cloudy	Rainy	Snow
Temp.	<32F	32-40F	40-70F	70-80F	80-90F
Wind	No	Light	Strong		
Humidity	Dry	Mod.	Humid		

PROBLEM DESCRIPTION (Reference Daily Report No.):____

____

____

____

____

____

PROBLEM LOCATION – REFERENCE TEST RESULTS AND LOCATION (Note: Use sketches on back of form as appropriate):______

____

____

____

____

____

PROBABLE CAUSES:____

____

____

____

____

____

SUGGESTED CORRECTIVE MEASURES: ____

____

____

____

____

____

APPROVALS:

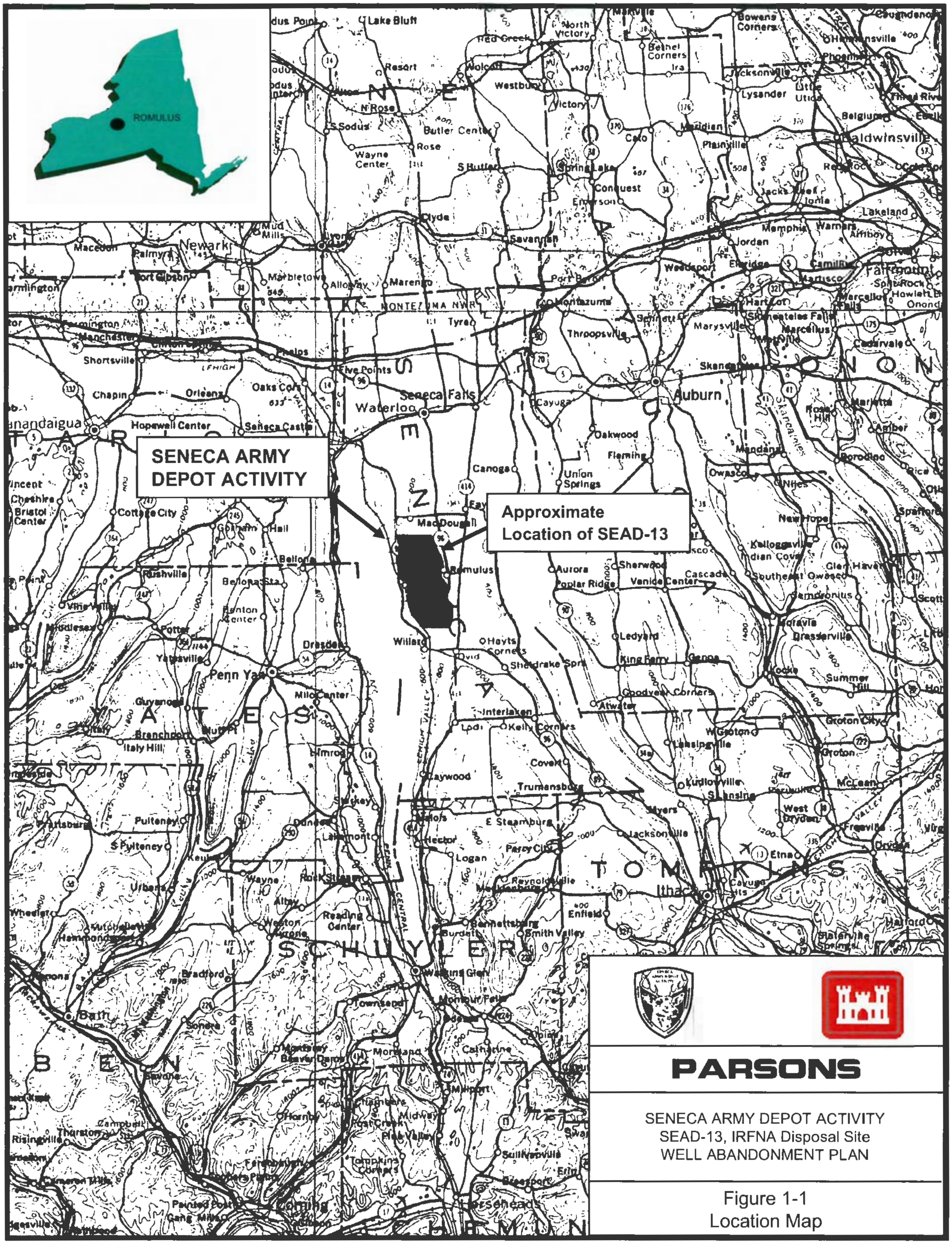
QA ENGINEER:____

PROJECT MANAGER: ____

Distribution:
1. Project Manager
2. Field Office
3. File
4. Owner

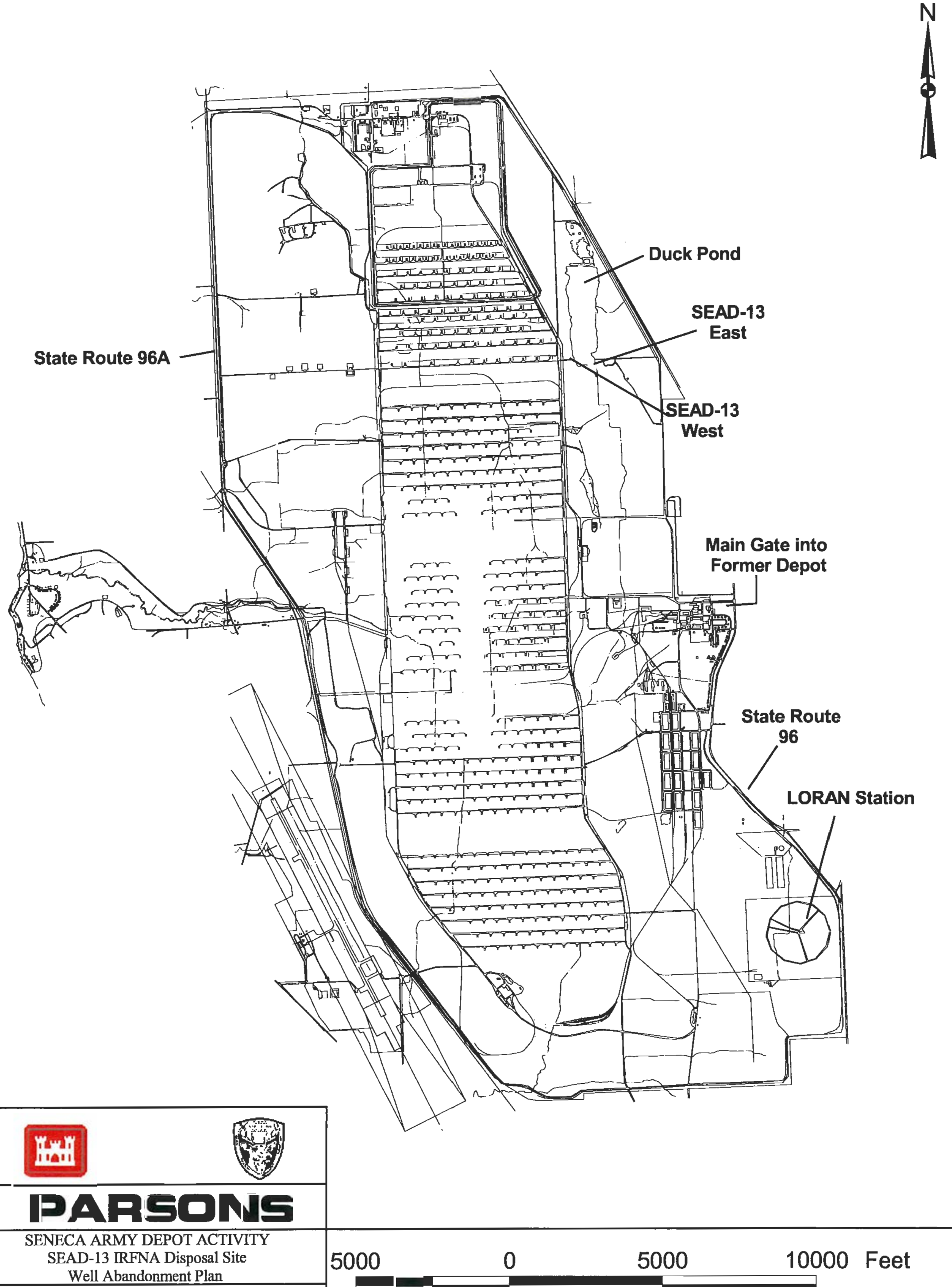
QA Personnel
Signature: ______________________________

FIGURES



SENECA ARMY DEPOT ACTIVITY
SEAD-13, IRFNA Disposal Site
WELL ABANDONMENT PLAN

Figure 1-1
Location Map



PARSONS

SENECA ARMY DEPOT ACTIVITY
SEAD-13 IRFNA Disposal Site
Well Abandonment Plan

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

June 2009

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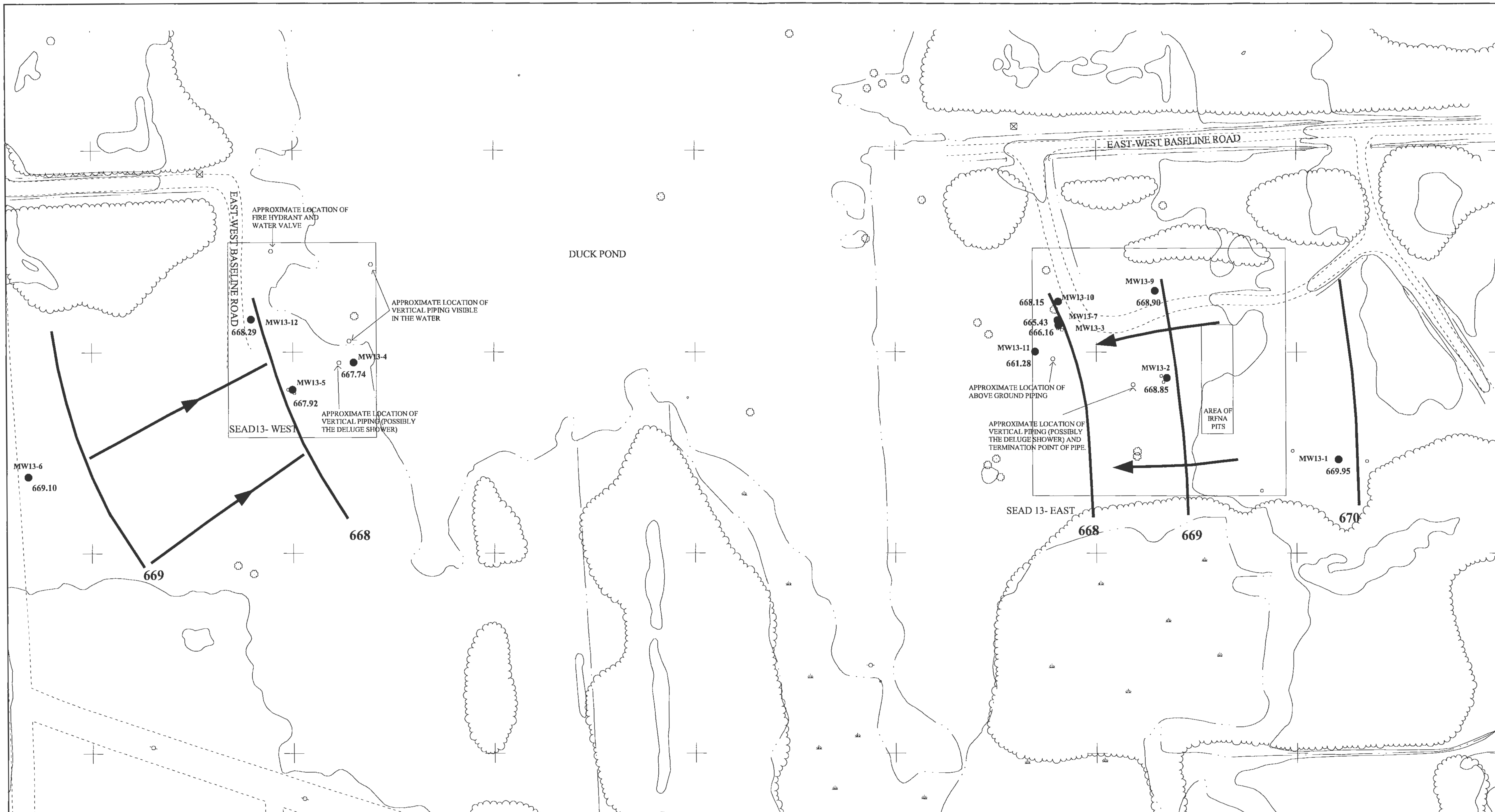

LEGEND

MW-13
670.00 Monitoring Well Location with Water Table Elevation

670 Groundwater elevation contour
Arrow indicates direction of flow

100 0 100 200 Feet

N

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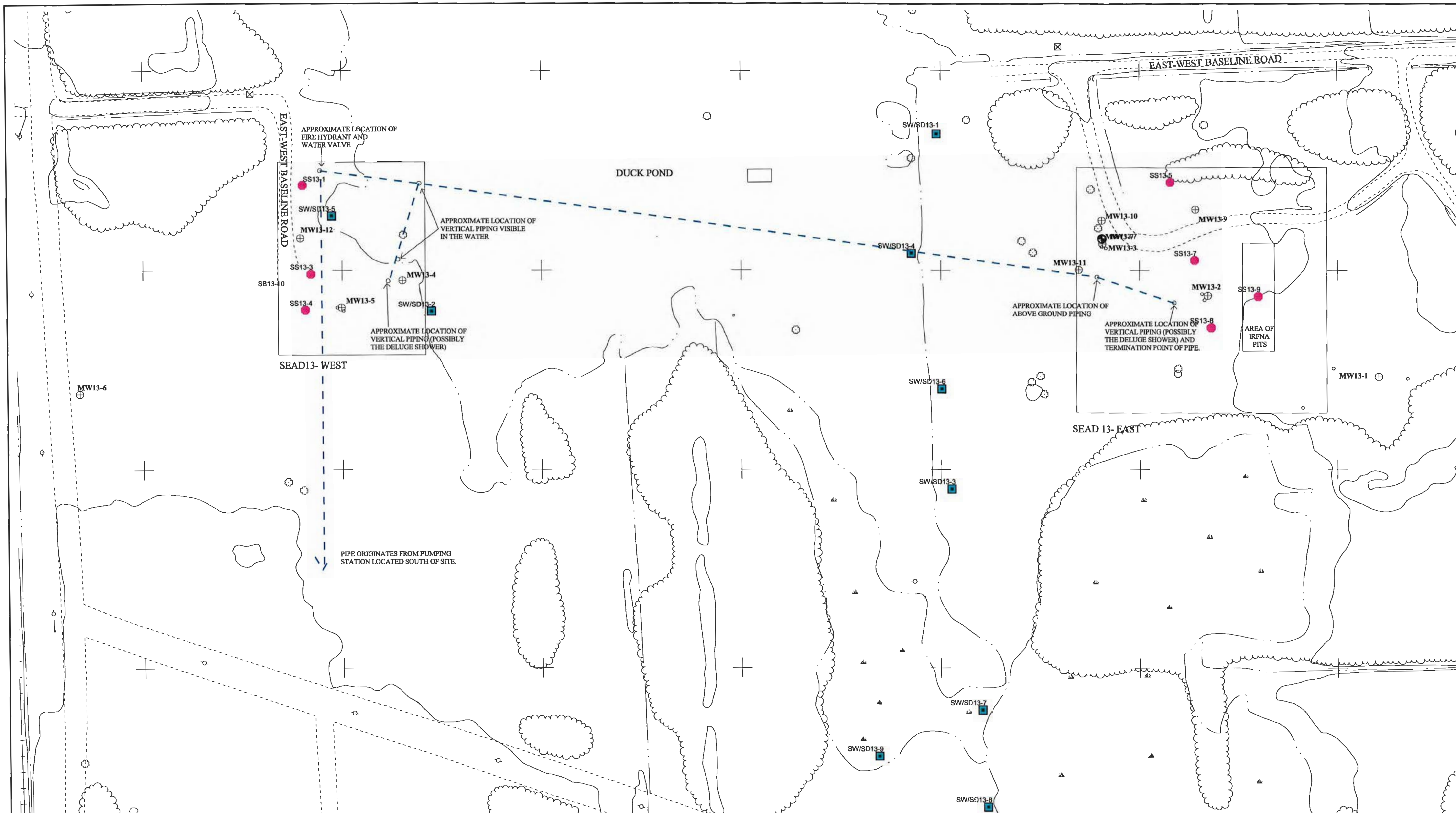
PARSONS

SENECA ARMY DEPOT ACTIVITY

SEAD-13 IRNFA DISPOSAL SITE
Well Abandonment Plan

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

DATE: June 2009 | Sheet 1 of 1



LEGEND

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

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PARSONS

SENECA ARMY DEPOT ACTIVITY
SEAD-13 IRNFA DISPOSAL SITE
Well Abandonment Plan

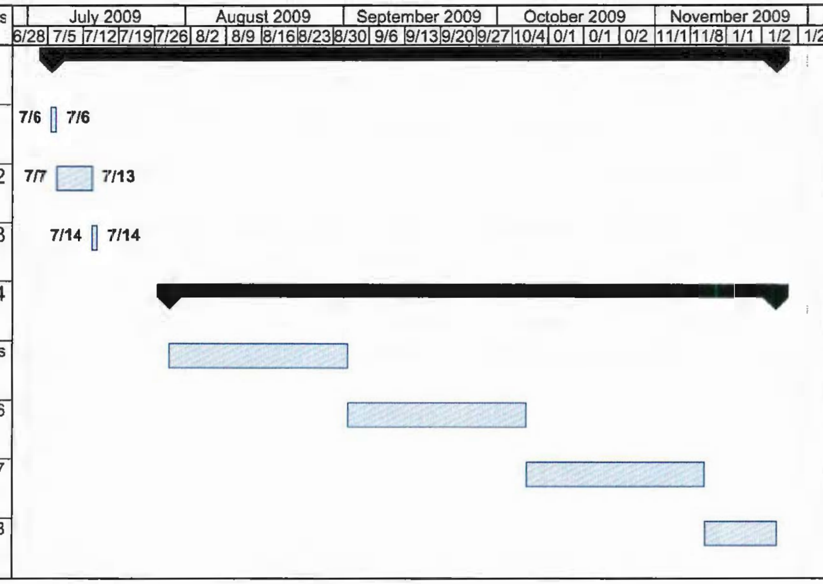
FIGURE 1-4

SEAD-13 IRFNA Disposal Site
Historical Sampling Locations

DATE: June 2009 | Sheet 1 of 1

Figure 2-1
Schedule for SEAD-13 Well Decommissioning
WELL ABANDONMENT PLAN FOR SEAD-13
SENECA ARMY DEPOT ACTIVITY

ID	Task Name	Duration	Start	Finish	Predecessors
1	**Well Decommissioning Plan SEAD-13**	**102 days**	**Mon 7/6/09**	**Tue 11/24/09**	
2	Mobilization	1 day	Mon 7/6/09	Mon 7/6/09	
3	Monitoring Well Decommissioning	5 days	Tue 7/7/09	Mon 7/13/09	2
4	Demobilization	1 day	Tue 7/14/09	Tue 7/14/09	3
5	**Report**	**85 days**	**Wed 7/29/09**	Tue 11/24/09	4
6	Prepare Draft Report	25 days	Wed 7/29/09	Tue 9/1/09	4FS+10 days
7	Regulatory Review Period	25 days	Wed 9/2/09	Tue 10/6/09	6
8	Prepare Final Report	25 days	Wed 10/7/09	Tue 11/10/09	7
9	Regulatory Acceptance	10 days	Wed 11/11/09	Tue 11/24/09	8



Project: SEAD-13 Well Abandonment S
Date: Tue 6/2/09

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

Figure 2-2
NYSDEC Monitoring Well Decommissioning Procedure
Well Abandonment Plan for SEAD-13
Seneca Army Depot Activity

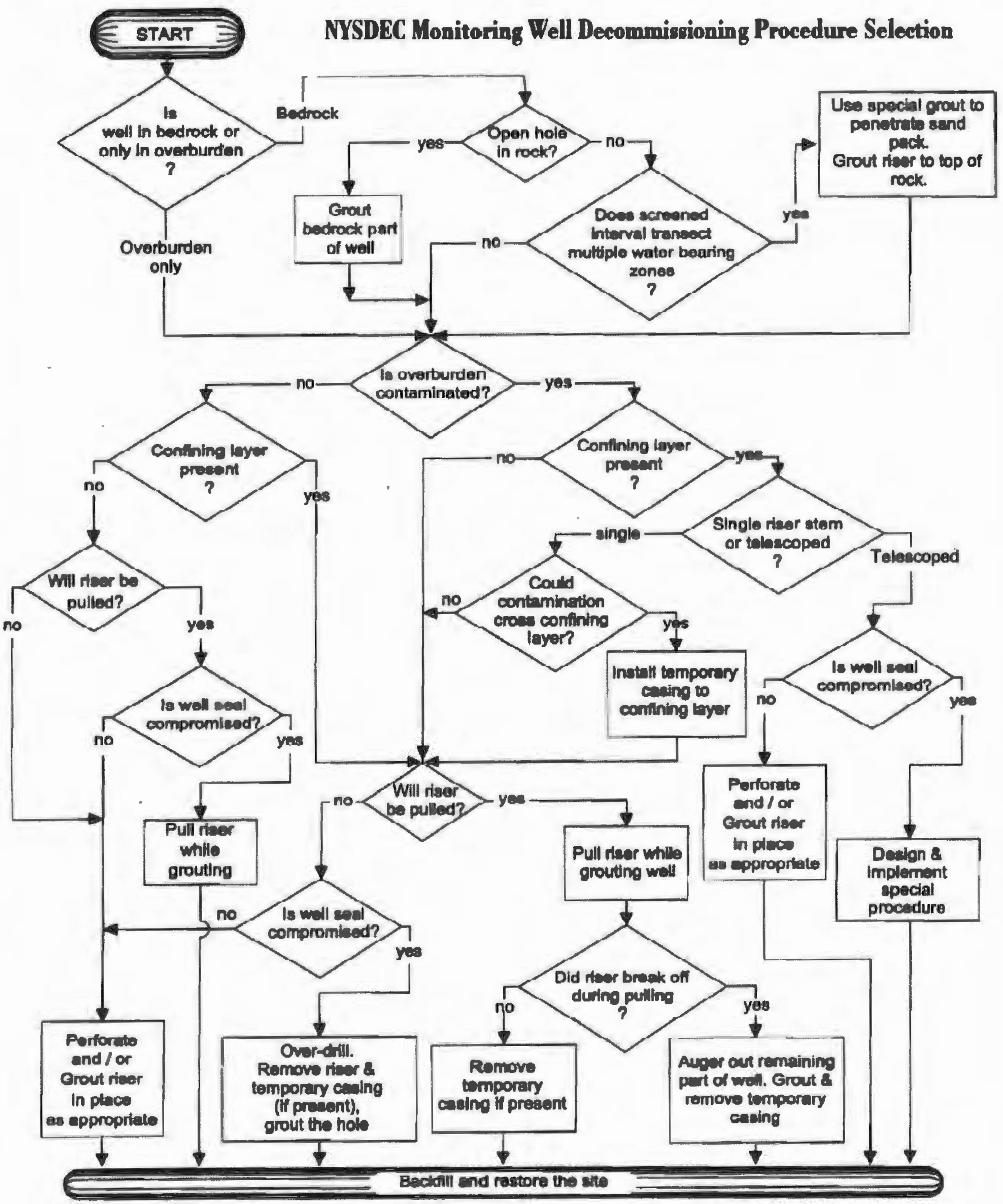


FIGURE 2

APPENDICES

APPENDIX A

NYSDEC GUIDANCE: GROUNDWATER MONITORING WELL DECOMMISSIONING PROCEDURES (DRAFT, JANUARY 8, 2009)

CP- Monitoring Well Decommissioning Policy

[redacted]

Issuing Authority: Commissioner Alexander G. Grannis

Date Issued:	**Latest Date Revised:** New (draft 01-08-2009)

I. Summary:

Monitoring wells provide essential access to the subsurface for scientific and engineering investigations (including monitoring wells installed for leak detection purposes). To a degree, every monitoring well is an environmental liability because of the potential to act as a conduit for pollution to reach the groundwater. To limit the environmental risk, a monitoring well must be properly decommissioned when its effective life has been reached. This document provides procedures to satisfactorily decommission monitoring wells in New York State. This policy also pertains to other temporary wells such as test wells, de-watering wells and other small diameter, non-potable water wells.

II. Policy:

Environmental monitoring wells should be decommissioned when:

1. they are no longer needed;
2. re-use by another program is not an option; or
3. the well's integrity is suspect or compromised.

The method for decommissioning will be determined based upon well construction and environmental parameters. The method selected must be designed to protect groundwater and implemented according to current best engineering practices while following all applicable federal, state and local regulations. *Groundwater Monitoring Well Decommissioning Procedures* shall be maintained as an addendum to this policy.

This policy is applicable to all New York State Department of Environmental Conservation (DEC) programs that install, utilize and maintain monitoring wells for the study of groundwater, except monitoring wells for landfills regulated under 6 NYCRR Part 360 decommissioned in accordance with those regulations [*see* 6 NYCRR 360-2.11(a)(8)(iv)]. There is no specific time frame to dictate when to decommission a well; timing is dependant upon the use and condition of the well and shall be determined on an individual basis. Best professional judgment must be exercised when using the decommissioning procedures. Outside of DEC use, this policy is mandatory when incorporated into the specifications of a state contract, an Order on Consent or a permit. In all other situations, it shall serve as guidance.

III. Purpose and Background:

This document establishes a monitoring well decommissioning policy and provides technical guidance. Synonyms for well decommissioning include "plugging," "capping" and "abandoning. For consistency, only the term "decommissioning" is used within this document.

Unprotected, neglected and improperly abandoned monitoring wells are a serious environmental liability. They can function as a pollution conduit for surface contaminants to reach the subsurface and pollute our groundwater. They also can cause unwanted mixing of groundwaters, which degrade the overall water quality within an aquifer. Improperly constructed, poorly maintained or damaged monitoring wells can yield anomalous poor data that can compromise the findings of an environmental investigation or remediation project. Unneeded or compromised monitoring wells should be properly decommissioned in order to prevent harm to our groundwater.

Since 1980, the DEC has installed, directed or overseen the installation of thousands of monitoring wells throughout New York for various state and federal programs, such as Superfund, solid waste, Resource Conservation and Recovery Act (RCRA), spill response, petroleum bulk storage and chemical bulk storage. This guidance addresses the environmental liability associated with this aging network of wells.

Within its boring zone, a successfully decommissioned well prevents the following:

1. Migration of existing or future contaminants into an aquifer or between aquifers;
2. Migration of existing or future contaminants within the vadose zone;
3. Potential for vertical or horizontal migration of fluids in the well or adjacent to the well; and
4. Any change in the aquifer yield and hydrostatic head, unless due to natural conditions.

Monitoring well construction in New York varies considerably with factors such as age of the well, local geology and either the presence or absence of contamination. The predominant type of monitoring well in New York is the shallow, watertable monitoring well constructed of polyvinyl chloride plastic (PVC). The best method for decommissioning should be selected to suit the conditions and circumstances. Each decommissioning situation is to be evaluated separately using this guidance before a method is chosen and implemented.

IV. Responsibility:

The Division of Environmental Remediation (DER) is responsible for updating this policy and the *Groundwater Monitoring Well Decommissioning Procedures* (addendum) in consultation with the Division of Solid and Hazardous Materials (DSHM) and the Division of Water (DOW). Compliance with the guidance does not relieve any party of the obligation to properly decommission a monitoring well. Oversight responsibility will be carried out by the DEC Regional Engineer.

V. Procedure:

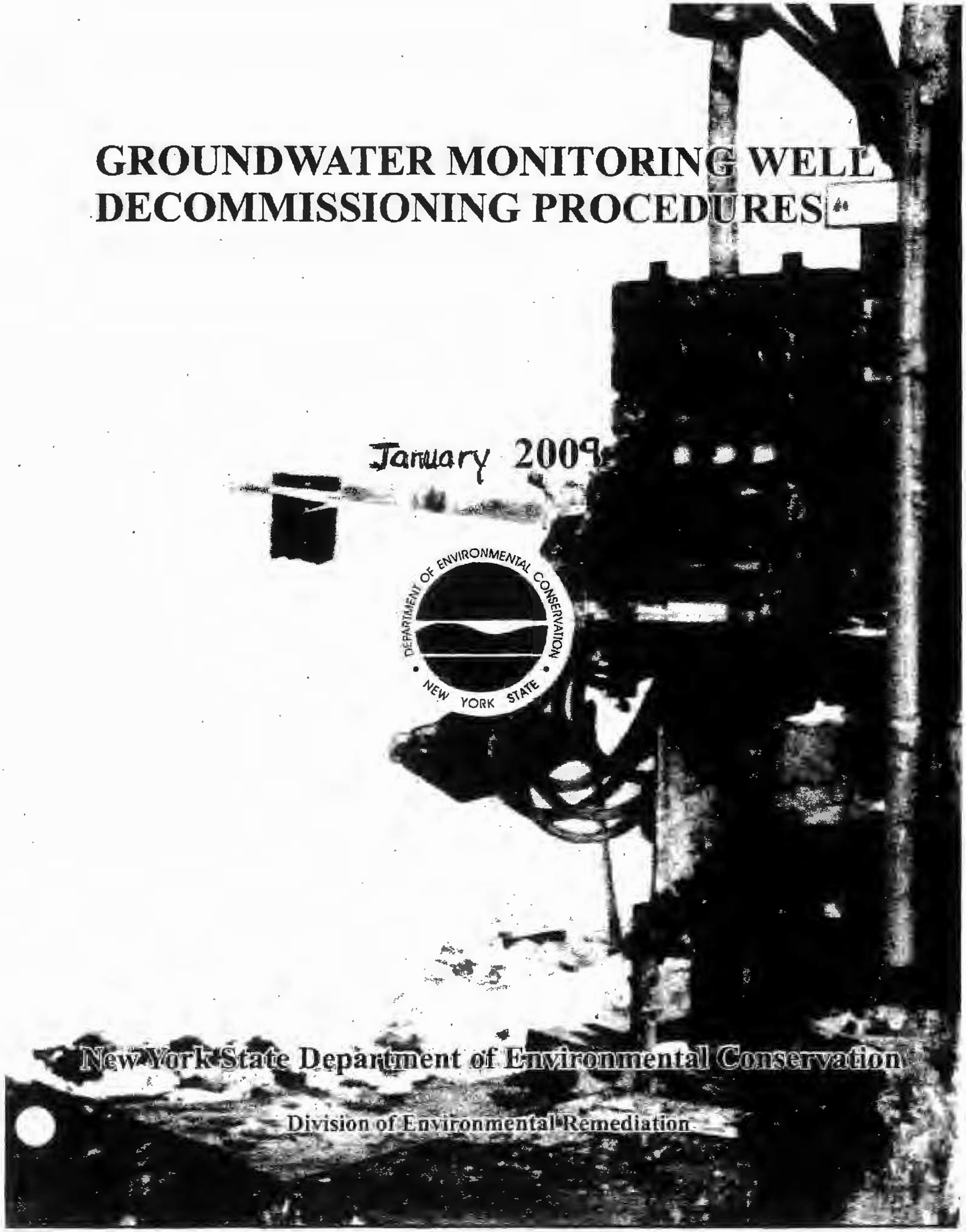
Groundwater Monitoring Well Decommissioning Procedures, the addendum to this policy, provides guidance on proper decommissioning of monitoring wells in New York State.

VI. Related References:

- Groundwater Monitoring Well Decommissioning Procedures, October 1986. Prepared by Malcolm Pirnie, Inc. for the New York State Department of Environmental Conservation, Division of Environmental Remediation.
- American Society for Testing and Materials, A.S.T.M. D 5299-99. Standard Guide for the Decommissioning of Ground Water Wells, Vadose Zone Monitoring Devices, Boreholes, and Other Devices for Environmental Activities. A.S.T.M. Philadelphia. 2005.
- New York State Department of Environmental Conservation, Division of Solid Waste, 6 NYCRR Part 360 Solid Waste Management Facilities, 1989.
- New York State Department of Environmental Conservation, Region 1 - Water Unit, Specifications for Abandoning Wells and Boreholes in Unconsolidated Materials, undated.
- United States Environmental Protection Agency, the Handbook of Suggested Practices for the Design and Installation of Groundwater Monitoring Wells, EPA 600/4-89/034.

GROUNDWATER MONITORING WELL DECOMMISSIONING PROCEDURES

January 2009



New York State Department of Environmental Conservation

Division of Environmental Remediation

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INTRODUCTION

This document, *Groundwater Monitoring Well Decommissioning Procedures*, is the addendum to CP- , Monitoring Well Decommissioning Policy, which provides acceptable procedures to be used as guidance when decommissioning monitoring wells in New York State. Please note that this document does not address some site-specific special situations that may be encountered in the field. Compliance with the procedures set forth in this document does not relieve any party of the obligation to properly decommission a monitoring well.

Unprotected, neglected and improperly abandoned monitoring wells are a serious environmental liability. They can function as a pollution conduit for surface contaminants to reach the subsurface and pollute our groundwater. They also can cause unwanted mixing of groundwaters, which degrade the overall water quality within an aquifer. Improperly constructed, poorly maintained or damaged monitoring wells can yield anomalous poor data that can compromise the findings of an environmental investigation or remediation project. Unneeded or compromised monitoring wells should be properly decommissioned in order to prevent harm to our groundwater.

Previous versions of this guidance have been issued since 1995. Originally developed as a specification for well decommissioning at Love Canal, the procedures were rewritten to make them applicable across the state. From an engineering standpoint, the guidance has changed very little. The DEC realizes that most situations do not require a complex procedure.

If you have any questions, please contact Will Welling at (518) 402-9814.

Sincerely,

Gerald J. Rider, Jr., P.E.
Chief, Remedial Section D
Remedial Bureau E

1.0 PREPARATION

If an unneeded monitoring well remains in good usable condition, an alternative to decommissioning might be the reuse by another agency program. DEC encourages reuse in situations where a well will continue to be used and responsibly cared for.

When reuse is not an option, the first step in the well decommissioning process is to review all pertinent well construction information. One must know the well depth and construction details. GPS coordinates and permanent labeling (if available) will be useful in confirming the well to be decommissioned. An inspection must be performed prior to decommissioning in order to verify the construction and condition of each well. Specific details and subsurface conditions form the basis for decisions throughout the decommissioning process.

Well Details

1. Is the well a single stem riser (all one diameter)?
2. Is the well a simple overburden well (no penetration into bedrock)?
3. Does the well riser consist of telescoping diameters of pipe which decrease with depth?
4. Is the well seal compromised (leaking, inadequate or damaged)?
5. If the well is PVC, is it 25 feet or shallower and not grouted into rock?
6. Can the riser be pulled and is removal of the well desired?
7. Is the well a bedrock well?
8. If the monitoring well is a bedrock well, does it have an open hole?
9. Is there a well assembly (riser and screen) installed within the bedrock hole?

Subsurface Conditions

10. Is the soil contaminated?
11. Does the well penetrate a confining layer?
12. If the well penetrates a confining layer, might overdrilling or casing pulling cause contamination to travel up or down through a break in the confining layer?
13. Does the screened interval cross multiple water-bearing zones?

For additional collection and verification of information, the "Monitoring Well Field Inspection Log" (Figure 1) can be used during a field inspection. After the well has been located and the information gathered, one is ready to select the decommissioning procedure in accordance with Section 2.

Special conditions, such as access problems, well extensions through capped and covered landfills and seasonal weather patterns affecting construction, should be assessed in the planning stage. Decommissioning work requiring the use of heavy vehicular equipment on landfill caps should be scheduled during dry weather (if possible) so as to minimize damage to the cover. If work must be performed during the spring, winter or inclement weather, special measures to reduce ruts should be employed to maintain the integrity of a completed landfill cover system. As an example, placement of plywood under vehicular equipment can eliminate deep ruts that would require repair.

2.0 DECOMMISSIONING METHODS

The primary rationale for well decommissioning is to remove any potential groundwater pathway. A secondary rationale, often important to the property owner or owner of the well, is to physically remove the well. Removed well materials may be recycled and will not interfere with future construction excavation. The previous versions of these decommissioning procedures have stressed that physical removal of the well by pulling is preferable to leaving casing in the ground. Due to the added effort, expense and risk involved with pulling, the decision of whether to pull or not should be a separate consideration aside from selecting the sealing procedure.

One should select a decommissioning procedure that takes into account the geologic and hydrogeologic conditions at the well site; the presence or absence of contamination in the groundwater; and original well construction details. The selection process for well decommissioning procedures is provided by the flow chart, Figure 2. Answers to the questions in the preceding section are the input for this flow chart. The four primary well decommissioning methods are:

1. Grouting in-place;
2. Perforating the casing followed by grouting in-place;
3. Grouting in-place followed by casing pulling;
4. Over-drilling and grouting with or without a temporary casing.

In a complex situation, one or more decommissioning procedures may be used for different intervals of the same well.

The remainder of Section 2 discusses the well decommissioning methods and the selection process. Refer to Figure 2 for a flow chart diagram of the complete procedure selection process. The DEC Project Manager has the discretion to deviate from the flow chart, (Figure 2), based on site conditions and professional judgement.

2.1 Grouting In-Place

Grouting in-place is the simplest and most frequently used well decommissioning method and grouting itself is the essential component of all the decommissioning methods. The grout seals the borehole and any portion of the monitoring well that may be left in the ground. Because dirt and foreign objects can fall into an open well, whenever possible a well should be sealed first with grout before attempting subsequent decommissioning steps.

For the purpose of these decommissioning procedures, the well seal is defined as the bentonite seal above the sand pack. Aside from obvious channeling by in-flowing surface water around the well, an indication of the well seal integrity may be obtained through review of the boring logs and/or a comparison of groundwater elevations if the well is part of a cluster. Any problems noted on the boring logs pertaining to the well seal, such as bridging of bentonite pellets or running sands, or disparities between field notes (if available) and the well log would indicate the potential for a poor (compromised) well seal.

If the well seal is not compromised and there is no confining layer present, a single-stem, 2-inch PVC, monitoring well can be satisfactorily decommissioned by grouting it in-place. If the seal is compromised, casing perforation may be called for as discussed in Section 2.2.

As discussed in Section 2.4 and its sub-sections, this method is specified for the bedrock portion of a well, and is used for decommissioning small diameter cased wells. Grouting in-place involves filling the casing with grout to a level of five feet below the land surface, cutting the well casing at the five-foot depth, and removing the top portion of the casing and associated well materials from the ground. The casing must be grouted according to the procedures in Section 6. In addition, the upper five feet of the borehole is filled to land surface and restored according to the procedures described in Section 7.

For open-hole bedrock wells, the procedure involves filling the opening with grout to the top of rock according to the procedures in Section 5. A thicker grout may be required to fill any bedrock voids. If excessive grout is being lost down-hole, consider grouting in stages to reduce the pressure caused by the height of the grout column.

The standard mix with the maximum amount of allowable water will be required to penetrate the well screen and sand pack when a well assembly has been installed within a bedrock hole. For an assembly such as this, the grout should be mixed thinly enough to penetrate the slots and sand pack. The grout mixes are discussed in Sections 6.1 and 6.2.

It should be noted that for wells located on landfills regulated under 6NYCRR Part 360, the screened interval of the well must be sealed separately and hydrostatically tested to ensure its adequacy before sealing the remaining borehole. For a Part 360 landfill, the pressure test will have to be performed unless a waiver is granted by the DEC. As an alternative to pressure testing the screened interval, it may be acceptable to grout the entire screen and riser. The Standard Operating Procedure (SOP) for the hydrostatic test has been included under Appendix A.

2.2 Casing Perforating/Grouting In-Place

Casing perforation followed by grouting in-place is the preferred method to use if there is poor documentation of the grouting of the well annulus, or the annulus was allowed to be back-filled with cuttings. The grout will squeeze through the perforations to seal any porous zones along the outside of the casing. The procedure involves puncturing, cutting or splitting the well casing and screen followed by grouting the well. A variety of commercial equipment is available for perforating casings and screens in wells with four-inch or larger inside diameters. Due to the diversity of applications, experienced contractors must recommend a specific technique based on site-specific conditions. A minimum of four rows of perforations several inches long around the circumference of the pipe and a minimum of five perforations per linear foot of casing or screen is recommended (American Society for Testing and Materials, Standard D 5299-99, 1999). After the perforating is complete, the borehole must be grouted according to the procedures in Section 6 and the upper five feet of borehole restored according to the procedures in Section 7.

2.3 Casing Pulling

Casing pulling should be used in cases where the materials of the well assembly are to be recycled, or the well assembly must be removed to clear the site for future excavation or re-development. Casing pulling is an acceptable method to use when no contamination is present; contamination is present but the well does not penetrate a confining layer; and when both contamination and a confining layer are present but the contamination cannot cross the confining layer. Additionally, the well construction materials and well depth must be such that pulling will not break the riser. When contamination is likely to cross the confining layer during pulling, a temporary casing can be used. See Section 2.4.

Casing pulling involves removing the well casing by lifting. Grout is to be added during pulling; the grout will fill the space once occupied by the material being withdrawn. An acceptable procedure to remove casing involves puncturing the bottom of the well or using a casing cutter to cut away the screen, grouting, using jacks to free casing from the hole, and lifting the casing out by using a drill rig, backhoe, crane, or other suitable equipment. Additional grout must be added to the casing as it is withdrawn. Grout mixing and placement procedures are provided in Section 6. In wells or well points in which the bottom cannot be punctured, the casing or screened interval will be perforated or cut away prior to being filled with grout. This procedure should be followed for wells installed in collapsible formations or for highly contaminated wells.

At sites in which well casings have been grouted into the top of bedrock, the casing pulling procedure should not be attempted unless the casing can be first cut or freed from the rock.

2.4 Over-Drilling

Over-drilling is the technique used to physically remove an entire monitoring well, its sand pack and the old grout column and fill. In situations where PVC screens and risers are expected to sever and removal of all well materials is required, over-drilling will be required. Over-drilling is called for when a riser can't be pulled and it penetrates a confining layer. Compared to the other procedures, over-drilling is the least common method of well decommissioning.

A "temporary casing" may be necessary when extraordinary conditions are present, such as a high concentration of mobile contaminants in the overburden, depth to water is shallow, there is poor construction documentation or shoddy construction practices. The approach involves installing a large diameter steel casing around the outside of the well followed by drilling / pulling /grouting within this casing. The casing is withdrawn at the end of pulling, grouting and (perhaps) drilling. If the confining layer is less than 5 feet thick, the casing should be installed to the top of the confining layer. Otherwise, it is installed to a depth of 2 feet below the top of the confining layer. After the outer casing has been set, the well can be removed and grouted through pulling if possible or removed and grouted by drilling inside the casing.

Over-drilling is used where casing pulling is determined to be unfeasible, or where installation of a temporary casing is necessary to prevent cross-contamination, such as when a confining layer is present and contamination in the deeper aquifer could migrate to the upper aquifer as the well is pulled. The over-drilling method should:

- Follow the original well bore;
- Create a borehole of the same or greater diameter than the original boring; remove all of the well construction materials.

In over-drilling the difficulty lies in keeping the augers centered on the old well as the bit is lowered; it will tend to wander off. As a precaution, the well column should be filled with grout before over-drilling. Then without allowing the grout to dry, the driller proceeds with over-drilling the well. Grouting first guarantees that if the drill wanders off the old well and the effort is less than 100% successful, the remaining well portion will at least have been grouted. There are many methods for over-drilling. Please note that the following methods are not suitable for all types of casing, and the advice of an experienced driller should be sought:

- Conventional augering (i.e., a hollow stem auger fitted with a pilot bit). The pilot bit will grind the well construction materials, which will be brought to the well surface by the auger.
- A conventional cable tool rig to advance "temporary" casing having a larger diameter than the original boring. The cable tool kit is advanced within the casing to grind the well construction materials and soils, which are periodically removed with large diameter bailer. This method is not applicable to bedrock wells.
- An over-reaming tool with a pilot bit nearly the same size as the inside diameter of the casing and a reaming bit slightly larger than the original borehole diameter.

This method can be used for wells with steel casings.

- A hollow-stem auger with outward facing carbide cutting teeth having a diameter two to four inches larger than the casing.

Prior to over-drilling, the bottom of the well should be perforated or cut away, and the casing filled with grout as with casing removal by pulling.

In all cases above, over-drilling should advance beyond the original bore depth by a distance of half a foot to ensure complete removal of the construction materials. Oversight attention should be focused on the drill cuttings, looking for fragments of well materials. Absence of these indicators is a sign that the drill has wandered off the well. If wandering is suspected, having previously filled the well with grout, the remaining portion which cannot be over-drilled can be considered grouted in-place. When the over-drilling is complete, grout should be tremied within the annular space between the augers and well casings. The grout level in the borehole should be maintained as the drilling equipment and well materials are sequentially removed. As with all the other methods, the upper five feet of borehole should be restored according to the procedures in Section 7.

3.0 SELECTION PROCESS AND IMPLEMENTATION

The decommissioning procedure selection flow chart, Figure 2, is to be used to select decommissioning methods. The selection process first identifies the basic monitoring well type. There are only two types of monitoring wells described in this guidance, overburden wells and bedrock wells. Bedrock wells typically have an overburden portion which in the selection process is to be treated as an overburden well. Techniques are specified for wells based upon their type and the other physical conditions present. Decommissioning techniques called for by the selection process have their practical limits; construction details dictate when a well stem can be pulled without breaking and when it cannot be pulled. The DEC project manager has the discretion to deviate from the flow chart, (Figure 2), based on site conditions, budgetary concerns and professional judgement. The remainder of this section will discuss types of monitoring wells in various settings along with recommended decommissioning techniques.

3.1 Bedrock Wells

Referring to Figure 2 and Section 2.1, if the well extends into bedrock, the rock hole portion of the well is to be grouted in-place to the top of the rock. The grout mix, however, may vary according to the conditions. A thicker grout may be required to fill voids and a thinner grout may be necessary to penetrate well screen and sand pack. Refer to the grout mixture specifications given in Section 6.1 and 6.2.

Prior to grouting, the depth of the well will be measured to determine if any silt or debris has plugged the well. If plugging has occurred, all reasonable attempts to clear it should be made before grouting. The borehole will then be tremie grouted according to Section 6.4 from the bottom of the well to the top of bedrock to ensure a continuous grout column.

After the rock hole is grouted, the overburden portion of the well is decommissioned using appropriate techniques described below. If the bedrock extends to the ground surface, grouting can extend to the ground surface or to slightly below so that the site can be restored as appropriate in accordance with Section 7.

3.2 Uncontaminated Overburden Wells

For overburden wells and the overburden portion of bedrock wells, the first factor in determining the decommissioning method is whether the overburden portion of the well exhibits contamination, as determined through historical groundwater and/or soil sampling results. If the overburden is uncontaminated, the next criteria considers whether the well penetrates a confining layer. In the case that the overburden portion of the well does not penetrate a confining layer, the casing can either be tremie-grouted and pulled or tremie grouted and left in place. As a general rule, PVC wells greater than 25-feet deep should not be pulled unless site-specific conditions or other factors indicate that the well can be pulled without breaking. If the well cannot be pulled, the well should be grouted in-place as accordance with Sections 2.1 and 2.2.

If a non-telescoped overburden well penetrates a confining layer, the casing should be removed by pulling (if possible) in accordance with Section 2.3. If the casing cannot be removed by pulling, the well should be grouted in-place or where complete removal is required, removed by over-drilling. Over-drilling will be based upon the site-specific conditions and requirements. If pulling is attempted and fails (i.e., a portion of the riser breaks) the remaining portion of the well should be removed by using the conventional augering procedure identified in Section 2.4. Note that if the riser is broken during pulling, it is highly unlikely that the driller will be able to target it to over-drill it. This is the reason why all wells should be grouted first. In all cases, after the well construction materials have been removed to the extent possible, the borehole will be grouted in accordance with Section 6 and the upper five feet will be restored in accordance with Section 7.

3.3 Contaminated Overburden Monitoring Wells/Piezometers

Contamination in the overburden plays a role in the selection process. Any contamination present in the overburden must not be allowed to spread as a result of the decommissioning construction. For wells and piezometers suspected or known to be contaminated with light non-aqueous phase liquid (LNAPL) and/or dense non-aqueous phase liquid (DNAPL), often referred to as "product," the decision to decommission the well should be reviewed. Such gross contamination is a special condition and requires design of the decommissioning procedure. If decommissioning is determined to be the proper course of action, measurement of the non-aqueous phase liquid volume will be determined and this liquid will be removed.

If an overburden well (or the overburden portion of a bedrock well) is contaminated with LNAPL, DNAPL and /or dissolved fractions as indicated by historical sampling results, one must evaluate the potential for contamination to cross an overburden confining layer (if one exists) during decommissioning. A rock or soil horizon of very low permeability is known as a confining layer. Contamination in the overburden lying above a confining layer is a significant condition to recognize. To prevent mobile contaminants from crossing a confining layer during pulling or over-drilling, a temporary casing should be installed to isolate the work zone. One should follow the procedure selection flow chart. Some contaminated conditions call for over-drilling or a specially designed procedure.

A well in contaminated overburden may be grouted in-place as long as the grout fully seals the well and boring zone. If a well in contaminated overburden was constructed allowing formation collapse as annular backfill or if the well has a compromised well seal, one must either physically remove the well or thoroughly perforate the riser and grout it in-place.

If physical removal of the well is required and the overburden contaminants are likely to be dragged upward or downward during decommissioning, a temporary casing should be used to seal off the construction work zone. Casing pulling and overdrilling can be safely accomplished within the temporary casing. Section 2.4 discusses the temporary casing technique.

3.4 Telescoped Riser

If the riser is telescoped in one or more outer casings, the decommissioning approach depends upon the integrity of the well seal. If there is no evidence that the well seal integrity is compromised, the riser should be grouted in-place in accordance with Sections 2.1 or 2.2 and the upper 5 feet of the well surface should be restored in accordance with Section 7. If indications are that the well seal is not competent, it will be necessary to design and implement a special procedure to perforate and grout or remove the well construction materials. The presence and configuration of the outer casing(s) will be specific in the individual wells and will be a key factor in the decommissioning approach. The special procedure must mitigate the potential for cross-contamination during removal of the well construction materials.

4.0 LOCATING AND SETTING-UP ON THE WELL

Prior to mobilizing to decommission a monitoring well, one should notify the property owner and/or other interested parties including the governing regulatory agency. It is advisable that when at the well location, one should review the proposed well decommissioning procedure. Verify well locations and identification by their identifying markers and GPS coordinates. Lastly, verify the depth of each well with respect to depth recorded on the well construction log.

5.0 REMOVING THE PROTECTIVE CASING

Most monitoring wells installed in non-traffic locations are finished with an elevated, protective casing (guard pipe) and a concrete rain pad. Wells at gasoline stations, usually being in high-traffic areas, are typically finished with a flush-mount, curb box and protective 8" dia steel inspection plate rather than a stick-up riser. The curb box is usually easily removed from around the flush-mount well before pulling or over-drilling. In the case of stick-up wells, the riser pipe may be bonded to the guard pipe and rain pad. When the protective casing and concrete pad of a stick-up monitoring well are "yanked out," a PVC riser will typically break off at the bottom of the guard pipe several feet below grade. Once this happens, it may become impossible to center a drill rig upon the well. The riser may become splintered and structurally unstable for pulling. Unless grouted first, the well may fill with dirt. Before pulling a casing or over-drilling a well, a method must be devised for removing these protective surface pieces without jeopardizing the remaining decommissioning effort.

Generally, unless the protective casing is loose and can be safely lifted off by hand, *one should fill the monitoring well with grout before removing the outer protective casing.* This will ensure that the well is properly sealed regardless of any problems later when removing the protective casing. Remove the protective casing or road box vault initially only if the stick-up or vault will interfere with subsequent down-hole work which must be done before grouting. This down-hole work may include puncturing, perforating or cutting the screen or riser. But as a general procedure don't remove the protective casing or road box until after initial grouting is complete.

The procedure for removing the protective casing of a well depends upon the decommissioning method specified for the monitoring well. The variety of protective casings available preclude developing a specific removal procedure but often one can simply break up the concrete seal surrounding the casing and jack or hoist the protective casing out of the ground. A check should be made during pulling to ensure that the inner well casing is not being hoisted with the protective casing. If this occurs, the well casing should be cut off after the base of the protective casing is lifted above the land surface. At well locations where the riser has been extended, the burial of a previous concrete pad may require the excavation of soil to the top of the concrete pad to remove the well.

Steel well casing should be removed approximately five feet below the land surface so as to be below the frost line and out of the way of any subsequent shallow digging. The upper five feet of casing and the protective casing can be removed in one operation if a casing cutter is used.

Waste handling and disposal must be consistent with the methods used for the other well materials unless an alternate disposal method can be employed (i.e., steam cleaning followed by disposal as non-hazardous waste).

6.0 SELECTING, MIXING, AND PLACING GROUT

This section gives recipes for the "standard grout mixture" and the thicker "special grout mixture." Mixing and placing grout is also discussed in this section. The goal of well decommissioning is to eliminate the capability of water to travel up or down within the volume of the former well and its boring. Success depends upon the correct grout mixture and placement where it is needed. There are two types of grout mixes that may be used to seal monitoring wells: a standard mix and a special mix. Both mixes use Type 1 Portland cement and four percent bentonite by weight. However, the special mix uses a smaller volume of water and is used in situations where excessive loss of the standard grout mix is possible (e.g., highly-fractured bedrock or coarse gravels).

6.1 Standard Grout Mixture

For most boreholes, the following standard mixture will be used:

- One 94-pound bag Type I Portland cement;
- 3.9 pounds powdered bentonite; and
- 7.8 gallons potable water.

Slightly more water may be used in order to penetrate a sand pack when a well screen transects multiple flow zones. This mixture results in a grout with a bentonite content of four percent by weight and will be used in all cases except in boreholes where excessive use of grout is anticipated. In these cases a special thicker mixture will be used.

6.2 Special Mixture

In cases where excessive use of grout is anticipated, such as high permeability formations and highly fractured or cavernous bedrock formations, the following special mixture will be used:

- one 94-pound bag type I Portland cement;
- 3.9 pounds powdered bentonite;
- 1 pound calcium chloride; and
- 6.0-7.8 gallons potable water (depending on desired thickness).

The special mixture results in a grout with a bentonite content of four percent by dry weight. It is thicker than the standard mixture because it contains less water. This grout is expected to set faster than the Standard Grout Mixture due to the added calcium chloride. The least amount of water that can be added for the mixture to be readily pumpable is 6 gallons per 94-pound bag of cement.

6.3 Grout Mixing Procedure

To begin the grout-mixing procedure, calculate the volume of grout required to fill the borehole. If possible, the mixing basin should be large enough to hold all of the grout necessary for the borehole.

Mix grout until a smooth, homogeneous mixture is achieved. Grout can be mixed manually or with a mechanized mixer. Colloidal mixers should not be used as they tend to excessively decrease the thickness of the grout of the above recipes.

6.4 Grout Placement

This guidance requires that grout be placed in the well from the bottom to the top by means of a "tremie." A tremie is a pipe, a hose or a tube extending from the grout supply to the bottom of the well. The tremie delivers the grout all the way down through the water column without its being diluted and mixed with the water that may be present in the well. The tremie pipe or tube is withdrawn as (or after) the well is filled with grout.

Using the tremie, grout is placed in the borehole filling from the bottom to the top. Two-inch and larger wells should use tremie tubing of not less than 1-inch diameter. Smaller diameter wells will call for a smaller tremie pipe. Grout will then be pumped in until the grout appears at the land surface (when grouting open holes in bedrock, the grout level only needs to reach above the bedrock surface). Any groundwater displaced during grout placement, if known to be contaminated, will be contained for proper disposal.

At this time the rate of settling should be observed. If grouting the well in place, the well casing remains in the hole. But if the decommissioning method has involved down-hole tools such as hollow-stem augers or temporary casing for overdrilling, these will be removed from the hole. As each section is removed, grout will be added to keep the level between 0 and 5 feet below grade. If the grout level drops below the land surface to an excessive degree, an alternate grouting method must be used. One possibility is to grout in stages; i.e., the first batch of grout is allowed to partially cure before a second batch of grout is added.

As previously described in Section 5.0, the outer protective casing "stick-up" should be removed only after a well has been properly filled with grout. This will ensure that the well is properly sealed regardless of any breakage which may occur when removing the stick-up. It is important to reiterate that when either casing pulling or over-drilling are required, due to the uncertainty of successfully pulling a well or over-boring a well, we insist that the driller tremie grout the well first. Then without allowing the grout to dry, the driller proceeds with pulling the casing or over-drilling the well.

Upon completion of grouting, ensure that the final grout level is approximately five feet below land surface. A ferrous metal marker will be embedded in the top of the grout to indicate the location of the former monitoring well. Lastly, a fabric "utility" marking should be placed one foot above the grout so an excavator can see it clearly.

7.0 BACKFILLING AND SITE RESTORATION

The uppermost five feet of the borehole at the land surface should be filled with material physically similar to the natural soils. The surface of the borehole should be restored to the condition of the area surrounding the borehole. For example, concrete or asphalt will be patched with concrete or asphalt of the same type and thickness, grassed areas will be seeded, and topsoil will be used in other areas. All solid waste materials generated during the decommissioning process must be disposed of properly.

8.0 DOCUMENTATION

A form which may be used in the field to record the decommissioning construction is included as Figure 3. Additional documentation may be required by a DEC project manager and samples are included in Appendix B. Programs within the DEC that maintain geographic data on monitoring wells strive to keep that data up to date. Owners of these data sets must be notified when a well is decommissioned. Historical groundwater quality data is linked to monitoring well locations so when a well is decommissioned, existing GIS data must be updated to reflect that fact but the coordinate location in the GIS database should not be eliminated. A metal detector may not be able to detect a deeply buried marker so if this locator is important for future utility runs or foundations, a map should be submitted to the property owner and the town engineer showing the decommissioned well locations. Global Positioning System (GPS) coordinates should be indicated on this map. Lastly, whatever documentation is produced should be provided to the property owner, the DEC, and all other parties involved.

9.0 FIELD OVERSIGHT

Over-drilling requires careful observation to detect whether the drill has wandered off the well. Grout preparation and tremie work should be carefully observed. The successful implementation of a decommissioning work plan depends upon proper direction, observation and oversight. Methods to be employed must be clearly worked through and all parties must understand what they have to do before going into the field. Flexibility is allowed where necessary but the work effort must be thorough and effective to protect our groundwater.

10.0 RELATED REFERENCES

- *Groundwater Monitoring Well Decommissioning Procedures*, October 1986. Prepared by Malcolm Pirnie, Inc., for the New York State Department of Environmental Conservation, Division of Environmental Remediation.

- American Society for Testing and Materials, A.S.T.M. D 5299-99, Standard Guide for the Decommissioning of Ground Water Wells, Vadose Zone Monitoring Devices, Boreholes, and Other Devices for Environmental Activities. A.S.T.M.. Philadelphia. 2005.

- New York State Department of Environmental Conservation, Division of Solid Waste, 6 NYCRR Part 360 Solid Waste Management Facilities, 1989.

- New York State Department of Environmental Conservation, Region I - Water Unit, Specifications for Abandoning Wells and Boreholes in Unconsolidated Materials, undated.

- United States Environmental Protection Agency, The Handbook of Suggested Practices for the Design and Installation of Groundwater Monitoring Wells, EPA 600/4-89/034.

FIGURES

APPENDICES

FIGURE 1

MONITORING WELL FIELD INSPECTION LOG

SITE NAME: ______________________ SITE ID.: ______

INSPECTOR: ______

MONITORING WELL FIELD INSPECTION LOG

DATE/TIME: ______

WELL ID.: ______

	YES	NO
WELL VISIBLE? (If not, provide directions below)		
WELL I.D. VISIBLE?		
WELL LOCATION MATCH SITE MAP? (if not, sketch actual location on back)		

WELL I.D. AS IT APPEARS ON PROTECTIVE CASING OR WELL: ......

	YES	NO
SURFACE SEAL PRESENT?		
SURFACE SEAL COMPETENT? (If cracked, heaved etc., describe below)		
PROTECTIVE CASING IN GOOD CONDITION? (If damaged, describe below)		

HEADSPACE READING (ppm) AND INSTRUMENT USED ______

TYPE OF PROTECTIVE CASING AND HEIGHT OF STICKUP IN FEET (If applicable) ______

PROTECTIVE CASING MATERIAL TYPE: ______

MEASURE PROTECTIVE CASING INSIDE DIAMETER (Inches): ......

	YES	NO
LOCK PRESENT?		
LOCK FUNCTIONAL?		
DID YOU REPLACE THE LOCK?		
IS THERE EVIDENCE THAT THE WELL IS DOUBLE CASED? (If yes,describe below)		
WELL MEASURING POINT VISIBLE?		

MEASURE WELL DEPTH FROM MEASURING POINT (Feet): ______

MEASURE DEPTH TO WATER FROM MEASURING POINT (Feet): ______

MEASURE WELL DIAMETER (Inches): ______

WELL CASING MATERIAL: ______

PHYSICAL CONDITION OF VISIBLE WELL CASING: ______

ATTACH ID MARKER (if well ID is confirmed) and IDENTIFY MARKER TYPE ______

PROXIMITY TO UNDERGROUND OR OVERHEAD UTILITIES ______

DESCRIBE ACCESS TO WELL: (Include accessibility to truck mounted rig, natural obstructions, overhead power lines, proximity to permanent structures, etc.); ADD SKETCH OF LOCATION ON BACK, IF NECESSARY.

______

______

DESCRIBE WELL SETTING (For example, located in a field, in a playground, on pavement, in a garden, etc.) AND ASSESS THE TYPE OF RESTORATION REQUIRED.

______

______

IDENTIFY ANY NEARBY POTENTIAL SOURCES OF CONTAMINATION, IF PRESENT (e.g. Gas station, salt pile, etc.):

______

______

REMARKS:

______

______

FIGURE 2

DECOMMISSIONING PROCEDURE SELECTION

NYSDEC Monitoring Well Decommissioning Procedure Selection

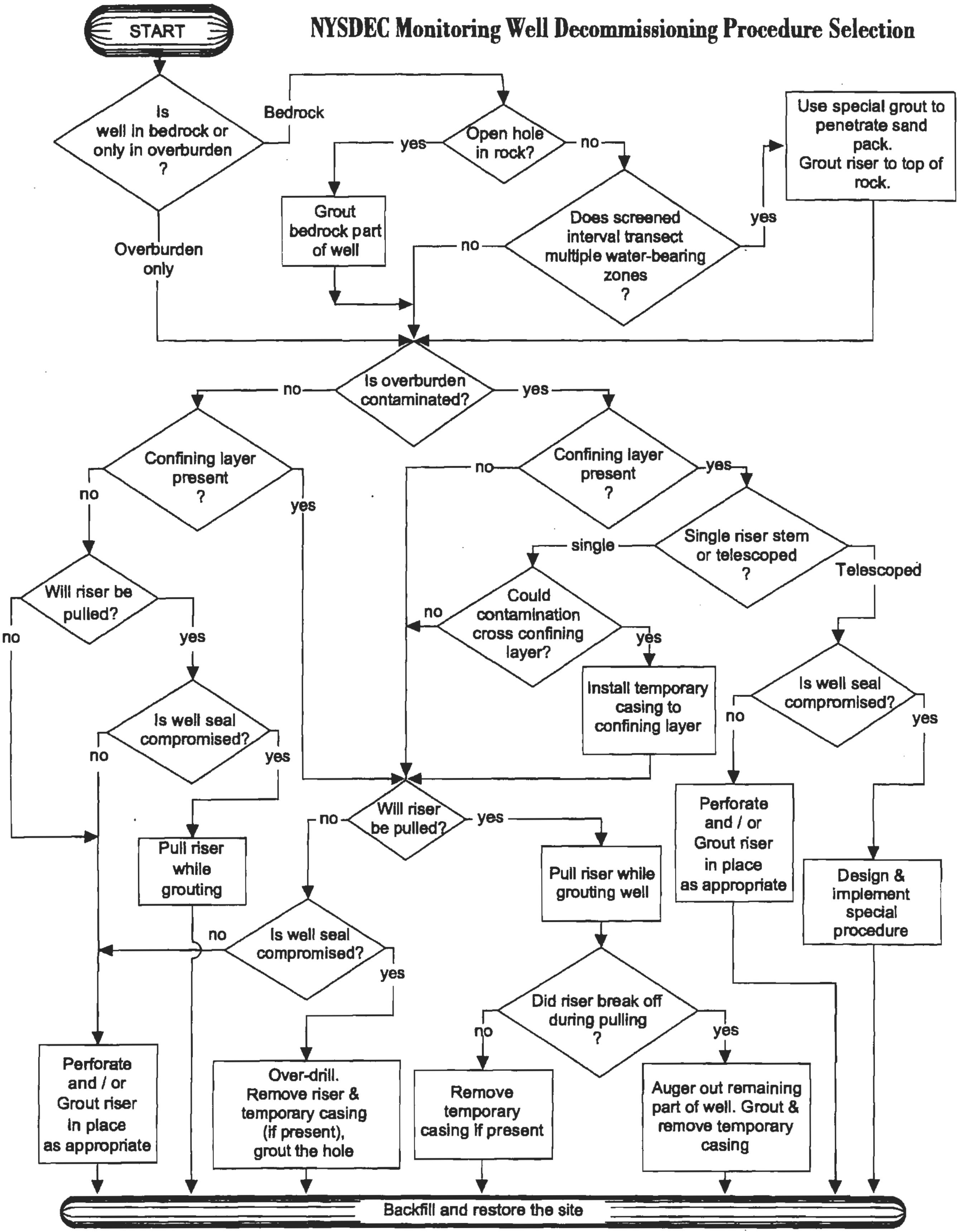


FIGURE 2

FIGURE 3

WELL DECOMMISSIONING RECORD

WELL DECOMMISSIONING RECORD

Site Name:	Well I.D.:
Site Location:	Driller:
Drilling Co.:	Inspector:
	Date:

DECOMMISSIONING DATA
(Fill in all that apply)

OVERDRILLING

Interval Drilled	
Drilling Method(s)	
Borehole Dia. (in.)	
Temporary Casing Installed? (y/n)	
Depth temporary casing installed	
Casing type/dia. (in.)	
Method of installing	

CASING PULLING

Method employed	
Casing retrieved (feet)	
Casing type/dia. (in)	

CASING PERFORATING

Equipment used	
Number of perforations/foot	
Size of perforations	
Interval perforated	

GROUTING

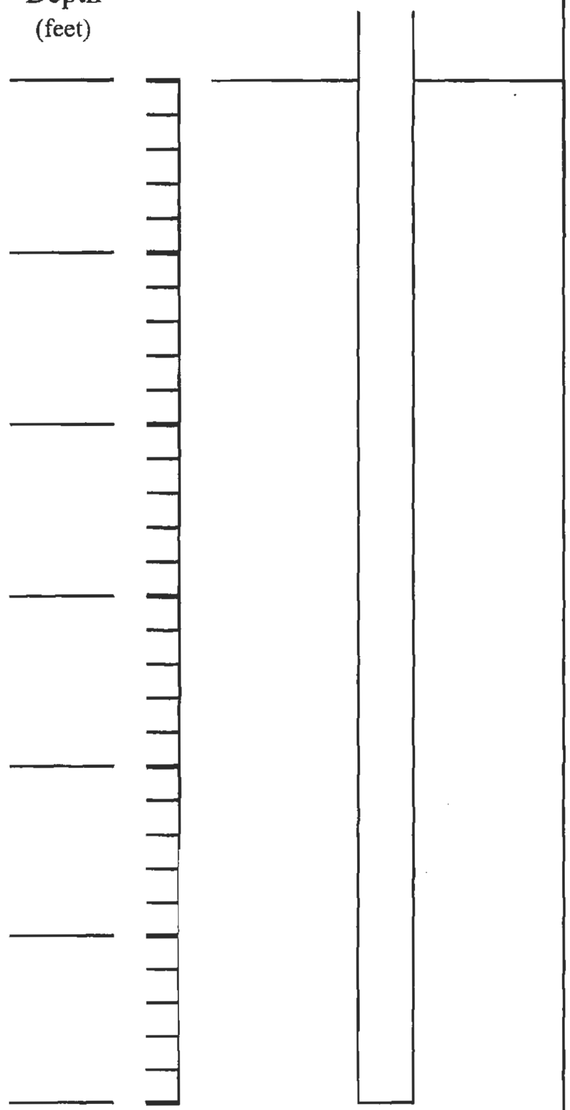
Interval grouted (FBLS)	
# of batches prepared	

For each batch record:

Quantity of water used (gal.)	
Quantity of cement used (lbs.)	
Cement type	
Quantity of bentonite used (lbs.)	
Quantity of calcium chloride used (lbs.)	
Volume of grout prepared (gal.)	
Volume of grout used (gal.)	

WELL SCHEMATIC*

Depth
(feet)



COMMENTS:

* Sketch in all relevant decommissioning data, including: interval overdrilled, interval grouted, casing left in hole, well stickup, etc.

Drilling Contractor

Department Representative

APPENDIX A

HYDRAULIC PRESSURE TESTING OF SCREENED INTERVAL

Appendix A

HYDRAULIC PRESSURE TESTING OF SCREENED INTERVAL

1.0 INTRODUCTION

This guideline presents a method for evaluating the integrity of a grout seal in the screened interval of a well being decommissioned by grouting in place.

2.0 METHODOLOGY

1. Grout the screened interval of the well using a tremie pipe, up to a level of one to two feet above the screened section.

2. Allow the grout to set for a period of not less than 24 hours and not greater than 72 hours before pressure testing of the grouted interval is begun.

3. Place a pneumatic packer at a maximum of four and one half feet above the top of the screened section of the well casing.

4. Apply an inflation pressure to the packer, not exceeding the pressure rating of the well casing material. If the interval between the top of the grout and the bottom of the packer is not saturated, use potable water to fill the interval.

5. Apply a gauge pressure of 5 psig at the well head to the interval for a period of 5 minutes to allow for temperature stabilization. After 5 minutes maintain the pressure at 5 psig for 30 minutes.

6. The grout seal shall be considered acceptable if the total loss of water to the seal does not exceed 0.5 gallons over a 30-minute period.

7. If the grout seal is determined to be unacceptable, an additional 5 feet of grout will ve added to the well casing with a tremie pipe. The interval will be retested as described above.

APPENDIX B - REPORTS

APPENDIX B1 - INSPECTOR'S DAILY REPORT

APPENDIX B2 - PROBLEM IDENTIFICATION REPORT

APPENDIX B3 - CORRECTIVE MEASURES REPORT

Inspector's Daily Report

CONTRACTOR:
ADDRESS:

TELEPHONE:
LOCATION ______________________ FROM ________ TO ________
WEATHER ______________ TEMP ______ A.M. ______ P.M. ______ DATE ________

CONTRACTOR'S WORK FORCE AND EQUIPMENT

DESCRIPTION	*H*	*#*	*DESCRIPTION*	*H*	*#*	*DESCRIPTION*	*H*	*#*	*DESCRIPTION*	*H*	*#*
Field Engineer						Equipment			Front Loader Ton		
Superintendent			Ironworker			Generators			Bulldozer		
						Welding Equip.					
Laborer Foreman			Carpenter								
Laborer									Backhoe		
Operating Engineer			Concrete Finisher								
Carpenter						Paving Equip. & Roller					
						Air compressor					

SEE REVERSE SIDE FOR SKETCH YES ☐ NO ☐

WORK PERFORMED:

PAY ITEMS

CONTRACT		STA		DESCRIPTION	QUANTITY	REMARKS
Number	ITEM	FROM	TO			

TEST PERFORMED:
PICTURES TAKEN:

VISITORS:

QA PERSONNEL
SIGNATURE

REPORT NUMBER
SHEET ________ Of ________

MEETINGS HELD AND RESULTS

REMARKS

REFERENCES TO OTHER FORMS

SKETCHES

SAMPLE LOG

SAMPLE NUMBER

APPROXIMATE LOCATION OF STOCKPILE

NUMBER OF STOCKPILE

DATE OF COLLECTION

CLIMATIC CONDITIONS

FIELD OBSERVATION

SHEETS OF

CORRECTIVE MEASURES REPORT

Date ______________________

Project ______________________ Job Number__________

Contractor ______________________

Subject ______________________

Day	Su	M	T	W	Th	F	Sa

Sky/Precip.	Clear	Partly Cloudy	Cloudy	Rainy	Snow
TEMP.	<32F	32-40F	40-70F	70-80F	80-90F
WIND	No	Light	Strong		
HUMIDITY	Dry	Mod.	Humid		

CORRECTIVE MEASURES TAKEN (Reference Problem Identification Report No.): ______________________

RETESTING LOCATION: ______________________

SUGGESTED METHOD OF MINIMIZING RE-OCCURRENCE: ______________________

SUGGESTED CORRECTIVE MEASURES: ______________________

APPROVALS:

QA ENGINEER: ______________________

PROJECT MANAGER: ______________________

Distribution:

1. Project Manager
2. Field Office
3. File
4. Owner

QA Personnel
Signature: ______________________

PROBLEM IDENTIFICATION REPORT

Date ______________

Project ______________ Job Number__________

Contractor ______________

Subject ______________

Day

Su	M	T	W	Th	F	Sa

Sky/Precip.	Clear	Partly Cloudy	Cloudy	Rainy	Snow
TEMP.	<32F	32-40F	40-70F	70-80F	80-90F
WIND	No	Light	Strong		
HUMIDITY	Dry	Mod.	Humid		

PROBLEM DESCRIPTION Reference Daily Report Number 1: ______________

PROBLEM LOCATION - REFERENCE TEST RESULTS AND LOCATION (Note: Use sketches on back of form as appropriate):

PROBABLE CAUSES: ______________

SUGGESTED CORRECTIVE MEASURES: ______________

APPROVALS:

QA ENGINEER: ______________

PROJECT MANAGER: ______________

Distribution:

1. Project Manager
2. Field Office
3. File
4. Owner

QA Personnel
Signature: ______________

APPENDIX B

RESPONSE TO COMMENTS

Army's Response to Comments from the United States Environmental Protection Agency

Subject: Draft Remedial Action Operations Plan
Inhibited Red Fuming Nitric Acid (IRFNA) Disposal Site (SEAD-13)
Seneca Army Depot
Romulus, New York

Comments Dated: May 5, 2009

Date of Comment Response: June 19, 2009

Army's Response to Comments

GENERAL COMMENT

Comment 1: Note that the subject document does not address how concentrations of hazardous substances in the groundwater will be monitored or how it will be determined when concentrations have been reduced to levels that will allow for unlimited exposure and unrestricted use of the groundwater.

Response 1: The remedy identified in the approved ROD for SEAD-13 (Parsons, 2007) is No Action (NA) combined with the establishment, maintenance, and monitoring of land use controls (LUCs) in the form of a groundwater access/use restriction. It was recognized in the ROD that the selected remedy may result in concentrations of hazardous substances to remain on-site above levels that allow for unlimited use and unrestricted exposure for an indefinite period of time. The intent of the selected remedy is to eliminate human contact with groundwater, thus reducing risk to acceptable levels for potential human receptors, by implementing a groundwater use/access restriction over the geographic area of SEAD-13. The subject document was prepared to implement the selected remedy by eliminating the potential use/access to the groundwater by decommissioning the existing groundwater monitoring wells at SEAD-13.

Note that the subject document has been renamed *Well Abandonment Plan* instead of the *RAOP*.

SPECIFIC COMMENTS

Comment 1: Section 1.0, Introduction, indicates that this Draft Remedial Action Operations Plan (RAOP) is a supplement to the "Land Use Control Remedial Design (LUC RD) Addendum 2." A specific reference for "LUC RD Addendum 2" is not included in Section 4.0, References, nor is a summary of what is included in this document provided. Since the information included in "LUC RD Addendum 2" likely affects the required content of this RAOP, a summary of the LUC RD Addendum 2 should be provided. Revise the RAOP to include a summary of the LUC RD Addendum 2, and provide a specific reference for this document.

Response 1: A reference to Addendum 2 has been added to Section 4.0.

A summary of the LUC Remedial Design (RD) Addendum 2 will be included in the Well Abandonment Plan. The text has been clarified to reference the Addendum and the LUC RD as a supporting document for further details on the LUC implementation, and the subject document is not a supplement of the LUC RD. The revised text is shown below:

> The remedy selected for the former Inhibited Red Fuming Nitric Acid (IRFNA) Disposal Site (SEAD-13) at the Seneca Army Depot (SEDA or the Depot) specifies the implementation, monitoring, maintenance, enforcement, and periodic documentation of a Land Use Control (LUC) that prohibits access to and use of groundwater at SEAD-13 until concentrations of hazardous substances or constituents in the groundwater have been reduced to levels that allow for unlimited exposure and unrestricted use. This remedy is documented in the *Final Record of Decision For Seventeen SWMUs 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).
>
> The details of implementing the SEAD-13 remedy and LUC are provided in the Land Use Control Remedial Design (LUC RD) Addendum 2. The LUC RD for SEAD 27, 66, and 64A dated December 2006 was amended on April 4, 2008 to include SEADs 13, 39, 40, 41, 43/56/69, 44A, 44B, 52, 62, 64B, 64C, 64D, 67, 122B, and 122E each of which require LUCs. The LUC objective for SEAD-13, as identified in the amendment, is to prevent access or use of groundwater until cleanup levels are met. LUC RD Amendment 2 details that the LUC implementation actions at the affected sites (i.e., SEADs 13, 39, 40, 41, 43/56/69, 44A, 44B, 52, 62, 64B, 64C, 64D, 67, 122B, and 122E) may include lease restrictions, an environmental easement, deed restrictions, zoning, annual certification, and a five-year review. The annual certification will be submitted to the NYSDEC and EPA to document that the LUC at SEAD-13 is unchanged and that no activities have occurred that impair or violate the ability of the LUC to protect the public health and environment. Additionally, a five-year review will be conducted to evaluate the effectiveness of the selected remedy for SEAD-13.
>
> As a means to ensure that the groundwater access/use restriction is implemented and that human contact to affected groundwater is eliminated, the Army will abandon monitoring wells currently located in SEAD-13. The Army's decision is based on the fact that SEAD-13 is located within an area currently identified by the State of New York as a regulated freshwater wetland which will affect and probably limit any future redevelopment of the property. If a future decision is made to redevelop the land that includes SEAD-13, examination of the groundwater quality beneath SEAD-13 might be warranted if access to or use of the groundwater was desired/required. However, until such time as a potential reuse is identified and developed, access to and use of the groundwater beneath SEAD-13 is not needed. Furthermore, the available information and data for SEAD-13 demonstrates that releases that are presumed to have occurred in the 1960s have not spread to a point where they affect either areas outside of the designated SWMU or other media (i.e., adjacent surface water and sediment in the Duck Pond). Therefore, the Army believes that that the planned abandonment of the aged monitoring well network at SEAD-13 provides that best term mechanism for preventing access to the groundwater at the SWMU.
>
> The balance of this document, hereafter identified as the "Well Abandonment Plan" or merely the "Plan", presents and describes the Army's plan and approach for abandoning the monitoring well network that currently exists at SEAD-13. Specific information pertinent to the environmental conditions that are present in SEAD-13 and that are associated with the wells

that are scheduled to be abandoned by the Army at SEAD-13 are presented, discussed, and summarized in the following material.

It is also the Army's intention to use this document as the basis and model that will be used for the abandonment of wells at other SWMUs within the Depot where CERCLA decisions have been reached and recorded, and where historic monitoring wells are no longer needed. This Plan has been prepared in accordance with the procedures and recommendations provided in the New York State Department of Environmental Conservation (NYSDEC)'s Draft guidance issued January 8, 2009, titled *Groundwater Monitoring Well Decommissioning Procedures*.

Comment 2: Section 1.8, Purpose, of the RAOP states that the selected remedy for SEAD-13, as presented and approved in the Final Record of Decision (ROD), "consists of a [Land Use Control] LUC that will be implemented, inspected, maintained, reported, and enforced until the concentrations of hazardous substances remaining in groundwater will allow for unlimited exposure and unrestricted use of the site" (Page 1-6). The RAOP only addresses one part of the implementation of the LUC (i.e., decommissioning of monitoring wells), and does not provide further detail on other measures, if any, that will be implemented as part of the LUC to prevent exposure to groundwater nor does it address how the LUC will be inspected, maintained, reported, and enforced until concentrations in groundwater have been reduced to levels that will allow unrestricted use of the site. Furthermore, the RAOP does not address how and when it will be determined that concentrations of hazardous substances in groundwater have been reduced to levels that will allow for unrestricted use of the site. All of the site wells have been proposed for decommissioning, and no plans to install additional wells at the site in the future have been presented in this RAOP. Revise the RAOP to describe all measures that will implemented as part of the LUC (land use restrictions, etc.), provide plans to implement these measures, and state how the LUC will be inspected, maintained, reported, and enforced until concentrations in groundwater have been reduced to levels that will allow for unrestricted use of the site. In addition, revise the RAOP to describe the monitoring program that will be implemented to evaluate concentrations of hazardous substances in groundwater in order to make a determination of "unlimited exposure and unrestricted use of the site." The criteria that will be used to make this determination (e.g., comparison of groundwater data to NYSDEC Ambient Water Quality Class GA Standards, federal maximum contaminant levels (MCLs), etc. over multiple sampling rounds) should be clearly defined as part of the monitoring program. Although we understand that this monitoring program is not strictly required within the ROD, we deem important the Army provide the level of effort that would be needed to meet the criteria specified in the ROD.

Response 2: The subject document addresses the sole component of the remedy: the LUC. As discussed in response to General Comment 1, the selected remedy specified in the signed ROD is NA combined with the implementation of a LUC in the form of a groundwater use/access restriction until groundwater standards are achieved to eliminate human contact with the groundwater thereby reducing the risk to within acceptable levels for potential human receptors. Human contact to groundwater at SEAD-13 will be eliminated once the monitoring wells are decommissioned as proposed in the subject document. Monitoring of the groundwater is not a component of the approved remedy defined in the ROD. In the absence of monitoring to demonstrate that the concentrations of COCs in the groundwater meet the groundwater standards, the LUC will be maintained and monitored, and periodic reports of inspections will be provided.

As discussed above, implementation and maintenance of the LUC at SEAD-13 is addressed under the LUC RD Addendum 2. The subject document is provided to focus on the abandonment of the wells, since the decommissioning of the wells removes the pathway for future receptors to contact groundwater. The Addendum 2 is a supporting document on the implementation of the LUC remedy.

Comment 3: The second paragraph of Section 1.8, Purpose, states that the risk associated with the use of groundwater at SEAD-13 is "driven by the concentrations of nitrate, aluminum, and manganese." Because only a limited discussion of previous groundwater investigations and results is provided, it is unclear whether concentrations of hazardous substances in addition to nitrate, aluminum, and manganese should be monitored in order to determine when LUCs can be removed at SEAD-13. Section 1.6, Groundwater Investigation and Analytical Results Summary, indicates that several metals in addition to aluminum and manganese were detected in the groundwater at concentrations exceeding their applicable NYSDEC Ambient Water Quality Class GA Standards. Revise the RAOP to indicate which specific constituents should be included in a groundwater monitoring program at the site.

Response 3: The remedy is to maintain the LUC in place. Therefore, monitoring concentrations of COCs is not required and is not an element of the remedy in the ROD.

A full discussion of COCs has been previously provided to the EPA and the NYSDEC in the Final ROD, March 2007; and Final Decision Document, Mini Risk Assessment, SEAD-13, Inhibited Red Fuming Nitric Acid Disposal Area, Seneca Army Depot Activity, Romulus, New York, July 2004.

Comment 4: A detailed schedule indicating the timetable for initiating and completing the proposed tasks has not been provided in the RAOP. A timeline or schedule which includes proposed mobilization/demobilization, work completion periods, and report finalization should be included. Revise the RAOP to include a detailed schedule indicating the proposed mobilization/demobilization, work completion periods, and report finalization.

Response 4: A schedule has been prepared for the well abandonment tasks including decommissioning of the groundwater monitoring wells and preparation and submittal of the final report. The schedule will be incorporated into the subject document as Figure 2-1.

Comment 5: The RAOP has not identified key organizations that will be involved in the proposed work. Contractors and other key personnel and their role in implementation of the RAOP should be identified. Revise the RAOP to present this information.

Response 5: Qualified subcontractors will be identified to perform the field activities identified in the subject document for SEAD-13. A letter identifying the subcontractors awarded the work will be submitted to the EPA and the NYSDEC prior to the start of the field program.

Comment 6: Section 2.0, Groundwater Monitoring Well Abandonment Plan, indicates that site wells will be abandoned in accordance with the procedures outlined in the *Monitoring Well Abandonment Work Plan, Seneca Army Depot Activity, Romulus, New York* (Parsons, 2005) and the *Final Sampling and Analysis Plan for Seneca Army Depot Activity (SAP)* (Parsons, 2006). All of the details that will be required for a contractor to implement the proposed work should be included in the RAOP. Revise the RAOP to append the applicable sections of the above-referenced documents so that all required information is presented in a single work plan.

Response 6: Decommissioning of the monitoring wells at SEAD-13 will be performed in accordance with NYSDEC's recently updated "Groundwater Monitoring Well Decommissioning Procedures"

(January 2009). These updated procedures will be referenced in the subject document and presented as Appendix A. Well construction information is provided in Table 2-1.

Army's Response to Comments from the New York State Department of Environmental Conservation

Subject: Draft Remedial Action Operations Plan
Inhibited Red Fuming Nitric Acid (IRFNA) Disposal Site (SEAD-13)
Seneca Army Depot
Romulus, New York

Comments Dated: May 8, 2009

Date of Comment Response: June 19, 2009

Army's Response to Comments

GENERAL COMMENTS

Comment 1: Recently we have changed the method selection process. We have re-drafted the NYSDEC guidance to say that primarily, un-needed monitoring wells must be decommissioned and that the effectiveness of the decommissioning depends upon the grout seal. Secondarily, other case-by-case factors will determine whether the wells will be grouted in-place and left or grouted in-place and physically removed.

In all cases grouting is key. The grouting must not be jeopardized if a well riser or casing breaks off during pulling or if the drilling auger wanders off the well during over-drilling. Wells to be pulled are first prepared by cutting, severing or breaking the well bottom. Then the well is tremied full of grout. If the well breaks during lifting, segments left behind will be full of grout. Wells to be over-drilled are also first filled with grout but the bottoms need not be broken out. If the drilling auger wanders off the well, the remaining portion is sealed.

As cited in Section 2.0 of your Plan, we offer some modifications to our guidance. I note that the "Monitoring Well Abandonment Workplan" dated May 3, 2005, references our 1996 guidance document "Groundwater Monitoring Decommissioning Procedures" originally prepared for the DEC by Malcolm Pirnie in the early '90s. The original guidance was prepared to batch-process approximately one thousand monitoring wells. The guidance therefore sorted the monitoring wells by host geology, well construction type, level of contamination which might be present, and feasibility of pulling. These sorting criteria led one to the appropriate method to use. Decommissioning methods in order of DEC preference were 1. well removal by pulling, 2. grouting up the well and leaving it in-place, and lastly, 3. over-drilling the well followed by grouting. A fourth option was to design a special procedure.

Best engineering practices are always to be followed and one must use best professional judgment.

Our latest draft well decommissioning guidance document attached.

Response 1: The Army has revised the subject document in accordance with NYSDEC's new guidance. Note that the subject document has been renamed *Well Abandonment Plan* instead of the *RAOP*.

SPECIFIC COMMENTS

Comment 1: Section 1.6. The concentrations at MW13-11 and MW13-14 were above the Class GA standards for nitrate/nitrite (expressed as N) and nitrate (expressed as N). These wells should be retained for future monitoring.

Response 1: Monitoring wells MW13-11 and MW13-14 will not be retained.

The remedy identified in the approved ROD for SEAD-13 (Parsons, 2007) is No Action (NA) combined with the establishment, maintenance, and monitoring of land use controls (LUCs) in the form of a groundwater access/use restriction. It was recognized in the ROD that the selected remedy will allow concentrations of hazardous substances to remain in the on-site groundwater above levels that allow for unlimited use and unrestricted exposure for an indefinite period of time. The available data suggest that these contaminants are located in a finite area, and are stable and perhaps diminishing. The intent of the remedy selected for SEAD-13 is to eliminate human contact with groundwater, thereby reducing the potential risk and hazards to acceptable levels for human receptors. The selected remedial action will abandon the existing monitoring well network, and will implement a groundwater use/access restriction over the geographic area of SEAD-13 until data are provided to indicate that it can be used for beneficial purposes. As was discussed, SEAD-13 is located in or immediately adjacent to a mapped wetland area at the former Depot, and it is unlikely that any new development will be allowed at this site and thus groundwater access/use is not expected for the foreseeable future due to prevailing wetland regulations and use limitations.

In the absence of monitoring to demonstrate that the concentrations of COCs in the groundwater meet the groundwater standards, the LUC will be maintained and monitored, and periodic reports of inspections will be provided. If a future user of SEAD-13 is interested in removing the LUC, the future user could install new monitoring wells and initiate a program to evaluate the concentrations of COCs in the groundwater in coordination with NYSDEC and USEPA, at that time.

Comment 2: Section 2.0. See General comment above.

Response 2: The Army is revising the subject document based on the new NYSDEC guidance. Based on an inspection of the condition of each well, the wells will be abandoned using one of the following four methods: (1) Grouting in place; (2) Perforating the casing followed by grouting in place; (3)

Grouting in place followed by case pulling; and (4) Over-drilling and grouting with or without a temporary casing. Section 2.0 has been revised to discuss the method selection process.