ADMIN RECORD / LOG IN INDEX

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TECHNICAL MEMORANDUM

Date: September 16, 2008

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To: Julio Vazquez, USEPA
Kuldeep Gupta, NYSDEC
Mark Sergott, NYSDOH

From: Todd Heino, Parsons; Jeff Adams, Parsons

Subject: Year 1, Round 3 – Long-Term Monitoring Results for OB Grounds at Seneca Army Depot Activity, Romulus, New York

1. INTRODUCTION

Long-term monitoring (LTM) of the groundwater and the vegetative soil cover is being performed at the Open Burning (OB) Grounds located at the Seneca Army Depot Activity (SEDA or the Depot) in Romulus, New York, in accordance with procedures defined in the "Long-Term Monitoring Plan for the Open Burning Grounds, Final" (LTM Plan) (Parsons, 2007). The LTM Plan was prepared to document how monitoring of groundwater, the soil cap, and sediment in Reeder Creek, which are integral components of the remedial action selected for the OB Grounds in the "Record of Decision (ROD), Former Open Burning Grounds Site, Final" (Parsons, 1999), which indicated that monitoring of groundwater and the vegetated soil cap at the OB Grounds, would be performed.

The collection of periodic groundwater quality data is needed to monitor the effectiveness of the implemented remedy at the site for preventing future impacts to the groundwater at the OB Grounds and to the sediments in Reeder Creek. Additionally, monitoring of the vegetated compacted soil cap placed over the buried soils at the OB Grounds is required to assure its long-term integrity and to prevent direct contact to, and incidental ingestion of, soils containing lead at concentrations up to 500 mg/kg by terrestrial wildlife at the site.

In accordance with the LTM Plan (Parsons, 2007), six groundwater monitoring wells were installed between August 6, 2007 and August 10, 2007. The first round of groundwater sampling was completed between November 21, 2007 and November 28, 2007. The soil cap was first inspected on January 11, 2008. The results and observations of the first monitoring event were reported in a technical memo submitted to the U.S. Army, (U.S. Environmental Protection Agency (EPA), the New York State Department of Environmental Conservation (NYSDEC) and the New York State Department of Health (NYSDOH) on January 25, 2008. The second round of groundwater sampling and cap inspections were

completed between February 25, 2008 and February 26, 2008. The results of the second monitoring event were reported to all parties in a technical memo submitted on May 19, 2008. The third round of groundwater sampling and cap inspections were completed between May 20, 2008 and May 21, 2008. The results and conclusions from the third round are presented below.

1.1 Objective

The overall objectives of the monitoring program is to monitor the effectiveness of the remedial actions completed at the site in preventing future groundwater quality deterioration at the site, the recontamination of sediments within Reeder Creek, and the incidental contact and ingestion of contaminated soil left buried at the site by indigenous terrestrial wildlife. Reeder Creek abuts a portion of the site, and it is hydraulically downgradient of the location where lead contaminated soil has been interred beneath a soil cap. Being downgradient of the internment location, sediments in the creek could be contaminated with lead and copper either via contaminated groundwater migration and discharge into the creek, or via overland flow of storm-event runoff that has mobilized previously interred contaminated soils.

Specifically, the ROD required:

- Periodic monitoring of groundwater quality at the OB Grounds for lead and copper content; and,
- Periodic monitoring of the vegetated, compacted soil cap placed over the lead contaminated soil remaining at the OB Grounds to assess whether evidence of erosion or protective cover breaching were present. .

In addition to assessing the quality of site groundwater and the integrity of the cap, the results of the periodic monitoring are used to assess the need for design and implementation of any sediment monitoring program that may subsequently be needed to assess potential site impacts to the sediment in Reeder Creek.

1.2 Site Description

SEDA is a 10,587-acre former military facility located in the Towns of Romulus and Varick, Seneca County New York. The United States Government acquired the land for the Depot and began construction of the Depot in 1941, and the Department of the Army operated the Depot until 2000, when the military mission was terminated. Since 2001, more than 8,000 acres of the former Depot have been transferred to other public and private parties, including the U.S. Coast Guard, the State of New York, and the Seneca County Industrial Development Agency (SCIDA) for beneficial reuse. .

SEDA is located between Seneca Lake and Cayuga Lake and is partially bordered by New York State Highway 96 on the east and New York State Highway 96A on the west. The remainder of the site is bordered by sparsely populated farmland and residential areas.

The former OB Grounds is located in the northwestern portion of the Depot where future use of the land is currently designated for future conservation purposes. The former site sits on gently sloping terrain as shown in **Figure 1**. The OB Grounds is bounded on the east by Reeder Creek, which is a perennial creek that is generally less than 1 foot deep and eventually flows into Seneca Lake. The quality of surface water in Reeder Creek has been designated by the State of New York as a Class C water body (best usage of fresh water is fishing; the waters shall be suitable for fish propagation and survival). Seneca Lake is located approximately 10,000 feet west of the OB Grounds site and is used as a source of drinking water for numerous surrounding communities and the SEDA.

The OB Grounds is vegetated with grass and brush and there are no permanent structures within the area other than small concrete bunkers. The Open Detonation Area (SEAD-45) is located immediately north of the OB Grounds, and the Explosive Ordnance Disposal Area (SEAD-57) is located approximately 4,000 to 5,000 feet south of the former OB Grounds. A site plan of the former OB Grounds prior to the removal of contaminated soil is provided in **Figure 1**.

The stratigraphy of the OB Grounds generally consists of between 2 and 10 feet of glacially derived till below which is a zone of weathered bedrock. The depth to groundwater in the till/weathered shale aquifer varies seasonally between approximately 2 and 7 feet below the ground surface. Infiltration of precipitation is the sole source of groundwater for the overburden aquifer and the direction of the groundwater flow in the till/weathered shale aquifer is generally to the east toward Reeder Creek as shown in **Figure 2.** A possible groundwater divide has been noted near the western edge of the site during various prior monitoring episodes. The location of the divide is highlighted on **Figure 2** and represents a high point of the upgradient groundwater flow regime. The divide diverts a portion of the groundwater to the west, away from Reeder Creek, which lies to the east. Historic sampling results from wells located west of the divide suggest that the quality of groundwater has not been impacted by soils at the OB Grounds.

Surface drainage is generally to the east-northeast towards Reeder Creek via a series of discontinuous, historic drainage ditches and culverts that are remnants of the former OB Grounds surface water control system. Portions of the former drainage ditches were disturbed or destroyed during the remedial action performed at the former AOC. Additionally, the historic surface water spillways connecting the OB Grounds and Reeder Creek were plugged during the remedial action to prevent surface overflow to the creek.

Little of the current storm event runoff impacting the former OB Grounds reaches the creek via overland flow because it is captured in one of the numerous, localized topographic lows that are scattered throughout the former AOC. The topographic lows result from the soil removal and interment action performed at the AOC. The captured stormwater subsequently infiltrates into the soil or evaporates.

Given the gentle slope of the site; the re-establishment of a vegetative covering over a majority (exclusive of the earthen road system) of the site; the presence of numerous localized lows where stormwater ponds, infiltrates, and evaporates; and, the plugging of surface water spillways between the former OB Grounds and Reeder Creek, the potential for sediment transport from the AOC is considered minimal. As such, the Army would anticipate that any sediment identified in Reeder Creek adjacent to the OB Grounds at this time most likely results from the downstream migration of sediments and entrained soils from upstream (non-OB Grounds) sources. It is inevitable sediments and entrained soils in Reeder Creek will contain some level of metals that are consistent with the natural background levels for soils found at the Depot. However, it is unlikely that lead or copper found in the sediments or Reeder Creek could result from possible future releases at the OB Grounds unless evidence of these metals was first observed in samples of the groundwater from locations around the site, or signs of significant erosion of the protective cover was noted prior to the discovery of metals in the sediments of the creek.

1.3 OB Grounds Remedial Action

The remedy specified in the ROD for the OB Grounds includes:

- Removal of the berms surrounding the historic burn pads;
- Removal of at least 1-foot of all soils;
- Placement of a 9-inch vegetative cover over any soils with lead concentrations greater than 60 mg/kg, but less than or equal to 500 mg/kg;
- Excavation of sediments in Reeder Creek with elevated levels of copper or lead; and
- Monitoring program for groundwater, sediment and the capped areas.

The first four of these required actions were conducted between June 1999 and May 2004. Groundwater monitoring at the site began in August 2007, and inspections of the cap began in January of 2008.

Prior to the preparation of the LTM Plan and initiation of the monitoring, the Army, EPA, and NYSDEC decided to reserve development of a sediment monitoring program until groundwater monitoring and cap inspection components indicated that releases from the OB Grounds might be or were occurring and could be impacting the sediments in Reeder Creek. Therefore, no post-remediation sediment monitoring is currently being conducted.

2. Groundwater Monitoring

Six wells (MW23-1, MW23-2, MW23-3, MW23-4, MW23-5, and MW23-6) were sampled as part of the third monitoring event on May 20, 2008. Groundwater samples were collected and submitted to Columbia Analytical Services (CAS) in Rochester, New York for the analysis of total copper and total lead by USEPA SW846 Method 6010B. The results of the lead and copper analyses were obtained for subsequent comparison to site-specific groundwater action levels that are defined in **Table 1**.

The following geochemical parameters were measured and recorded in the field, the following geochemical parameters for each groundwater sample collected: pH, ORP, dissolved oxygen (DO), conductivity, temperature, and turbidity. Data from the geochemical parameters were used to assess when the well was purged and stabilized adequately prior to sampling and to assess macro-groundwater quality.

Groundwater samples were collected at the former OB Grounds using low flow sampling techniques. Sampling procedures, sample handling and custody, holding times, and collection of field parameters were conducted in accordance with the "Final Sampling and Analysis Plan for Seneca Army Depot Activity (SAP)" (Parsons, 2005).

2.1 OB GROUNDS GROUNDWATER MONITORING RESULTS

Groundwater Levels

The groundwater levels recorded on May 20, 2008 during the third round of groundwater monitoring and the historic groundwater elevation range are presented on **Table 2**.

Chemical Results

Neither total copper nor total lead were detected in any of the six wells that during the third round as shown in **Table 3**. Similarly, copper and lead were not detected in any of the groundwater samples characterized during the first or second rounds. Cemical specific detection limits were below action levels for both of these parameters. The data support that groundwater at the site has not been impacted by residual levels of copper and lead that remain in the soils at the site.

3. SOIL CAP INSPECTION

The cap inspection consisted of documenting observations of the 25, 125 by 125-foot grids, where soils with residual lead concentrations in excess of 60 mg/Kg but less than 500 mg/Kg were interred under a 9-inch soil cover. The locations of the grids are shown on **Figure 3**.

Overall, minimal erosion and a lack of animal burrowing activity were observed in the capped areas. Shallow surface water drainage paths were observed in three grids (L8, I8, and J6). At Grid I8, sparse vegetation was observed. The observations were reported to the Army, and the washout areas observed in grids L8, I8, and J6 were repaired in May 2008. The areas of the cap where sparse vegetatetion was found, were reseeded.

A cap inspection log summarizing observations from the third monitoring event is provided in **Table 4**.

4. CONCLUSIONS

Based on the results of Year 1, Round 3 LTM at the OB Grounds, the following conclusions have been reached:

- Residual lead and copper concentrations remaining in the soils have not impacted groundwater at, or in the immediate vicinity of ,the site;
- The integrity of the vegetated soil cap overlying interred contaminated soils at the site was generally intact and there is no evidence that terrestrial wildlife are exposed to the contaminated soils below the 9-inch cap at this time. The washout areas were repaired and the soil cap has been restored to its original condition;
- The Army will continue to monitor cap erosion, and note any instance of cap erosion or exposed native soil; and,
- Based on the groundwater data and the cap inspection, there is no evidence to suggest that the OB Grounds may be contributing to the degradation of sediment quality in Reeder Creek. Therefore, there is currently no reason to develop a sediment monitoring plan, and no sediment monitoring within Reeder Creek is warranted due to the action completed at the OB Grounds at this time.

In accordance with the ROD and the Final Long-Term Monitoring Plan for the Open Burning Grounds (Parsons, 2007), quarterly groundwater monitoring and cap inspections will continue. The next quarterly monitoring will occur at the end of August 2008. After one year of monitoring has been completed (four rounds), the Army will prepare an annual report that presents all of the results and conclusions of the first year of monitoring, and provides recommendations for further groundwater monitoring at the OB Grounds.

Table 1
Quantitative Limits and CUGs for Copper and Lead
OB Grounds LTM Quarter 3 Report
Seneca Army Depot Activity

ANALYTES	Contract Required Quantitation Limits Water (µg/L)	Action Level Water (µg/L)
Copper	20	200
Lead	5	15

Notes:
1. Copper action level is from NYSDEC Class GA Groundwater Standard (TOGS 1.1.1, June 1998 through addendum June 2004).
2. Lead action level is from USEPA Maximum Contaminant Limit (MCL), Source http://www.epa.gov/safewater/mcl.html#inorganic.html
3. Referenced from Table 5-1 in "Final Long-Term Monitoring Plan for the Open Burn (OB) Grounds", (Parsons, Jan 2007)

Table 2
Groundwater Elevation and Well Monitoring
OB Grounds LTM
Seneca Army Depot Activity

Monitoring Well	Top of Riser Elevation (ft)	Round 3 - May 2008			Historical Data			
					Groundwater Elevation (ft)			
		Date	Depth to Groundwater (ft)	Water Level Elevation (ft)	Maximum	Minimum	Range	Well Depth (ft)
MW23-1	622.64	05/20/2008	11.63	611.005	611.18	610.64	0.54	15.50
MW23-2	622.28	05/20/2008	9.17	613.11	613.50	612.68	0.82	15.50
MW23-3	619.18	05/20/2008	9.68	609.501	609.94	608.38	1.56	15.50
MW23-4	637.11	05/20/2008	4.14	632.967	633.91	628.51	5.40	17.50
MW23-5	639.47	05/20/2008	5.19	634.282	636.62	632.47	4.15	17.50
MW23-6	632.59	05/20/2008	5.54	627.054	628.81	624.24	4.57	17.60

Table 3
Groundwater Analytical Data - Round 3
OB Grounds LTM Quarter 3 Report
Seneca Army Depot Activity

Project:									OB Grounds		OB Grounds		OB Grounds		OB Grounds		OB Grounds		OB Grounds		OB Grounds		OB Grounds	
Location ID:									MW23-1		MW23-2		MW23-2		MW23-3		MW23-4		MW23-5		MW23-6			
Matrix:									GW		GW		GW		GW		GW		GW		GW			
Sample ID:									OBLM20015		OBLM20017		OBLM20016		OBLM20018		OBLM20019		OBLM20020		OBLM20021			
Date:									5/21/2008		5/21/2008		5/21/2008		5/21/2008		5/21/2008		5/21/2008		5/20/2008			
QC Code:									SA		DU		SA		SA		SA		SA		SA			
Study ID:									LTM		LTM		LTM		LTM		LTM		LTM		LTM			
Study Round									3		3		3		3		3		3		3			
Parameter	Units	Maximum Value	Frequency of Detection	Action Level Source	Action Level	Number of Exceedances	Number of Times Detected	Number of Samples Analyzed	Value	(Q)	Value	(Q)	Value	(Q)	Value	(Q)	Value	(Q)	Value	(Q)	Value	(Q)		
Copper	UG/L	0	0%	GA	200	0	0	7	20	U	20	U	20	U	20	U	20	U	20	U	20	U		
Lead	UG/L	0	0%	MCL	15	0	0	7	5	U	5	U	5	U	5	U	5	U	5	U	5	U		

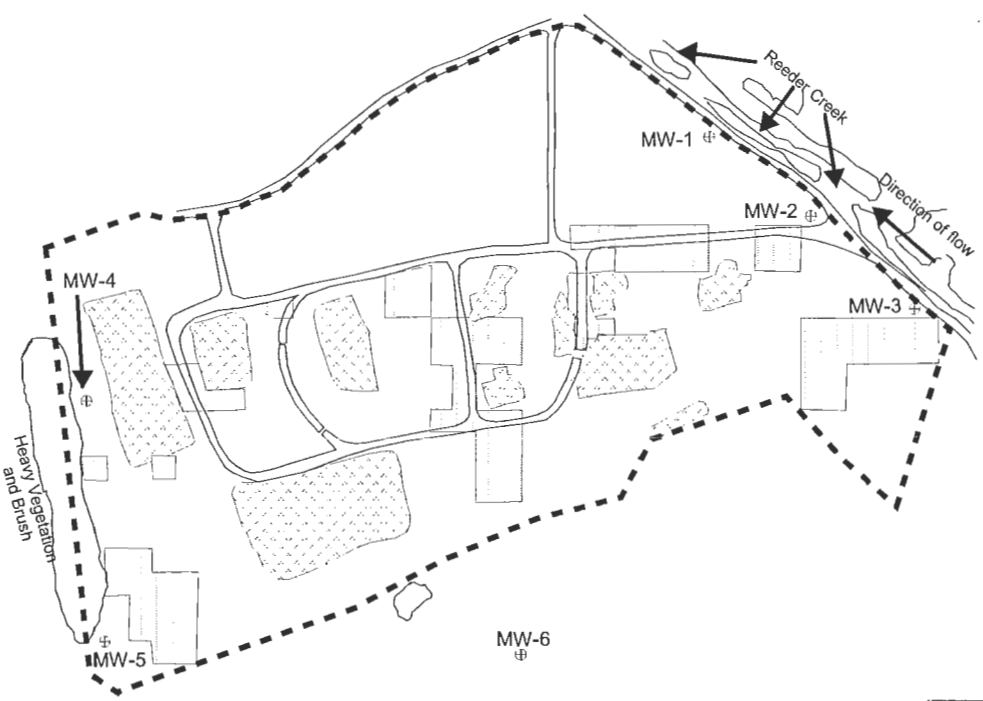
Notes:
U - compound was not detected

1. Copper action level is from NYSDEC Class GA Groundwater Standard (TOGS 1.1.1, June 1998).
2. Lead action level is from US EPA Maximum Contaminant Limit (MCL),
Source http://www.epa.gov/safewater/mcl.html#inorganic.html

Table 4
Soil Cap Inspection Log
OB Grounds LTM Quarter 3 Report
Seneca Army Depot Activity

	Observations		
Grid #	Round 1 - January 2008	Round 2 - February 2008	Round 3 - May 2008
S8	Several 1" to 2" size mice holes were observed	No change	No change
S8	Several 1" to 2" size mice holes were observed on the ground surface.	No change	No change
R8	Several 1" to 2" size mice holes were observed on the ground surface.	No change	No change
Q8	2" mice hole was observed on the ground surface.	No change	No change
Q8	A cluster of 1" to 2" size mice holes was observed.	No change	No change
P10	A cluster of 1" to 2" size mice holes was observed.	No change	No change
L9	Two mice holes approximately 6" deep	No change	No change
L9	A mouse hole approximately 6"deep was observed	No change	No change
L9	A mouse hole approximately 6"deep and 6" diameter was observed	No change	No change
L8	Minor erosion along the edge of the soil cap from surface water flow.	Surface water runoff path forming. Repaired drainage path May 2008.	Repaired drainage path May 2008.
I8	A mouse hole about 2" to 3" in size was observed	Vegetation spotty, large amounts of surface soil exposed. Reseeded May 2008.	Reseeded May 2008.
I8	Minor erosion of the soil cap.	Surface water runoff path forming. Repaired drainage path May 2008.	Repaired drainage path May 2008.
I6	A cluster of 1" to 2" size mice holes was observed.	No change	No change
J6	2" mice holes were observed on the ground surface.	Short surface water drainage path; native soil not visible. Repaired drainage path May 2008.	Repaired drainage path May 2008.
H9	Two mice 2" size holes was observed.	No change	No change
D7	Two mice 2" size holes was observed.	No change	No change
B3	A mouse hole approximately 6" wide and approximately 6" deep was	No change	No change

Notes:
1. All grids capped areas were inspected. Grids with no signs of erosion or other disturbances to the cover are not included in this log.
2. The Army repaired the washout areas noted above, and reseeded areas with sparse vegetation on or before May 22, 2008.



Approximate Location of Interred Soils

Former Burning Pads

OB Grounds Boundary

Proposed Monitoring Well Location

Map not to scale. Site features derived from information presented in "Soil and Sediment Remediation, Open Burning Grounds, Completion Report." See Figure 4-13 . (Weston Solutions, Inc. June 2005)

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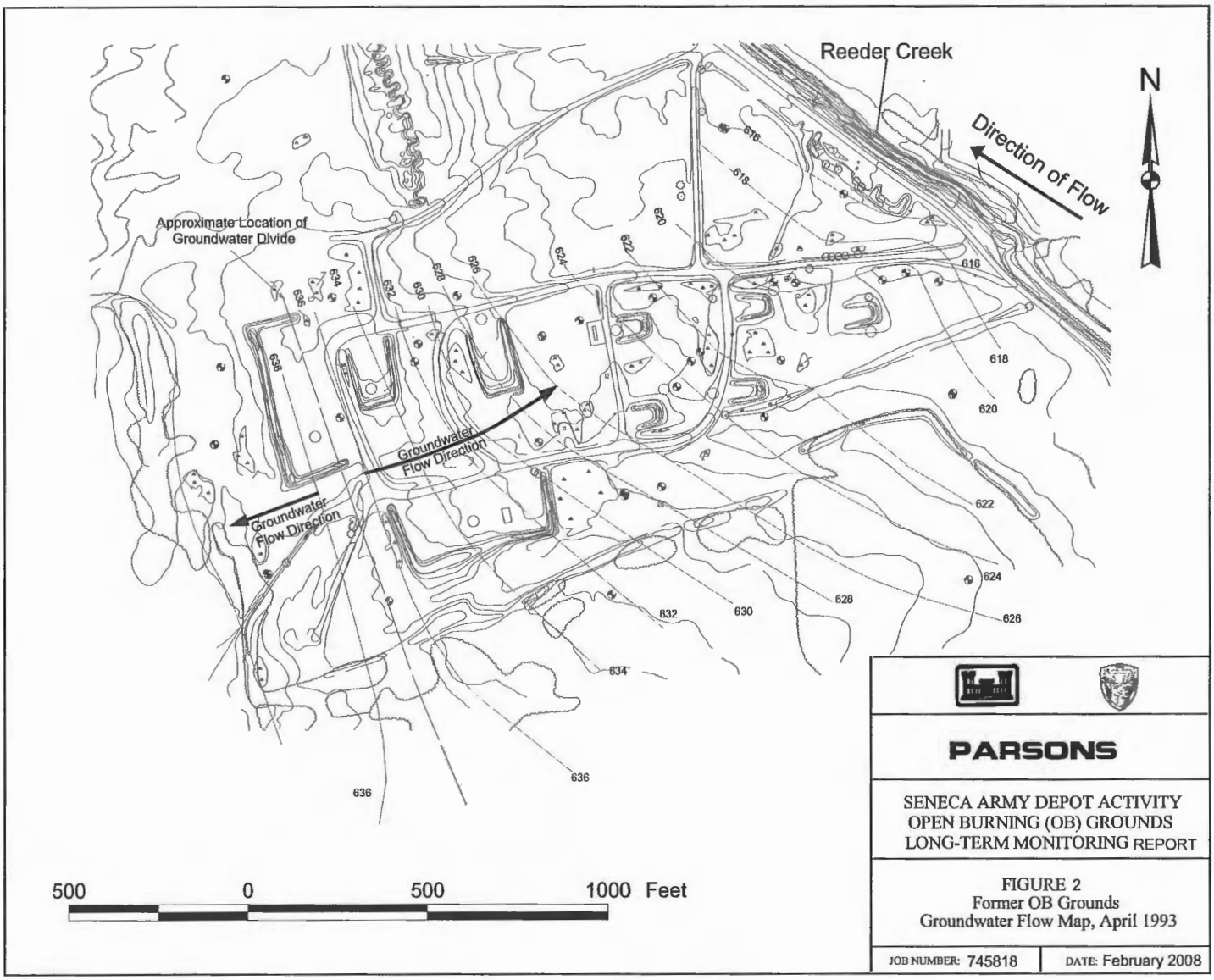
SENECA ARMY DEPOT ACTIVITY
OPEN BURNING (OB) GROUNDS
LONG-TERM MONITORING PLAN

FIGURE 1
Former Open Burning Grounds
Site Plan

JOB NUMBER: 745818 | DATE: APRIL 2008



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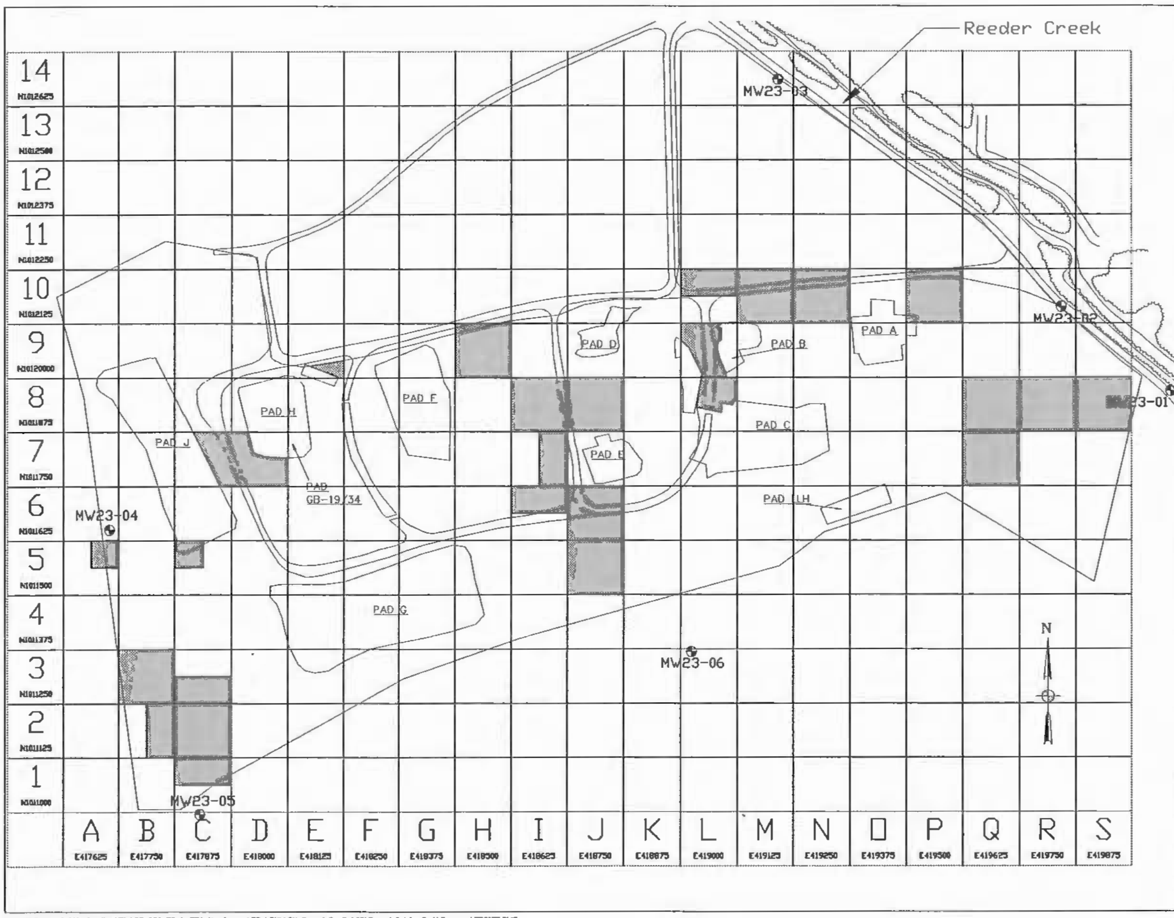
SENECA ARMY DEPOT ACTIVITY
OPEN BURNING (OB) GROUNDS
LONG-TERM MONITORING REPORT

FIGURE 2
Former OB Grounds
Groundwater Flow Map, April 1993

JOB NUMBER: 745818 | DATE: February 2008



LEGEND

Wells installed August 2004

Area of 9-inch vegetative cover over soil. Having lead concentrations between 60 and 500 ng/ug. (Remedial Action, 1999-2004)

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CLIENT/PROJECT TITLE

SENECA ARMY DEPOT
OPEN BURNING GROUNDS
LONG-TERM MONITORING REPORT

DEPT. ENVIRONMENTAL ENGINEERING | Proj. No. 745618-02000

FIGURE 3
OPEN BURNING GROUNDS
SOIL CAP AREAS AND WELL LOCATIONS

SCALE 1" = 200' | DATE APRIL 2008 | REV –

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