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TECHNICAL MEMORANDUM

Date: May 19, 2008

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

From: Todd Heino, Parsons; Jacqueline Travers, Parsons

Subject: Year 1, Round 2 – 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 at the Open Burning (OB) Grounds located at the Seneca Army Depot Activity (SEDA or the Depot) in Romulus, New York, groundwater monitoring is being performed, as specified in the "Long-Term Monitoring Plan for the Open Burning Grounds, Final" (LTM Plan) (Parsons, 2007). The LTM Plan is based on 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, as well as the sediment in Reeder Creek, are integral components of the approved remedy implemented at the OB Grounds. The collection of groundwater quality data are needed to monitor the effectiveness of the implemented remedy at the site for preventing future impacts to groundwater at the OB Grounds and to 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 at the OB Grounds between November 21, 2007 and November 28, 2007. The OB Grounds cap was first inspected on January 11, 2008. The results of the first monitoring event were presented in a technical memo submitted on January 25, 2008. A second round of groundwater sampling and cap inspections were completed between February 25, 2008 and February 26, 2008. The results and conclusions from the second round are presented below.

1.1 Objective

The overall objectives of the monitoring program is to monitor the effectiveness of the actions completed 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. Specifically, the ROD required:

- Periodic monitoring of groundwater quality at the OB Grounds; and,
- Periodic monitoring of the vegetated, compacted soil cap placed over the lead contaminated soil remaining at the OB Grounds.

In addition to assessing the quality of site groundwater and the integrity of the cap, the results of the periodic monitoring are to be used to assess the need for any sediment monitoring program for Reeder Creek.

1.2 Site Description

SEDA is a 10,587-acre former military facility located in Seneca County near Romulus, New York, which has been owned by the United States Government and operated by the Department of the Army since 1941. SEDA is located between Seneca Lake and Cayuga Lake in Seneca County and is bordered by New York State Highway 96 on the east, New York State Highway 96A on the west, and sparsely populated farmland on the north and south.

The former OB Grounds is located in the northwestern portion of the Depot where land is 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 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, the re-establishment of 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. The Army would anticipate that any sediment identified in Reeder Creek adjacent to the OB Grounds at this time would most likely result from the downstream migration of sediments from upstream (non-OB Grounds) sources which contain metals concentrations that are consistent with the natural background levels for soils found at the Depot.

1.3 OB Grounds Remedial Action

A remedial action was conducted at the site between June 1999 and May 2004. The remedy specified in the ROD for the OB Grounds included:

- 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.

It was later decided between the Army, USEPA and NYSDEC 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. The monitoring program for groundwater and the capped areas is documented in the "Final Long-Term Monitoring Plan for the Open Burning Grounds" (Parsons, 2007).

2. GROUNDWATER MONITORING ACTIVITES

Six wells (MW23-1, MW23-2, MW23-3, MW23-4, MW23-5, and MW23-6) were installed in August 2007 and sampled as part of the second monitoring event on February 26, 2008. Groundwater samples were collected and submitted to Columbia Analytical Services (CAS) in Rochester, New York for the following analyses of copper and lead by USEPA SW846 Method 6010B

In the field, the following geochemical parameters were measured and recorded for each groundwater sample: pH, ORP, dissolved oxygen (DO), conductivity, temperature, and turbidity. Chemical analysis for lead and copper was completed to compare the groundwater concentration to the cleanup goals, listed in **Table 1**. The other geochemical parameters were measured to assess when the well was purged adequately and suitable for sampling and to assess 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 February 25-26, 2007 during the second round of groundwater monitoring and the historic groundwater elevation range are presented on **Table 2**.

Chemical Results

Copper and lead were not detected in any of the six wells that were sampled in the second round as shown in **Table 3**. Similarly, copper and lead were not detected in the groundwater during the first round. All

detection limits were below action levels for these parameters. The data support that groundwater at the site has not been impacted by residual levels of copper and lead in the soils at the site.

3. OB CAP INSPECTION

The cap inspection consisted of documenting observations of the 25 125 by 125-foot grids, where cover was placed over areas of the site where total lead has been detected at concentrations between 60 and 500 mg/kg. These grids are shown on **Figure 3**.

Overall, minimal erosion and a lack of animal burrowing activity were observed in the capped areas. There had been surface melt of snow and the accumulation of new snow, since the Round 2 cap inspection was completed. 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 immediately repaired in May 2008. The areas of the cap that were sparsely vegetated were reseeded.

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

4. CONCLUSIONS

Based on the results of Year 1, Round 2 LTM at the OB Grounds, the Army has made the following conclusions:

- Residual lead and copper concentrations remaining in the soils have not impacted groundwater at the site;

- The integrity of the vegetated soil cap placed over the residual lead contaminated soils at the site was generally intact and there is no evidence that terrestrial wildlife are exposed to 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; 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, no sediment monitoring plan is warranted at this site. The Army will continue to monitor cap erosion, and note any instance of cap erosion or exposed native soil.

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 May 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

Quantative Limits and CUGs for Copper and Lead
OB Grounds LTM Quarter 2 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).
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 3
Groundwater Analytical Data - Round 2
OB Grounds LTM Quarter 2 Report
Seneca Army Depot Activity

Project:									OB Grounds	OB Grounds	OB Grounds	OB Grounds	OB Grounds	OB Grounds	OB Grounds
Location ID:									MW23-1	MW23-2	MW23-3	MW23-3	MW23-4	MW23-5	MW23-6
Matrix:									GW	GW	GW	GW	GW	GW	GW
Sample ID:									OBLM20001	OBLM20002	OBLM20004	OBLM20003	OBLM20005	OBLM20006	OBLM20007
Date:									02/25/08	02/25/08	02/25/08	02/25/08	02/25/08	02/25/08	02/25/08
QC Code:									SA	SA	DU	SA	SA	SA	SA
Study ID:									LTM	LTM	LTM	LTM	LTM	LTM	LTM
Study Round									2	2	2	2	2	2	2
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
Copper	UG/L	0	0%	GA	200	0	0	7	20 U	20 U	20 U	20 U	20 U	20 U	20
Lead	UG/L	0	0%	MCL	15	0	0	7	5 U	5 U	5 U	5 U	5 U	5 U	5

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

Monitoring Well	Top of Riser Elevation (ft)	Round 2 - February 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	02/25/2008	11.46	611.175	611.18	610.64	0.54	15.50
MW23-2	622.28	02/25/2008	8.78	613.5	613.50	612.68	0.82	15.50
MW23-3	619.18	02/25/2008	9.24	609.941	609.94	608.38	1.56	15.50
MW23-4	637.11	02/25/2008	3.2	633.907	633.91	628.51	5.40	17.50
MW23-5	639.47	02/25/2008	2.85	636.622	636.62	632.47	4.15	17.50
MW23-6	632.59	02/25/2008	3.78	628.814	628.81	624.24	4.57	17.60

Table 3
Groundwater Analytical Data - Round 2
OB Grounds LTM Quarter 2 Report
Seneca Army Depot Activity

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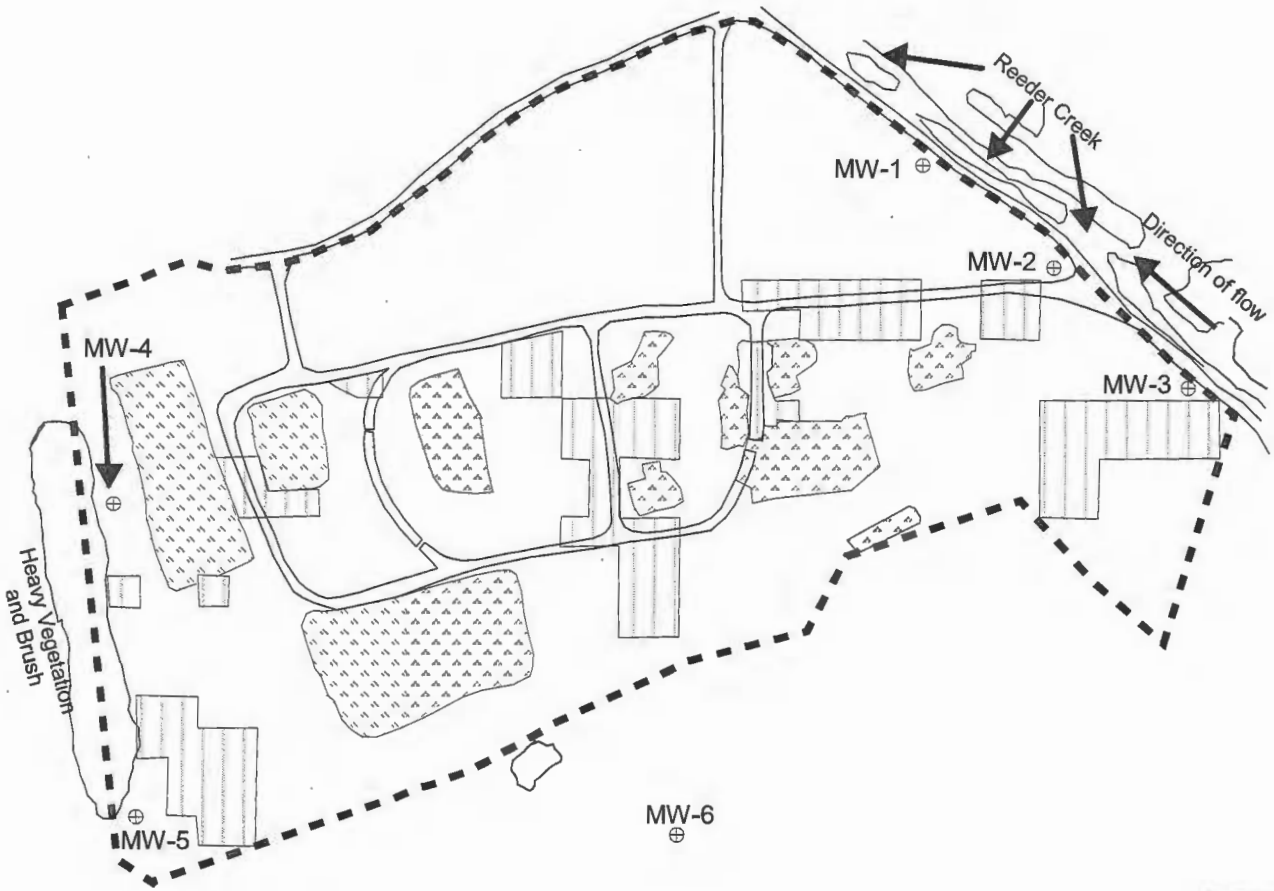
Table 4
Soil Cap Inspection Log
OB Grounds LTM Quarter 2 Report
Seneca Army Depot Activity

	Observations	
Grid #	**Round 1 - January 2008**	**Round 2 - February 2008**
S8	Several 1" to 2" size mice holes were observed	No change
S8	Several 1" to 2" size mice holes were observed on the ground surface.	No change
R8	Several 1" to 2" size mice holes were observed on the ground surface.	No change
Q8	2" mice hole was observed on the ground surface.	No change
Q8	A cluster of 1" to 2" size mice holes was observed.	No change
P10	A cluster of 1" to 2" size mice holes was observed.	No change
L9	Two mice holes approximately 6" deep	No change
L9	A mouse hole approximately 6"deep was observed	No change
L9	A mouse hole approximately 6"deep and 6" diameter was observed	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.
I8	A mouse hole about 2" to 3" in size was observed	Vegetation spotty, large amounts of surface soil exposed. Reseeded May 2008.
I8	Minor erosion of the soil cap.	Surface water runoff path forming. Repaired drainage path May 2008.
I6	A cluster of 1" to 2" size mice holes was observed.	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.
H9	Two mice 2" size holes was observed.	No change
D7	Two mice 2" size holes was observed.	No change
B3	A mouse hole approximately 6" wide and approximately 6" deep was	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 12, 2008.



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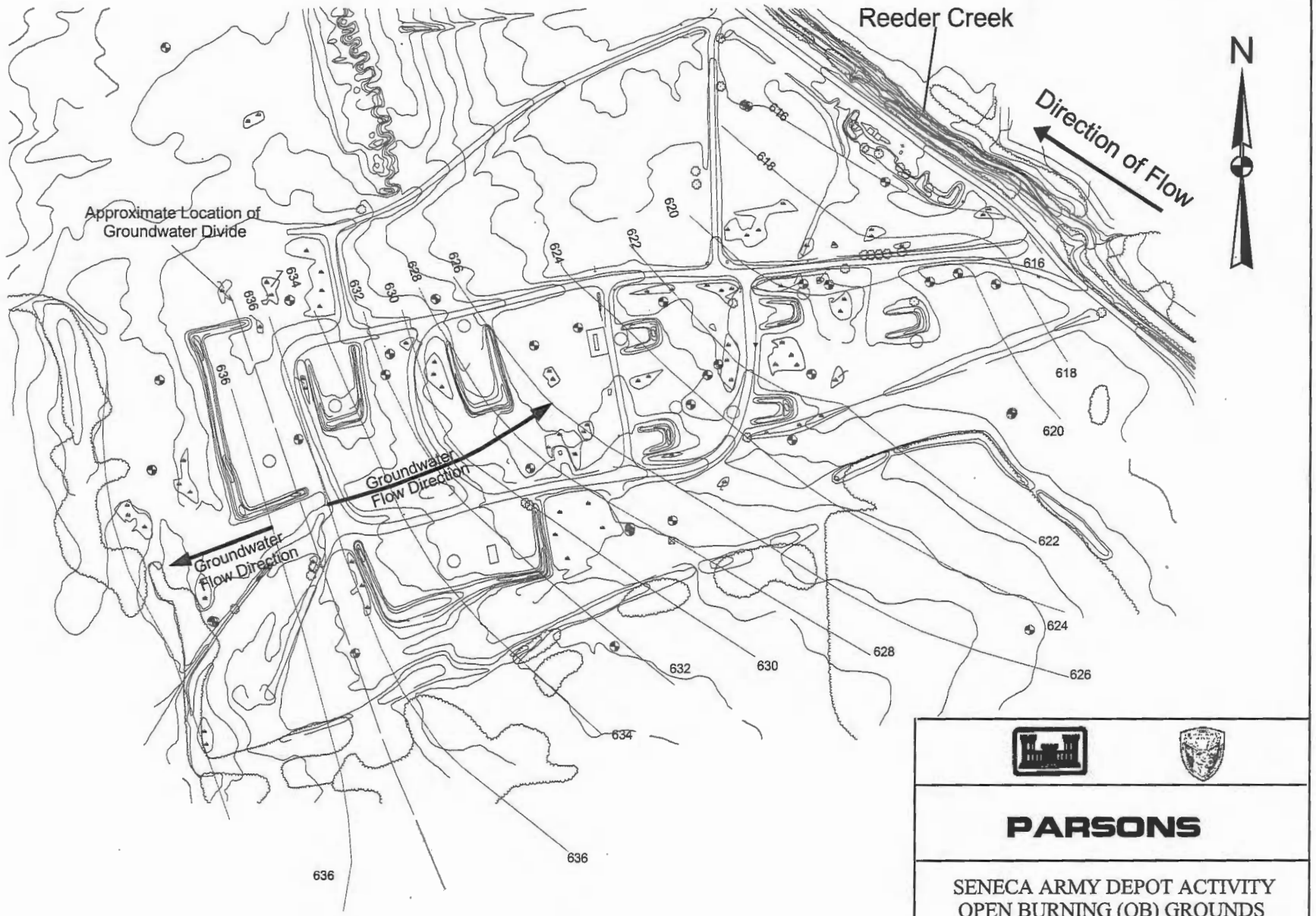
SENECA ARMY DEPOT ACTIVITY
OPEN BURNING (OB) GROUNDS
LONG-TERM MONITORING REPORT

FIGURE 1
Open Burning Grounds
Site

JOB NUMBER: 745818 | DATE: May 2008



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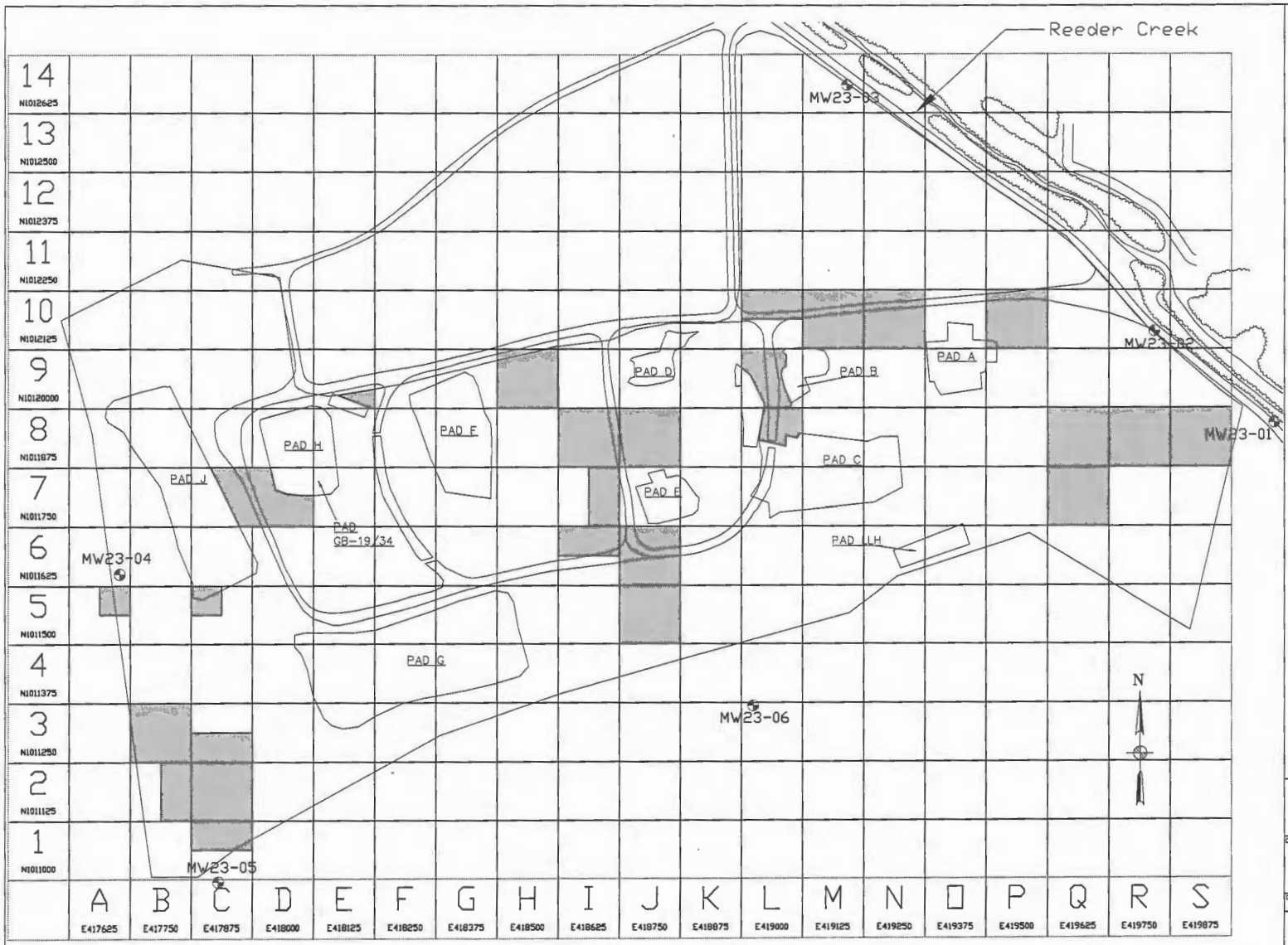
SENECA ARMY DEPOT ACTIVITY
OPEN BURNING (OB) GROUNDS
LONG-TERM MONITORING REPORT

FIGURE 2
Former OB Grounds
Groundwater Flow Map, April 1993

JOB NUMBER: 745818 | DATE: April 2008



LEGEND

Wells installed August 2004

Area of 9-inch vegetative cover over soil. Having lead concentrations between 60 and 500 mg/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 | Dwg. No. 746618-03000

FIGURE 3
OPEN BURNING GROUNDS
SOIL CAP AREAS AND WELL LOCATIONS

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

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