FIELD SAMPLING PLAN ADDENDUM
FOR
ADDITIONAL GROUNDWATER CHARACTERIZATION

NIAGARA FALLS STORAGE SITE

NIAGARA COUNTY, NEW YORK

Contract DACW49-97-D-OO01
Delivery Order 0012

Prepared For:

U.S. Army Corps of Engineers
Buffalo District
1776 Niagara Street
Buffalo, New York 14207-3199

May 2003
9905006

MAXIM TECHNOLOGIES, INC.
1908 Innerbelt Business Center Drive
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LIST OF ACRONYMS/ABBREVIATIONS

CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CRDL	Contract Required Detection Limit
DI	Deionized Water
ES	Environmental Surveillance
FID	Flame Ionizing Detector
FUSRAP	Formerly Utilized Sites Remedial Action Program
HP	Health Physics
IDL	Instrument Detection Limit
IDW	Investigation Derived Waste
KPA	Kinetic Phosphorescence Analysis
L	Liters
LPM	Liters/minute
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
NFSS	Niagara Falls Storage Site
NTU	Nephelormetric Turbidity Unit
NYSDEC	New York State Department of Environmental Conservation
ORP	Oxidation Reduction Potential
PAH	Polycyclic Aromatic Hydrocarbon
Pest/PCB	Pesticide/Polychlorinated Biphenyls
PID	Photo-Ionizing Detector
PVC	Poly Vinyl Chloride
Q	Flow Rate
QA	Quality Assurance
QC	Quality Control
RAGS	Risk Assessment Guidance for Superfund
RI	Remedial Investigation
SAIC	Science Applications International Corporation
SM	Site Manager
SOW	Scope of Work
SVOC	Semi-Volatile Organic Compound
TAL	Target Analyte List
TCL	Target Compound List
TDS	Total Dissolved Solids
TOC	Total Organic Carbon
TWP	Temporary Well Point
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
VOC	Volatile Organic Compound
WBZ	Water-Bearing Zone

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1.0 Introduction

This Field Sampling Plan Addendum is a part of the ongoing Remedial Investigation (RI) being performed at the Niagara Falls Storage Site (NFSS) and is a supplement to the 1999 Field Sampling Plan. It describes the activities that will be performed to characterize groundwater concentrations at the NFSS and is submitted in accordance with the statement of work for Delivery Order 12, Contract #: DACW49-97-D-0001.

The activities described in this document are based on the April 2003 Statement of Work (SOW), "*Remedial Investigation and Environmental Surveillance Groundwater Sampling",* issued by the Buffalo District, United States Army Corps of Engineers (USACE), and on decisions made during subsequent negotiations.

Data Quality Objectives were developed during Technical Planning Process meetings and were presented in the original Field Sampling Plan for this project: Data Quality Objectives supported by this Field Sampling Plan Addendum include:

- Obtain information of sufficient quantity and quality to meet the requirements of a site inspection as described in the directives entitled "Guidance for Performing Site Inspections Under CERCLA: USEPA Directives 93.151-05, September 1992";
- Obtain information of sufficient quantity and quality to meet the requirements for use in a risk assessment as described in the USEPA document, Guidance for Data Usability in Risk Assessment, April 1992;
- Obtain information of sufficient quantity and quality to meet the requirements for development of a Baseline Risk Assessment based on USEPA Risk Assessment Guidance for Superfund (RAGS), 1989 and subsequent guidance documents;
- Obtain information of sufficient quantity and quality to identify sources of contamination and migration pathways to adequately characterize potential contamination at areas included in this investigation; and
- Use the monitoring well network to collect groundwater samples to obtain information of sufficient quantity and quality to determine if contaminants are migrating off-site or migrating on-site from off-site sources.

The above Data Quality Objectives were used to guide the development of this plan. In order to sufficiently characterize the groundwater conditions at the NFSS additional and to satisfy the SOW for this task, Maxim identified several additional objectives. Objectives for this task include:

1) To confirm groundwater contamination found in previous phases of the remedial investigation, 13 wells will be re-sampled for full suite analysis (radiological parameters, metals, SVOC, VOCs, Pest/PCBs, and nitroaromatic compounds, described in Table 2). These wells are described as "TWP (temporary well point) data" in the remarks column of Table 1.

2) To more fully characterize the groundwater conditions at the site,

full suite analysis will be performed on samples collected from 15 wells that were sampled for limited lists of parameters during previous phases of the remedial investigation. Previously collected samples from these 15 wells contained detectable concentrations of compounds of interest. These wells are described as "Previously Sampled" in the remarks column of Table 1.

3) To more fully characterize the groundwater conditions at the site, full suite analysis and analysis of natural attenuation parameters (total organic carbon, selected anions, phosphate, and methane, described in Table 3) will be performed on samples collected from 13 wells not sampled during previous phases of the remedial investigation. These wells are described as "Not previously sampled" in the remarks column of Table 1.

4) Eight wells will be sampled full suite parameters, natural attenuation parameters, alkalinity and total dissolved solids as part of an on-going environmental surveillance of the groundwater at the site. These wells are described as "Environmental surveillance wells" in the remarks column of Table 1. Three of the Environmental surveillance wells were not sampled during previous phases of the remedial investigation and are included in total count for item 1, above. Three other Environmental Surveillance Wells were previously sampled and are included in the total count for item 2.

5) Results from the analysis of groundwater samples will be assessed to evaluate the presence of site related compounds.

6) In order to augment knowledge of the subsurface conditions at the site and to facilitate groundwater modeling, slug tests will be performed at 15 wells. The slug test data will be used to estimate the subsurface hydraulic conductivity at locations of the 15 tested wells (these wells are identified in Table 6).

In accordance with the scope of work, the past analytical results for the wells included in items 1 and 2, above, were evaluated. The 10 wells that contained detectable concentrations of organic compounds were selected for analysis of natural attenuation parameters.

The Site Manager for this task will be David Germeroth, P.E. During the field activities described in this plan, he may be reached at the site trailer at 716-754-9141.

2.0 Sample Locations

In accordance with the SOW, groundwater samples will be collected from the 43 wells

listed on Table 1 and shown on Figure 1. Wells where hydraulic conductivity testing will be performed are shown on Figure 2.

3.0 Analytical Parameters, Methods, and Detection Limits

Groundwater samples collected for this task will be analyzed for the parameters shown in Tables 2 through 4. These tables also specify method numbers, preservation requirements and holding times. Table 5 shows the method detection limits for the natural attenuation and environmental surveillance parameters that will be analyzed for as part of this task that were not previously specified in the Quality Assurance Project Plan.

In accordance with the SOW, samples will be collected from ten wells that were previously sampled and analyzed for natural attenuation parameters. Samples previously collected from these ten wells contained detectable concentrations of organic compounds. The previous analytical results are summarized in Appendix A.

Groundwater samples from wells not sampled during previous phases of the remedial investigation will be analyzed for full suite parameters and for natural attenuation parameters.

Samples collected from the eight environmental surveillance wells will be analyzed for full suite parameters, natural attenuation parameters, alkalinity, and total dissolved solids.

Five Quality Control (QC) (field duplicate) samples will be collected for this task. The QC samples will be submitted for the same analysis as their associated prime samples. The primary and Quality Control (QC) groundwater samples will be shipped to General Engineering Laboratories at the following address:

General Engineering Laboratories
Attn: Sample Custodian
3040 Savage Road
Charleston, SC 29407
Telephone: (843) 556-8171, Fax: (843) 766-1178

Two Quality Assurance (QA) samples will be collected for this task and will be analyzed for the following parameters:

- Volatile Organic Compounds (VOC)
- Semivolatile organic compounds (SVOC)
- PEST/PCB
- Total Metals
- Isotopic Uranium
- Isotopic Thorium

- Radium 226/228

The QA laboratory for this task is:

Severn Trent Laboratories
Attn: John Powell
13715 Rider Trail North
Earth City, MO 63045
Phone: 314-298-8566

4.0 Groundwater Sample Collection

The low-flow procedure described below will be used to collect all groundwater samples listed in Table 1. The procedure is based on EPAIS4O/S-95/504, *"Low-Flow (Minimal Drawdown) Groundwater Sampling Procedures"* and EPA Region 2 *"Ground water Sampling Procedure, Low Stress (Low Flow) Purging and Sampling"*. Prior to purging and sampling, the field equipment will be calibrated in accordance with the manufacturer's instructions.

A schematic summary of this procedure is shown on Figure 3.

1) Measure and record the well headspace VOC concentration with a PID. Using an electronic water-level indicator, measure and record the depth to groundwater, to the nearest 0.01 foot, relative to the top-of-casing elevation. After measuring the depth to groundwater, sound the depth of the well with the water-level indicator.
2) Gently lower the pump into the well to approximately the elevation of the mid-point of the wetted portion of the screened interval. To the extent allowable by the project schedule, the pumps will be installed in wells 48 hours prior to pumping the well. This waiting period will allow any temporary increase in turbidity caused by the installation of the pumps to attenuate.
3) While monitoring the depth to groundwater, pump the well at the maximum allowable rate (not exceeding 0.5 Liters/minute, LPM) that causes little or no drawdown in the well. Ideally, the drawdown should be limited to no more than one foot. Notify the Site Manager if pump rates less than 0.1 L/minute cause a drawdown of more than one foot. This requirement may be difficult to achieve due to geologic heterogeneities within the screened interval, and may be relaxed in the field if the other sample collection method requirements can be satisfied.
4) Continuously monitor in-line water quality indicator parameters (temperature, pH, conductivity, oxidation-reduction potential (ORP), oxygen concentration, and turbidity). Record the values for these parameters every three to five minutes. Stabilization is defined as three successive readings for all parameters within the following ranges:

    - pH: difference of no more than 0.1 units between the high and low readings,

- conductivity: relative percent difference between the high and low readings of no more than 3%,
- ORP: difference of no more than 10 mV between high and low readings,
- dissolved oxygen: relative percent difference between the high and low readings of no more than 10%, and
- turbidity: all readings less than 50 NTU and relative percent difference between the high and low readings of no more than 10%.

Notify the Site Manager and Site Superintendent if the well does not stabilize within 3 hours.

An example calculation demonstrating the method by which relative percent difference will be determined is shown in Appendix B.

5) After the well has stabilized, disconnect the flow-through cell and fill sample containers directly from the pump in the following order:

- VOCs (3x40 ml vials)
- Methane (3x40 ml vials)
- Anions (Cl, Fl, SO_4, NO_3, NO_2) (250 mL)
- Radiological Parameters — Total (1 gallon)
- Gross Alpha/Beta —Total (1 L)
- Total Uranium (I L)
- Metals — Total (1 L)
- Polycyclic Aromatic Hydrocarbons (PAH) (1 L)
- Filtered Radiological Parameters (1 gallon)
- Filtered Gross Alpha/Beta (1 L)
- Filtered Total Uranium (1 L)
- Filtered Metals (1 L)
- SVOC (1 L)
- Pesticides/PCBs (2 L)
- Nitroaromatic Compounds (1 L)
- Total Organic Carbon (250 mL glass)
- Phosphate (250 mL)
- Total Dissolved Solids (250 mL)
- Alkalinity (500 mL)
- SVOC (1 L)*

*This 'extra' container provides additional sample volume in the event a sample container is damaged in transit or at the laboratory.

NOTE: Not all of the above parameters will be collected

from all locations. See Tables 1 through 4 for the parameter list for each location.

6) In the event that a pump rate of 0.1 LPM causes the well to purge dry before stabilization of the water level or water quality parameters can be achieved, the pump(s) will be left in the well and sampling activities at the well will be temporarily suspended. After the well has sufficiently recharged, sampling activities will resume at Step 5, above.

If the well offers a good response (i.e. rapid stability, minimal drawdown), and the response does not diminish through time, the order of the above list may be modified. If after filling the PAH container the well continues to show a good response, the Site Manager may instruct the field team to fill containers for SVOC, Pest/PCBs, and nitroaromatic compounds prior to filling the dissolved radiological and metals containers.

All dissolved samples will be filtered in the field using disposable, in-line 0.45-micron filters. If it is necessary to suspend sample collection while filling the PAH or SVOC bottles, the bottles will be capped. After all sample bottles are filled, the pumps will be removed from the well/piezometer.

While filling the sample containers, the pump rate should not be increased above that required to achieve well stabilization. Periodically measure and record the turbidity (i.e. at least once per sample container). If the turbidity exceeds 50 NTU, cease filling sample containers and continue to pump the well until the stabilization criteria are again satisfied.

The water level will be periodically measured and recorded (i.e. at least once per sample container) and if necessary the pump rate may be decreased to minimize the drawdown. Notify the Site Manager if it is necessary to decrease the pump rate to below 0.1 LPM.

The date and time at which the first bottle of a given sample set is filled will be recorded on the chain-of-custody form and on all bottles of the sample set. Because of analytical laboratory's sample logging requirements, all bottles of a given sample set must have the same collection date and time. The times at which the individual sample containers are filled will be recorded in the field notes. Electric submersible pumps (whale pumps) and an air bladder pump will be available for sampling wells. It is anticipated that most of the wells and piezometers will be sampled with electric submersible pumps. However, if the submersible pumps cannot maintain the necessary low flow, the wells may be sampled with the air bladder pump. In all cases, the pumps will be equipped with new Teflon tubing and the tubing will not be reused. When electric submersible pumps are used, new pumps will be dedicated to each well. The electric submersible pumps will not be reused in other wells.

In accordance with the SOW, all eight of the environmental surveillance wells (i.e. those wells scheduled for analytical groups 1, 2 and 3, as shown on Table 1) will be sampled

during a single seven-day period. It is anticipated that the environmental surveillance wells will be sampled during the period from 13 May 2003 to 20 May 2003.

A list of equipment required for the performance of the fieldwork for this task is shown in Appendix C.

5.0 Slug Tests

Slug tests will be performed to estimate hydraulic conductivity on the 15 wells (priority 1) listed on Table 6 and shown on Figure 2. Also listed on Table 6, and shown on Figure 2, are four alternate wells (priority 2). In the event that slug testing is not possible on any of the 15 selected wells, a well from the alternate list will be tested as a substitute.

Ten of the 15 priority 1 wells and all of the priority 2 wells are also scheduled to be sampled. For those wells scheduled for both sampling and slug testing, the well will be sampled prior to slug testing. Slug testing will be delayed for a maximum of five days following sampling or until the water level in the well recharges to within 0.2' of its original elevation.

The slug tests will be performed using an electronic pressure transducer and a poly vinyl chloride (PVC) slug capable of displacing at least 0.5 feet of water in the well casing. The hydraulic conductivity at each well will be estimated from the slug test data using the Bouwer and Rice (1976) method.

In cases where the well screen is completely submerged below the water table, both slug in and slug out tests will be performed. If the well screen straddles the water table, only slug out tests will be performed. A copy of the slug test standard operating procedure is included in Appendix D.

6.0 Decontamination Procedures and Management of Investigation Derived Waste

To a large extent, only single-use and dedicated equipment will come in contact with the samples. New Teflon tubing will be used at each well. At wells sampled with submersible electric pumps, new dedicated pumps will be used at each well. All dissolved samples will be filtered using single-use in-line 0.45-micron filters.

The air bladder pump will be decontaminated after each use by pumping a mixture of Alconox soap and deionized (DI) water through the pump for five minutes. Afterwards, the pump will be rinsed by pumping DI water through it for five minutes. The pump will also be decontaminated at the site prior to any sampling activities. The PVC air delivery tubing will be replaced with new tubing prior to each use.

Water quality meter flow-through cells and the down-hole slug test equipment will be decontaminated after each use by washing the cells with an Alconox/DI mixture, followed by a DI rinse. The water quality probe will be decontaminated with a DI rinse.

During the sampling of groundwater wells at the NFSS, liquid IDW consisting of well purge and equipment decontamination water will be generated. As liquid IDW is generated at the groundwater monitoring well locations, it will be collected in portable plastic carboys. When a carboy is filled, it will be transported back to the NFSS site and its contents poured into a dedicated plastic storage tank (approximately 1500 gallon capacity). The liquid IDW generated during the groundwater sampling activities will remain in the dedicated storage tank until the City of Niagara Falls Wastewater Treatment plant grants a temporary discharge permit. Once the temporary discharge permit is obtained, Maxim will have the liquid IDW transported by a vacuum/tanker truck to the treatment plant for discharge and subsequent treatment.

To receive a temporary discharge permit from the City of Niagara Falls Wastewater Treatment plant, Maxim will characterize the IDW for wastewater discharge acceptance criteria parameters. The characterization will be based, in part, on analytical results from the groundwater monitoring wells. This approach assumes that the collected groundwater will have the same chemical and radiological characteristics as the well purge and equipment decontamination water. Maxim contacted the City of Niagara Falls Industrial Monitoring coordinator and has received approval to use this approach for the characterization of the liquid IDW, with the following conditions:

1. A composite sample of the liquid IDW will be collected from the dedicated storage tank and will be analyzed for total organic carbon (TOC), total suspended solids , cyanides, and phosphorous. TOC and total suspended solids will be analyzed since these parameters are the basis for the discharge fee charged by the City of Niagara Falls. Cyanides and phosphorous will be analyzed since they are on the local sewer ordinance parameter list.
2. The City of Niagara Falls has requested that the worst-case concentration for each parameter be reported. Along with reporting concentrations for the acceptance criteria parameters, Maxim will report the waste load for each parameter (#/discharge). In addition to reporting worst-case concentrations, Maxim will report the range and median of the concentrations to further characterize the liquid IDW generated at the NFSS.

A summary of the groundwater chemical and radiological parameters/parameter groups that will be submitted to the City of Niagara Falls Industrial Monitoring coordinator for review is as follows:

1. Total Radionuclides
2. Total Uranium
3. Total Gross Alpha/Beta
4. VOCs
5. SVOCs
6. Total Metals
7. Pesticides/PCBs
8. Nitroaromatics
9. PAHs

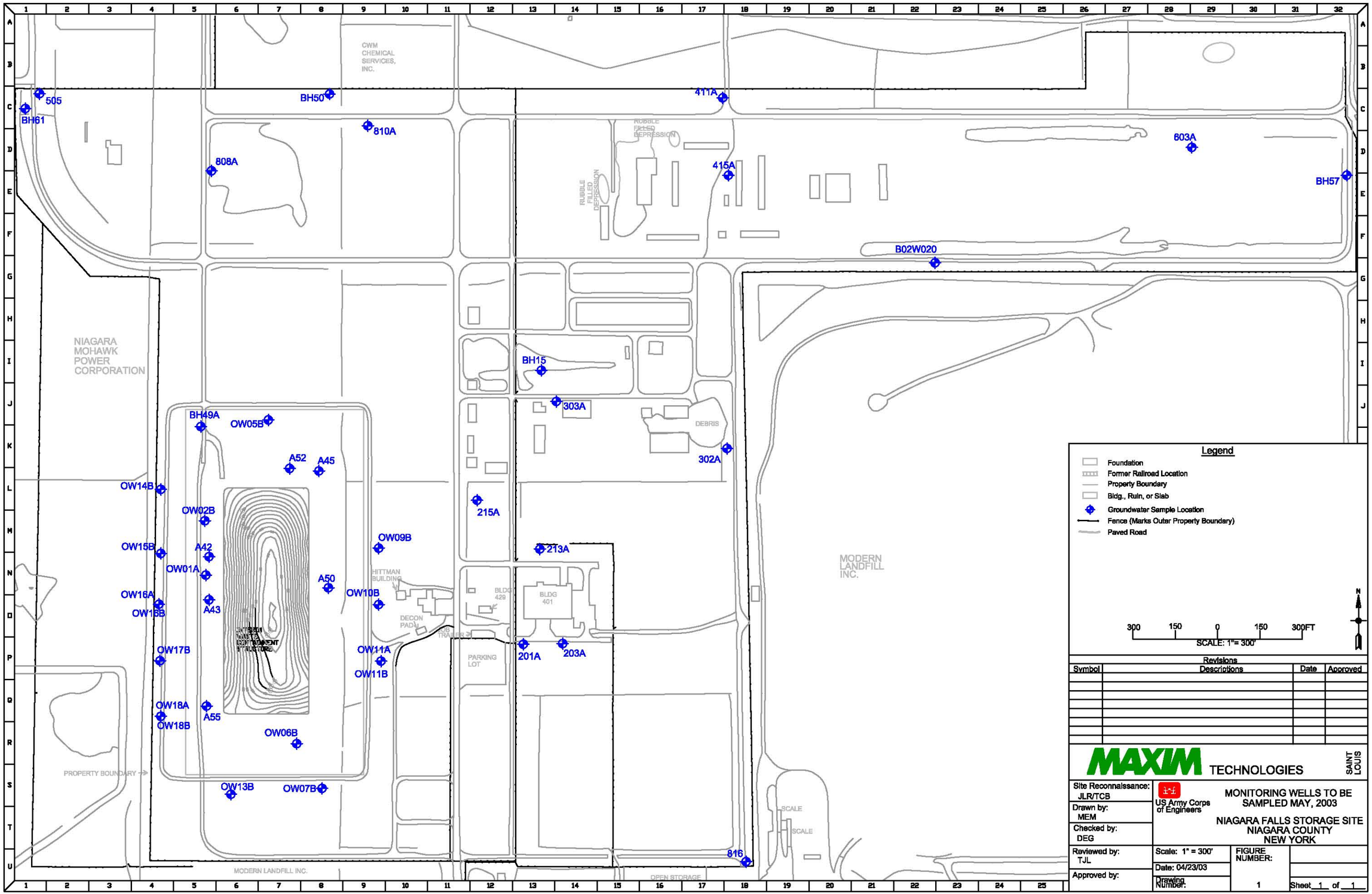
10. TOC
11. Total Suspended Solids
12. Total Cyanides
13. Total Phosphorous

The City of Niagara Falls must approve all discharges to their wastewater treatment plant. After approvals are obtained, Maxim will contact a vacuum/tanker truck company to pump out the contents of the dedicated storage tank containing the liquid IDW, transport the liquid IDW, and discharge it at the location specified by the City of Niagara Falls Industrial Monitoring Coordinator.

Based on past liquid IDW sampling events and the components of liquid IDW (primarily decontamination water), it is not anticipated that light nonaqueous or dense nonaqueous phases will be encountered in the storage tank. However, if multiple phases are encountered, each will be sampled separately.

7.0 Subcontractor Activities

Science Applications International Corporation (SAIC) will provide health physics (HP) services for this task. SAIC will provide HP support for all sampling activities and will insure compliance with all regulations governing the shipment of potentially radioactive environmental samples. SAIC also performed a review of a draft version of this document.



Legend

- Foundation
- Former Railroad Location
- Property Boundary
- Bldg., Ruin, or Slab
- Groundwater Sample Location
- Fence (Marks Outer Property Boundary)
- Paved Road

300 150 0 150 300FT

SCALE: 1"= 300'

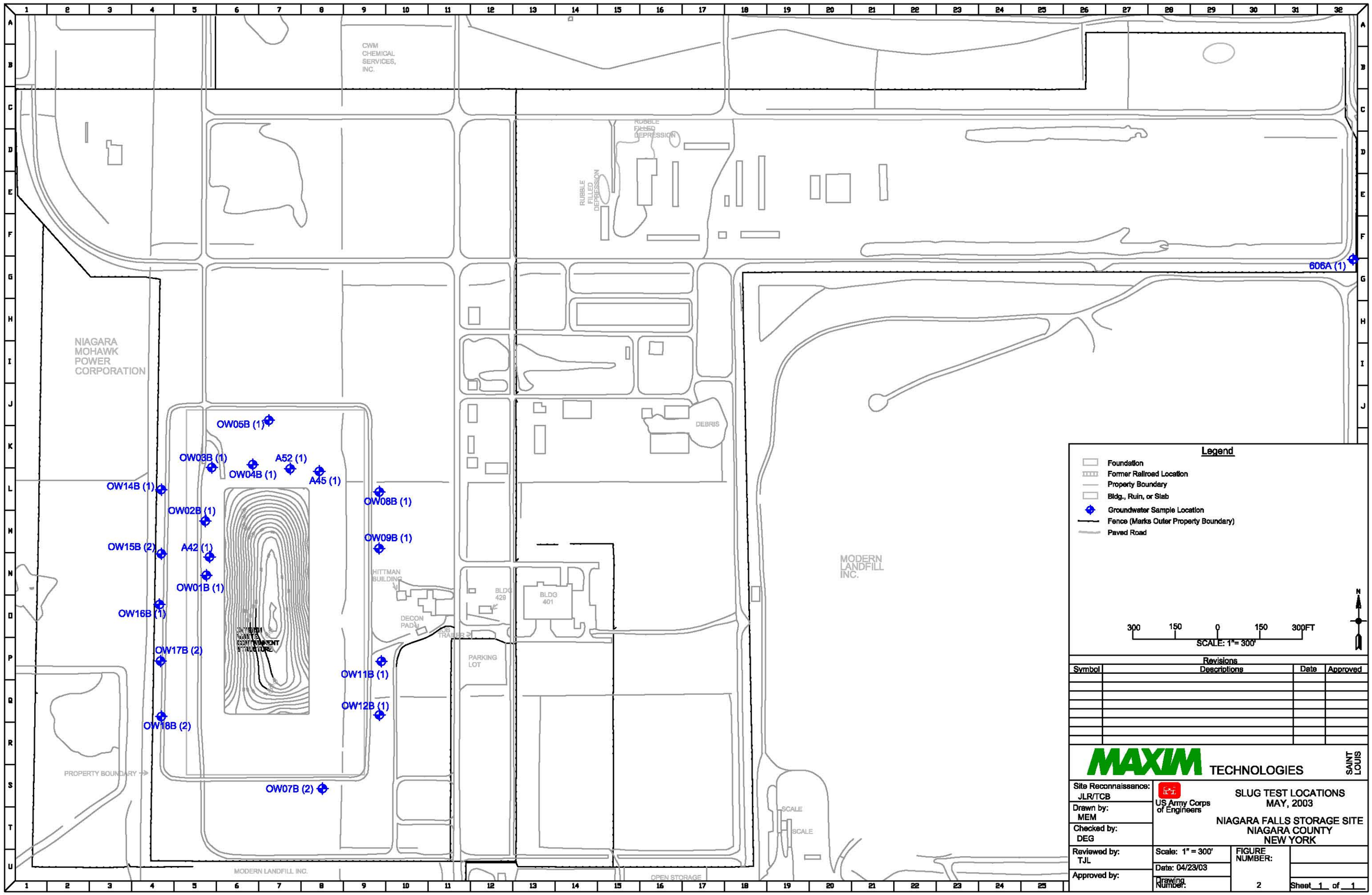
N

Revisions			
Symbol	Descriptions	Date	Approved

MAXIM TECHNOLOGIES SAINT LOUIS

Site Reconnaissance: JLR/TCB	US Army Corps of Engineers	MONITORING WELLS TO BE SAMPLED MAY, 2003 NIAGARA FALLS STORAGE SITE NIAGARA COUNTY NEW YORK
Drawn by: MEM		
Checked by: DEG		
Reviewed by: TJL	Scale: 1" = 300'	FIGURE NUMBER:
Approved by:	Date: 04/23/03	
	Drawing Number:	1

Sheet 1 of 1



Legend

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300 150 0 150 300FT

SCALE: 1"= 300'

Revisions

Symbol	Descriptions	Date	Approved

MAXIM TECHNOLOGIES SAINT LOUIS

Site Reconnaissance: JLR/TCB	US Army Corps of Engineers	SLUG TEST LOCATIONS MAY, 2003	
Drawn by: MEM		NIAGARA FALLS STORAGE SITE NIAGARA COUNTY NEW YORK	
Checked by: DEG			
Reviewed by: TJL	Scale: 1" = 300'	FIGURE NUMBER:	
Approved by:	Date: 04/23/03	2	Sheet 1 of 1
	Drawing Number:		

Figure 3
Decision Tree
Groundwater Sample Collection

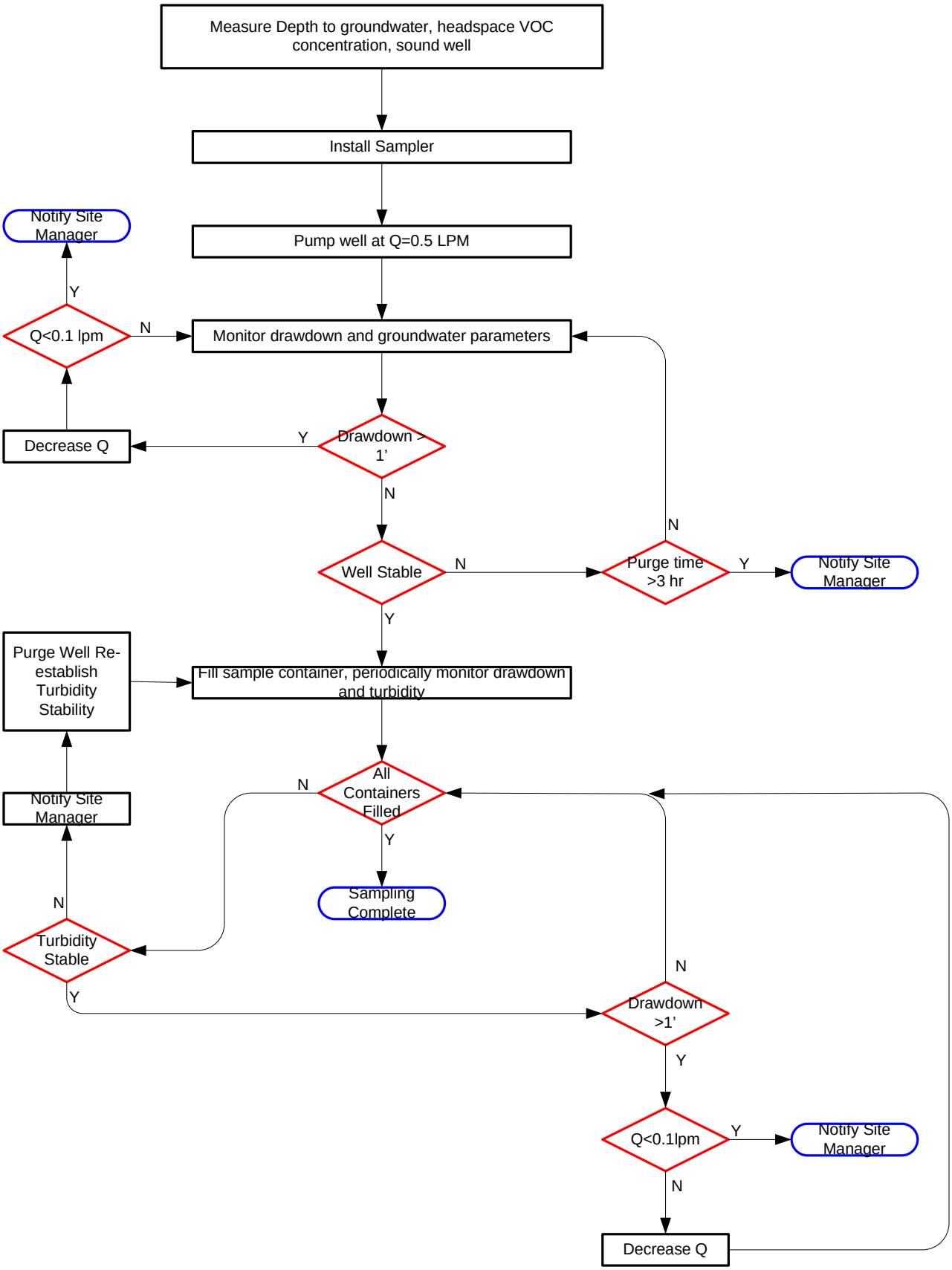

Table 1
Niagara Falls Storage Site Remedial Investigation

Groundwater Samples

Sample	Slug Test	QA/QC*	Remarks	Location	Parameter List**	Well Depth (ft)	K (cm/s)
GW- 201A - 3250		QA	Only TWP data previously collected	201A	Group 1	15	6.02E-06
GW- 203A - 3251		MS/MSD	Only TWP data previously collected	203A	Group 1	15	1.84E-05
GW- 215A - 3252			Only TWP data previously collected	215A	Group 1	10	2.99E-06
GW- 302A - 3253			Only TWP data previously collected	302A	Group 1	15	1.01E-06
GW- 303A - 3254			Only TWP data previously collected	303A	Group 1	15	2.83E-06
GW- 411A - 3255			Only TWP data previously collected	411A	Group 1	17	5.92E-07
GW- 603A - 3256			Only TWP data previously collected	603A	Group 1	20	5.58E-07
GW- 808A - 3257			Only TWP data previously collected	808A	Group 1	17	2.43E-06
GW- 810A - 3258			Only TWP data previously collected	810A	Group 1	15	6.07E-07
GW- A43 - 3259		MS/MSD	Previously sampled	A-43	Group 1	14	1.00E-03
GW- A52 - 3260	Y		Previously sampled	A-52	Group 1	15	
GW- BH49A - 3261			Previously sampled	BH-49A	Group 1	19.5	2.00E-06
GW- O-9B - 3262	Y		Previously sampled	OW-9B	Group 1	14.6	
GW- OW11B - 3263	Y		Previously sampled	OW-11B	Group 1	16	
GW- OW2B - 3264	Y		Previously sampled	OW-2B	Group 1	20	
GW- A55 - 3265			Not previously sampled	A-55	Group 1	39	
GW- OW11A - 3266			Not previously sampled	OW-11A	Group 1	37.2	
GW- OW13B - 3267		QA	Not previously sampled	OW-13B	Group 1	14	3.21E-06
GW- OW14B - 3268	Y		Not previously sampled	OW-14B	Group 1	15.1	
GW- OW16A - 3269			Not previously sampled	OW-16A	Group 1	45.2	
GW- OW16B - 3270	Y		Not previously sampled	OW-16B	Group 1	13.2	
GW- OW18A - 3271			Not previously sampled	OW-18A	Group 1	47.8	
GW- OW18B - 3272	Y		Not previously sampled	OW-18B	Group 1	16.6	
GW- OW1A - 3273			Not previously sampled	OW-1A	Group 1	47	
GW- OW5B - 3274	Y		Not previously sampled	OW-5B	Group 1	17	
GW- A42 - 3275	Y		Previously Sampled. Di-n-octyphthalate detected	A-42	Groups 1 and 2	22.5	
GW- BH15 - 3276		QC	Previously Sampled. Ethylbenzene detected	BH-15	Groups 1 and 2	104.5	2.00E-05
GW- OW10B - 3277			Previously Sampled. Phenol detected	OW-10B	Groups 1 and 2	29	8.41E-07
GW- BH57 - 3278			Previously Sampled. Toluene detected	BH-57	Groups 1 and 2	101.5	9.68E-07
GW- 505 - 3279			TWP data. Chloroform detected.	505	Groups 1 and 2	18.5	2.81E-07
GW- 415A - 3280			TWP data. Chlorinated Solvents previously detected.	415A	Groups 1 and 2	15	7.37E-07
GW- 213A - 3281			TWP data. TCE previously detected	213A	Groups 1 and 2	15	2.43E-06
GW- 816 - 3282		QC	TWP Data. Phenol previously detected	816	Groups 1 and 2	15	9.75E-06
GW- BH50 - 3283		QC	Previously Sampled. Vinyl chloride detected	BH-50	Groups 1 and 2	44	5.00E-05
GW- BH61 - 3284		QC	Previously Sampled. Vinyl chloride detected	BH-61	Groups 1 and 2	46	2.20E-05
GW- A45 - 3285	Y		Previously sampled. Environmental Surveillance Well	A-45	Groups 1, 2, and 3	20	
GW- A50 - 3286		MS/MSD	Previously sampled. Environmental Surveillance Well	A-50	Groups 1, 2, and 3	23	2.17E-04
GW- B02W020S - 3287		QC	Environmental Surveillance Well	B02W020S	Groups 1, 2, and 3	19.4	4.20E-06
GW- OW15B - 3288	Y		Environmental Surveillance Well	OW-15B	Groups 1, 2, and 3	12	
GW- OW17B - 3289	Y		Not previously sampled. Environmental Surveillance Well	OW-17B	Groups 1, 2, and 3	16.9	
GW- OW4B - 3290	Y		Not previously sampled. Environmental Surveillance Well	OW-4B	Groups 1, 2, and 3	17	
GW- OW6B - 3291			Previously sampled. Environmental Surveillance Well	OW-6B	Groups 1, 2, and 3	17	
GW- OW7B - 3292	Y		Not previously sampled. Environmental Surveillance Well	OW-7B	Groups 1, 2, and 3	13	
GW- BH51 - 3292			Added at the request of the USACE	BH51	Total and FilteredMetals		
GW- OW07A - 3293			Added at the request of the USACE	OW07A	Total and Filtered Radionuclides		
GW- OW13A - 3294			Added at the request of the USACE	OW13A	Total and Filtered Radionuclides		

*: For QC samples, a 'Q' will be appended to the sample name. For example, the QC sample collected from well BH-61 will be named 'GW-BH61-3284Q'. Similarly, for QA samples, 'QA' will be appended to the sample name. Depending on conditions encountered in the field, QA/QC samples may be collected from wells different than those listed in this table. However, the frequency of the various QA/QC samples will not be changed.

**: The analytes, methods, and containers for each analytical group are shown on Tables 2 through 4.

Note: Because of requirements associated with the analysis of nitrates and nitrites, the 'anions' containers must be shipped on the day of sample collection. Anions containers cannot be shipped on Saturdays.

Table 2
Groundwater Analysis
Primary Analytes
Parameter Group 1

Parameter	Method	Container
Volatile TCL Organic Compounds (VOCs)	EPA SW-846, 5030B/8260B	3x40 ml vial, HCL Preserved, Cold
Semi-Volatile TCL Organic Compounds (SVOCs)	EPA SW-846, 3510C/8270C	1 L Glass Amber, Cold
Polycyclic Aromatic Hydrocarbons (PAHs)	EPA SW-846, 8310	1 L Glass Amber, Cold
TAL Metals	EPA SW-846 6010B/6020/7470A	1 L HDPE, HNO_3 Preserved, pH<2
Filtered TAL Metals	EPA SW-846 6010B/6020/7470A	1 L HDPE, HNO_3 Preserved, pH<2
Nitroaromatics	EPA SW-846, 8330	1 L Glass Amber, Cold
Pesticides/PCBs	EPA SW-846, 3510C/8081/8082	1 L Glass Amber, Cold
Total Radionuclides:		1 Gallon HDPE, HNO_3 Preserved, pH<2
Isotopic Uranium	DOE EML HASL 300 Series	
Isotopic Thorium	DOE EML HASL 300 Series	
Radium-226/Radium-228	EPA 903.1 mod radon emanation / EPA 904.1 (gas proportional)	
Gamma Spec (includes U-238, Ra-228, Th-228, U-235, Pa-231, Ac-227, Co-60, Cs-137, Am-241)	Gamma Spec	
Total Uranium	Kinetic Phosphorescence Analysis (KPA) ASTM D-5714	1 L HDPE, HNO_3 Preserved, pH<2
Gross alpha/beta	EPA 900 (gas-flow)	1 L HDPE, HNO_3 Preserved, pH<2
Filtered Radionuclides		1 Gallon HDPE, HNO_3 Preserved, pH<2
Isotopic Uranium	DOE EML HASL 300 Series	
Isotopic Thorium	DOE EML HASL 300 Series	
Radium-226/Radium-228	EPA 903.1 mod radon emanation / EPA 904.1 (gas proportional)	
Gamma Spec (includes U-238, Ra-228, Th-228, U-235, Pa-231, Ac-227, Co-60, Cs-137, Am-241)	Gamma Spec	
Filtered Total Uranium	Kinetic Phosphorescence Analysis (KPA) ASTM D-5714	1 L HDPE, HNO_3 Preserved, pH<2
Filtered Gross alpha/beta	EPA 900 (gas-flow)	1 L HDPE, HNO_3 Preserved, pH<2

Note: These parameters will be collected for all wells listed in Table 1
Note: "Filtered" samples will be filtered in the field

Table 3
Groundwater Analysis
Natural Attenuation Parameters
Parameter Group 2

Parameter	Method	Container
Total Organic Carbon	EPA 9060 modified	250 mL Glass Amber, H_2SO_4, pH<2, Cold, No Headspace
Methane	FID	3x40 mL Vial, HCl, pH<2, Cold, No Headspace
Anions (Cl, Fl, SO_4, NO_3, NO_2)	EPA 300.0	250 mL HDPE, Cold.
Phosphate	EPA 300.0	250 mL HDPE, Cold. Sample will be filtered in the field.

Note: Because of requirements associated with the analysis of nitrates, nitrites and phosphate, the 'anions' containers and phosphate containers must be shipped on the day of sample collection. Anions and phosphate containers will not be shipped on Saturdays or Sundays.

Table 4
Groundwater Analysis
Environmental Surveillance (ES) Parameters
Parameter Group 3

Parameter	Method	Container
Alkalinity (includes Carbonate and Bicarbonate)	EPA 310.1	500 mL HDPE, Cold
Total Dissolved Solids	EPA 160.1	250 mL HDPE, Cold

Table 5
Required Method Detection Limits

Parameter	Method Detection Limit
Volatile TCL Organic Compounds (VOCs) EPA SW-846, 5030B/8260B,	QAPP Table 3-4 (revised Jan. 2003)
Semi-Volatile TCL Organic Compounds (SVOCs), EPA SW-846, 3510C/8270B	QAPP Table 3-5 (revised Jan. 2003)
Polycyclic Aromatic Hydrocarbons (PAHs), EPA SW-846, 8310	QAPP Table 3-5A (revised Jan. 2003)
Filtered and Total TAL Metals, EPA SW-846 6010B	QAPP Table 3-8 (revised Jan. 2003) exceptions listed below
Pb	1 ug/L
Cu	6 ug/L
V	8 ug/L
Ca	11 ug/L
Mg	25 ug/L
K	200 ug/L
Na	29 ug/L
Fluoride, EPA 300.0	per Method
Total Organic Carbon, EPA 9060 modified	0.5 mg/L
Methane (FID)	per Method
Chloride, EPA 300.0	1 mg/L
Sulfate, EPA 300.0	0.5 mg/L
Phosphate as P (soluble), EPA 300.0	0.15 mg/L
Alkalinity, EPA 310.1	5 mg/L
Temperature, Field Measurement	--
pH, Field Measurement	--
Specific Conductivity (milliSiemens/centimeter), Field Measurement	--
Dissolved Oxygen (mg/L), Field Measurement	--
Oxidation-Reduction Potential (mV), Field Measurement	--
Turbidity (NTU), Field Measurement	--
Nitrate EPA 300.0	0.05 mg/L
Nitrite EPA 300.0	0.05 mg/L
Nitroaromatics	QAPP Table 3-7

Table 5
Required Method Detection Limits

Parameter	Method Detection Limit
Pesticides/PCBs	QAPP Table 3-6 (revised Jan. 2003)
Total Dissolved Solids	10 mg/L
Filtered and Total Radionuclides	
Isotopic Uranium	0.5 pCi/L
Total Uranium (by KPA)	0.5 ug/L
Isotopic Thorium	0.5 pCi/L
Radium-226/Radium-228	0.5 pCi/L
Gross alpha/beta	2 pCi/L
Gamma Spec (includes U-238, Ra-228, Th-228, U-235, Pa-231, Ac-227, Co-60, Cs-137, Am-241)	QAPP Table 3-10b (revised Jan. 2003)

Table 6
Niagara Falls Storage Site
Wells to be Slug Tested

Well	Groundwater Sample Collected	Priority	Depth (ftBGS)	Screen (ftBGS)	
				Top	Bottom
606A		1	20.0	8.7	18.7
A42	Y	1	22.5	15.7	20.5
A45	Y	1	20.0	13.4	18.0
OW02B	Y	1	20.0	13.5	18.5
OW03B		1	16.0	9.5	14.5
OW04B	Y	1	17.0	10.2	15.2
OW05B	Y	1	17.0	9.5	14.5
OW08B		1	12.0	5.5	10.5
OW12B		1	12.2	5.8	10.8
OW14B	Y	1	15.1	8.5	13.5
OW16B	Y	1	13.2	6.9	11.9
A52	Y	1	15.0	8.4	13.0
OW01B		1	17.0	10.3	15.3
OW09B	Y	1	14.6	8.2	13.2
OW11B	Y	1	16.0	7.5	12.5
OW18B	Y	2	16.6	10.5	15.2
OW07B	Y	2	13.0	6.3	11.3
OW15B	Y	2	12.0	5.7	10.7
OW17B	Y	2	16.9	10.5	15.5

Note: Wells with a priority of 2 will be slug tested only in the event that testing is not possible for any of the wells with a priority of 1.

Appendix A
Previous Analytical Results

Summary of Previous SVOC and VOA Results for Wells Selected for Additional Sampling

Niagara Falls Storage Site Remedial Investigation

sample_no	parameter	fraction	lab_result	lab_qual	location	units
A42-254	Acetone	VOA	1.2	J	WL A42	ug/L
	Di-n-octylphthalate	SVOA	19.6		WL A42	ug/L
BH50-268	2-Butanone	VOA	1.4	J	WL BH50	ug/L
	Acetone	VOA	0.49	JB	WL BH50	ug/L
	Ethylbenzene	VOA	0.083	JB	WL BH50	ug/L
	Vinyl chloride	VOA	1.3		WL BH50	ug/L
	bis(2-Ethylhexyl)phthalate	SVOA	37.6		WL BH50	ug/L
BH57-276	Toluene	VOA	0.32	J	WL BH57	ug/L
	2-Butanone	VOA	2.9	JB	WL BH57	ug/L
	Acetone	VOA	1.1	JB	WL BH57	ug/L
	Ethylbenzene	VOA	0.066	JB	WL BH57	ug/L
BH61-280	Acetone	VOA	0.62	J	WL BH61	ug/L
	Ethylbenzene	VOA	0.067	J	WL BH61	ug/L
	Vinyl chloride	VOA	1		WL BH61	ug/L
GW213A-775	Acetone	VOA	3.6	J	WL213A	ug/L
	Tetrachloroethylene	VOA	0.46	J	WL213A	ug/L
GW415A-781	cis-1,2-Dichloroethylene	VOA	12300	D	WL415A	ug/L
	Tetrachloroethylene	VOA	103000	D	WL415A	ug/L
	Trichloroethylene	VOA	21200	D	WL415A	ug/L
	Vinyl chloride	VOA	1850		WL415A	ug/L
	Isophorone	SVOA	28.7		WL415A	ug/L
GW505-783	Acetone	VOA	3.5	J	WL505	ug/L
	Chloroform	VOA	0.41	J	WL505	ug/L
	2-Butanone	VOA	8.4		WL505	ug/L
	bis(2-Ethylhexyl)phthalate	SVOA	6.4	J	WL505	ug/L
GW816-789	Phenol	SVOA	6.1	J	WL816	ug/L
OW10B-801	bis(2-Ethylhexyl)phthalate	SVOA	14.2		WL OW10B	ug/L
	Phenol	SVOA	57.9		WL OW10B	ug/L
BH15-253	2-Butanone	VOA	2.2	J	WL BH15	ug/L
	Acetone	VOA	1	J	WL BH15	ug/L
	Ethylbenzene	VOA	0.06	J	WL BH15	ug/L

D: Sample Diluted

J: Estimated Value

B: Detected in Blank

Summary of Previous SVOC and VOA Results for Wells Not Selected for Additional Sampling

Niagara Falls Storage Site Remedial Investigation

sample_no	parameter	fraction	lab_result	lab_qual	location	units
A42-254	Acetone	VOA	1.2	J	WL A42	ug/L
A43-264	Acetone	VOA	0.86	J	WL A43	ug/L
A50-258	2-Butanone	VOA	2.6	J	WL A50	ug/L
A50-258	Acetone	VOA	0.31	JB	WL A50	ug/L
A52-259	2-Butanone	VOA	2.5	JB	WL A52	ug/L
A52-259	Acetone	VOA	0.64	JB	WL A52	ug/L
GW201A-773	Acetone	VOA	2.8	J	WL201A	ug/L
GW203A-774	Acetone	VOA	3.3	J	WL203A	ug/L
GW303A-778	Acetone	VOA	3.1	J	WL303A	ug/L
GW810A-788	2-Butanone	VOA	4.9	J	WL810A	ug/L
GW810A-788	Acetone	VOA	2.2	J	WL810A	ug/L
OW06B-262	2-Butanone	VOA	2.4	J	WL OW06B	ug/L

Appendix B
Example Calculation
Relative Percent Difference

For a given pair of numbers, relative percent difference is defined as the difference between two numbers divided by the average between the two numbers, expressed as a percentage. Relative percent difference can be calculated as follows:

$$RPD = 100x\{2x(X - Y)\} / (X + Y)$$

Where:

RPD = Relative Percent Difference
X = The larger value of the pair
Y = The lesser value of the pair

Example Calculation

Given two numbers, 10 and 15, the relative percent difference between this pair of numbers is:

RPD =100x{2x(15-10)}/(15+10)
= 40%

Appendix C
Equipment List

Equipment List

Rheostat Pump Controllers (3)
Teflon Tubing
Air Bladder Pump
Compressed Air Bottle
Water Quality Meter and In-line Flow-through Cell (3)
Turbidity Meter (3)
DC/AC Converter (3)
Deionized Water
Decontamination Kits (Alconox, sprayer, brushes, etc) (3)
Water Level Indicators (4)
PID (3)
Combination Gas Meters (3)
.45-micron in-line filters
Whale Pumps
Slugs

Appendix D
Slug Test Standard Operating Procedure

STANDARD OPERATING PROCEDURE

AQUIFER TESTING

EQUIPMENT

- Aquifer Test Field Forms
- Weather-Proof Notebook
- Well Logs
- Electric Well Probe
- 100 Foot Measuring Tape
- Generator
- Control Box w/Electrical Cable
- Submersible Pump w/Check valve
- Standpipe
- Discharge Hose
- Assortment of Valves, Elbows, Fittings
- Teflon Tape
- Electrical Tape
- Laptop Computer w/Communication Software
- Pressure Transducers w/Manual
- Digital Recorder w/Manual
- Watch
- Fuel Cans
- Rope
- Sample Bottles
- Pipe Wrenches
- Screwdrivers
- Ratchet Set
- Allen Wrenches
- Wire Splice Kit
- Tape Measurer (0.01 ft. increments)
- Cooler
- Pocket Knife
- Shovel
- S.C. Meter
- Discharge Measurement Device(s)
- pH Meter
- Thermometer
- Solid Cylinders (Slug)

PUMPING TESTS

1. Measure water levels in the pumping well and all observation wells daily for several days prior to the test to document water table fluctuation. It may be appropriate to install continuous water level recorders in selected wells to obtain this information.

2. Arrive on-site with all necessary equipment decontaminated and in good repair.

3. Set-up equipment; insure discharge hose/piping is directed away from test area such that the discharge will not influence the test. Obtain discharge permits if necessary.

4. Choose pump capacity based on expected well yield reported from previous pumping tests or from the well development logs. It is important to stress the aquifer during the pumping test yet have enough available drawdown for the expected duration of the test. It's better to use an oversized pump rather than an undersized pump. A one-way check valve should always be attached to the top of the pump.

5. Measure water levels in the pumping well and all observation wells prior to setting the test pump. Record all data on standardized field forms.

6. Calibrate pressure transducers in accordance with manufacturer's recommendations. Use the most sensitive transducersin observation wells and the least sensitive transducer in the pumping well, if applicable. If transducers are used, secure

transducer immediately above check valve with electrical tape. While lowering the pump into the well, secure transducer cable and electrical cable to the standpipe every 10 feet with electrical tape. Be sure to include a shroud over the pump if the pump intake is below the lowest screened interval.

7. Plumb a valve into the discharge line at the well head to facilitate flow rate adjustments. It may also be appropriate to plumb a sample port into the discharge line near the well head.

8. Lay out discharge hose in a manner that will not subject the hose to disruption thoughout the duration of the test.

9. Begin trial pumping test by maintaining a constant discharge rate and measuring drawdown in the pumping well with an electric well probe or a pressure transducer. Determine if pumping rate is appropriate for the length of the test by plotting trial test data on semi-log or log-log graphs. Adjust discharge rate as necessary. Terminate trial pumping test and allow water levels to recover to prepumping elevations.

10. Prepare for constant discharge test by coordinating all personnel involved. Be sure that the generator is fully fueled. If a digital recording device is used to record time/water level data, configure the device so that water level data are recorded every 30 seconds for the first half hour of the test and every ten minutes for the remainder of the test. If a digital recorder is not used, measure depth to water in the pumping well and all observation wells every 30 seconds for the first five minutes of the test, every minute for the next five minutes, every two minutes for minutes 10 through 20 of the test, every five minutes for minutes 20 through 40, every 10 minutes for minutes 40 through 60, every 15 minutes for minutes 60 through 100, every 30 minutes for minutes 100 through 300, and every 60 minutes for the remainder of the test.

11. Following termination of the constant discharge test, collect water level recovery data in a sequence similar to that above with the most frequent measurements obtained early in the recovery tests.

12. During the constant discharge test, obtain measurements of discharge periodically (at least every hour) and record on field forms. Be aware that flow rates may decrease as drawdown in the pumping well increases. Adjust discharge as necessary to maintain consistency. Measure field parameters, including pH, SC, and temperature at the time of discharge measurements.

13. Record all data on standard field forms and plot drawdown and recovery curves in the field in accordance with methods described in Lohman (1972) or other appropriate techniques as conditions or aquifer type warrant. Note any irregularities noticed during the test on field forms.

14. Upon completion of aquifer testing, decontaminate all equipment prior to exiting the project area.

References: Lohman, S.W. 1972. Ground Water Hydraulics. U.S. Geological Survey
Professional Paper 708. Washington.

SLUG TESTING

1. Arrive on-site with all equipment decontaminated and in good repair.

2. Calibrate pressure transducer (if applicable) prior to conducting the test in accordance with manufacturer's recommendation.

3. Lower transducer into the well to be tested and allow to stabilize. Measure and record static water level prior to initiation of test. Be sure to set transducer at a depth where it will not be disturbed when the slug is installed. Secure the transducer cable to the well head to prevent movement of the transducer in the well bore during the test.

4. Perform test by either withdrawing a known volume of water from the well with a bailer or by inserting a solid cylinder of know dimensions. Record water level recovery data at frequent intervals on a standardized field form. Measurement frequency should be similar to that described for aquifer tests. It is preferable to use a continuously recording pressure transducer to record recovery data as data obtained early in the test are typically the most valuable data for slug testing. Record data until recovery is about 95 percent complete.

5. Analyze time/water level data using methods described in U.S. Department of the Navy (1974), Hvorslev (1951), Bouwer (1989) and/or any other appropriate techniques for the type of aquifer being tested.

6. Note any irregularities in test procedures on the field forms.

7. Decontaminate all field equipment prior to leaving each site.

References: Bouwer, H. 1989. The Bouwer and Rice Slug Test - An Update. Ground Water, Volume 27, No. 3. May-June, 1989.

Hvorslev, J.M. 1951. Time Lag and Soil Permeability in Ground Water Observations. Bulletin 36. U.S. Corps of Engineers, Waterways Exp. Sta., Vicksburg, MS.

U.S. Department of the Navy. 1974. Naval Facilities Engineering Command

Niagara Falls Storage Site

Well Construction Details

	Depth	Screen (ftBGS)	
Well	(ftBGS)	Top	Bottom
201A	15	5	15
203A	15	5	15
215A	10	5	10
302A	15	5	15
303A	15	5	15
411A	17	7	17
603A	20	10	20
808A	17	7	17
810A	15	5	15
A-43	14	9.4	14
A-52	15	10.4	15
A-55	39	34	39
BH-15	104.5	94.5	104.5
BH-49A	19.5	14.6	19.5
OW-11A	37.2	26.9	37.2
OW-13B	14	9	14
OW-14B	15.1	10.1	15.1
OW-16A	45.2	34.9	45.2
OW-16B	13.2	8.2	13.2
OW-18A	47.8	37.5	47.8
OW-18B	16.6	11.9	16.6
OW-1A	47	36.7	47
OW-2B	20	15	20
OW-5B	17	12	17
OW-9B	14.6	9.6	14.6
505	18.5	10	18.5
816	15	10	15
213A	15	5	15
415A	15	10	15
A-42	22.5	17.7	22.5
BH-50	44	30.5	44
BH-57	101.5	91.5	101.5
BH-61	46	31.9	46
OW-10B	29	18.7	29
OW-11B	16	11	16
A-45	20	15.4	20
A-50	23	18.4	23
B02W020S	19.4	10	19.4
OW-15B	12	7	12
OW-17B	16.9	11.9	16.9
OW-4B	17	12	17
OW-6B	17	12	17
OW-7B	13	8	13

Appendix E
Review Comments and Responses

Judy Leithner Comments;

Good job on FSP. Careful attention was paid to our SOW. My only comments are not procedural, but should be fixed for entry into the administrative record:

Comment 1: Correct acronym for the state agency is NYSDEC (please include the "S")
Response 1: The acronym has been revised.

Comment 2. The "U" in FUSRAP stands for "utilized", not "used" (it does stand for "used" in DERP-FUDS).
Response 2: Text revised.

Comment 3: In Appendix A, please add the definition of the qualifier "D" at the bottom of the table.
Response 3: The qualifier has been defined in Appendix A.

COMMENT SHEET
PDT/ ITR Review

Complete and Return to: Michelle Rhodes, Project Engineer by 5 May 2003

Project: NFSS FUSRAP **Work item/phase:** Remedial Investigation: Additional Groundwater characterization Work Plan

Reviewer: Karen Keil, CELRB-TD-EH Risk Assessor **Date:** 05 May 2003

COMMENT NUMBER	PAGE / OR SHEET	COMMENT	RESPONSE
1	Section 1, DQO's	1) The 5th bullet is not a DQO of this particular sampling effort, and so should not be listed here. There is no indication in this work plan that new wells will be installed. Furthermore, these work plans do not include any surface water, sediment, nor soil sampling. 2) Is determination of nature and extent of groundwater contamination a DQO for this effort of groundwater sampling? It should be, for a remedial investigation.	The presentation of objectives has been revised and now reads: Data Quality Objectives were developed during Technical Planning Process meetings and were presented in the original Field Sampling Plan for this project: Data Quality Objectives supported by this Field Sampling Plan Addendum include: • Obtain information of sufficient quantity and quality to meet the requirements of a site inspection as described in the directives entitled "Guidance for Performing Site Inspections Under CERCLA: USEPA Directives 93.151-05, September 1992"; • Obtain information of sufficient quantity and quality to meet the requirements for use in a risk assessment as described in the USEPA document, Guidance for Data Usability in Risk Assessment, April 1992; • Obtain information of sufficient quantity and quality to meet the requirements for development of a Baseline Risk Assessment based on USEPA Risk Assessment Guidance for Superfund (RAGS), 1989 and subsequent guidance documents; • Obtain information of sufficient quantity and quality to identify sources of contamination and migration pathways to adequately characterize potential contamination at areas included in this investigation; and • Use the monitoring well network to collect groundwater samples to obtain information of sufficient quantity and quality to determine if contaminants are

COMMENT SHEET
PDT/ ITR Review

Complete and Return to: Michelle Rhodes, Project Engineer by 5 May 2003

Project: NFSS FUSRAP **Work item/phase:** Remedial Investigation: Additional Groundwater characterization Work Plan

Reviewer: Karen Keil, CELRB-TD-EH Risk Assessor **Date:** 05 May 2003

COMMENT NUMBER	PAGE / OR SHEET	COMMENT	RESPONSE
			migrating off-site or migrating on-site from off-site sources. The above Data Quality Objectives were used to guide the development of this plan. In order to sufficiently characterize the groundwater conditions at the NFSS additional and to satisfy the SOW for this task, Maxim identified several additional objectives. Objectives for this task include: 1) To confirm groundwater contamination found in previous phases of the remedial investigation, 13 wells will be re-sampled for full suite analysis (radiological parameters, metals, SVOC, VOCs, Pest/PCBs, and nitroaromatic compounds, described in Table 2). These wells are described as "TWP data" in the remarks column of Table 1. 2) To more fully characterize the groundwater conditions at the site, full suite analysis will be performed on samples collected from 15 wells that were sampled for limited lists of parameters during previous phases of the remedial investigation. These wells are described as "Previously Sampled" in the remarks column of Table 1. 3) To more fully characterize the groundwater conditions at the site, full suite analysis and analysis of natural attenuation parameters (total organic carbon, selected anions, phosphate, and methane, described in Table 3) will be performed on samples collected from 13 wells not sampled during previous phases of the remedial investigation. These wells are described as "Not previously sampled" in the remarks column of Table 1. 4) Eight wells will be sampled full suite parameters, natural attenuation parameters, alkalinity and total dissolved solids

COMMENT SHEET
PDT/ ITR Review

Complete and Return to: Michelle Rhodes, Project Engineer by 5 May 2003

Project: NFSS FUSRAP **Work item/phase:** Remedial Investigation: Additional Groundwater characterization Work Plan

Reviewer: Karen Keil, CELRB-TD-EH Risk Assessor **Date:** 05 May 2003

COMMENT NUMBER	PAGE / OR SHEET	COMMENT	RESPONSE
			as part of an on-going environmental surveillance of the groundwater at the site. These wells are described as "Environmental surveillance wells" in the remarks column of Table 1. Three of the Environmental surveillance wells were not sampled during previous phases of the remedial investigation and are included in total count for item 1, above. Three other Environmental Surveillance Wells were previously sampled and are included in the total count for item 2. 5) Results from the analysis of groundwater samples will be assessed to evaluate the presence of site related compounds. 6) In order to augment knowledge of the subsurface conditions at the site and to facilitate groundwater modeling, slug tests will be performed at 15 wells. The slug test data will be used to estimate the subsurface hydraulic conductivity at locations of the 15 tested wells (these wells are identified in Table 6). In accordance with the scope of work, the past analytical results for the wells included in items 1 and 2, above, were evaluated. The 10 wells that contained organic compounds were selected for analysis of natural attenuation parameters.
2	Page 2	Please spell out "TWP" the first time this acronym is used.	Text revised.
3	Page 7	Is it necessary to heat the plastic storage tank for IDW, now that winter is over? This may also not be desirable, if there are	The word 'heated' will be stricken.

COMMENT SHEET
PDT/ ITR Review

Complete and Return to: Michelle Rhodes, Project Engineer by 5 May 2003

Project: NFSS FUSRAP **Work item/phase:** Remedial Investigation: Additional Groundwater characterization Work Plan

Reviewer: Karen Keil, CELRB-TD-EH Risk Assessor **Date:** 05 May 2003

COMMENT NUMBER	PAGE / OR SHEET	COMMENT	RESPONSE
		volatiles in the IDW.	
4	Page 8	Please clarify the use of the word, "both" in the first sentence of the 2nd full paragraph on this page.	The sentence will be revised to read: "*The City of Niagara Falls must approve all discharges to their wastewater treatment plant."*
5	Table 1	The text (p. 2) indicates that only 10 wells will be chosen for testing of natural attenuation parameters (parameter group 2; table 3). However, table 1 indicates that there are 28 wells to be tested for group 2 parameters. Please clarify.	The SOW specified Group 2 parameters for 18 wells. It also directed Maxim to evaluate past analytical results and select an additional 10 wells for Group 2 analysis. The text on pages 1 and 2, shown in response to Comment 1, will be revised to clarify this.
6	Table 2	Suggestion: Since all wells will be analysed for water quality indicator parameters (listed on page 4 – pH, conductivity, ORP, oxygen concentration, and turbidity), these should be included on the list of parameter group 1 analytes. (Note that these parameters are part of the natural attenuation parameters.)	The terms 'Group 1', Group 2' and 'Group 3', as defined in Tables 2 through 4, refer strictly to analytes, methods, and containers for samples to be analyzed at the laboratory. The field measurement of water quality indicator parameters is part of Maxim's standard sample collection procedure and is described on page 4 of the FSP Addendum.
7	Table 3 and 4	The parameters listed separately in table 4 should be added to table 3. All wells that will be analysed for natural attenuation parameters should include analysis for alkalinity and total dissolved solids.	Maxim received an interpretation of the SOW from the USACE, dated 7 April 2003, which states *"The 10 wells not previously sampled will be analyzed fro all chemical and radiological parameters in Table 2 (excluding TDS)."* Table 2 has a footnote which states that carbonate, bicarbonate, and alkalinity are "For 'ES' wells only."

COMMENT SHEET
PDT/ ITR Review

Complete and Return to: Michelle Rhodes, Project Engineer by 5 May 2003

Project: NFSS FUSRAP **Work item/phase:** Remedial Investigation: Additional Groundwater characterization Work Plan

Reviewer: Karen Keil, CELRB-TD-EH Risk Assessor **Date:** 05 May 2003

COMMENT NUMBER	PAGE / OR SHEET	COMMENT	RESPONSE
8	Table 6and Table 1	The text (p. 2) and table 6 indicate that 15 wells will be subject to slug testing. However, there are only 13 wells indicated with a "Y" in the slug test column on table 1. Please correct.	The complete list of wells to be slug tested is presented in Table 6, not Table 1.

Reviewer: Michelle Rhodes

Page	Comment	Response
1, 2nd to last Paragraph	Awkwardly worded sentence.	The entire paragraph has been revised.
2, First Bullet	These wells were selected based on previous analytical results which found evidence of contamination in the groundwater. This fact should be noted in the FSP.	The FSP Addendum was revised. The following sentence has been inserted into page 2 of the FSP Addendum: *Previously collected samples from these 15 wells contained detectable concentrations of compounds of interest*
Table 1	SAIC made the following comment on the FSP for the upcoming groundwater sampling task: *SAIC suggests including the following wells for the following constituents:BH51 - metals (an unusually high concentration of beryllium was detected in this well - the lower water bearing zone) OW07A - rad (Cesium was detected in the lower water bearing zone. Confirmation of this value would help in the calibration of the groundwater model. If cesium is really present and the model doesn't show it, the model may have to be adjusted to represent actual conditions.) OW13A - rad (Th-228 was detected in the lower water bearing zone. There may be potential issues with the southern portion of the dike. Confirmation of this detection will help in the FS evaluation.)* The USACE is in agreement with SAIC's comment and authorizes Maxim to collect the samples described above.	Comment Noted. Table 1 has been revised accordingly.

Reviewer: Michelle Rhodes

Page	Comment	Response
1, 2nd to last Paragraph	Awkwardly worded sentence.	The entire paragraph has been revised.
2, First Bullet	These wells were selected based on previous analytical results which found evidence of contamination in the groundwater. This fact should be noted in the FSP.	The FSP Addendum was revised. The following sentence has been inserted into page 2 of the FSP Addendum: *Previously collected samples from these 15 wells contained detectable concentrations of compounds of interest*
Table 1	SAIC made the following comment on the FSP for the upcoming groundwater sampling task: *SAIC suggests including the following wells for the following constituents:BH51 - metals (an unusually high concentration of beryllium was detected in this well - the lower water bearing zone) OW07A - rad (Cesium was detected in the lower water bearing zone. Confirmation of this value would help in the calibration of the groundwater model. If cesium is really present and the model doesn't show it, the model may have to be adjusted to represent actual conditions.) OW13A - rad (Th-228 was detected in the lower water bearing zone. There may be potential issues with the southern portion of the dike. Confirmation of this detection will help in the FS evaluation.)* The USACE is in agreement with SAIC's comment and authorizes Maxim to collect the samples described above.	Comment Noted. Table 1 has been revised accordingly.

Lori Powell (Project HP):

Comment 1. The SOW requires that the Contractor sample all ESP wells within a one-week period. This wasn't addressed in the FSP submitted from Maxim. (Michelle will discuss this with you when she calls you)
Response 1: The following text has been inserted into Section 4.0 of the FSP Addendum:

> *In accordance with the SOW, all eight of the environmental surveillance wells (i.e. those wells scheduled for analytical groups 1, 2 and 3, as shown on Table 1) will be sampled during a single seven-day period. It is anticipated that the environmental surveillance wells will be sampled during the period from 13 May 2003 to 20 May 2003.*

Comment 2. The SOW requires states that "up to 10 wells which have exhibited organic contamination be monitored for natural attenuation parameters". The FSP indicates that 10 wells will be monitored for natural attenuation parameters in addition to the ESP wells (page 2, section 3.0) (We want the additional wells, per Michelle and me).
Response 2: Table 1 FSP incorrectly specified the analysis of natural attenuation parameters for groundwater samples collected from the wells that were not previously sampled.

The revised Table 1 specifies a total of 18 natural attenuation samples, plus two field duplicates. The ten samples with four digits extensions (as shown on Table 1) ranging from 3275 to 3284 will be submitted for natural attenuation parameters, as will the eight ES wells (samples 3285 through 3292). Samples 3275 through 3284 will be collected from wells that were sampled during previous phases of the RI. Samples previously collected from those ten wells contained detectable concentrations of organic compounds.

The negotiated cost estimate for this task included costs for the analysis of 20 samples for natural attenuation parameters.