Environmental Surveillance Program Modifications
Niagara Falls Storage Site
Lewiston, NY

U.S. Army Corps of Engineers
Buffalo District

Building Strong®

May 2013

Formerly Utilized Sites Remedial Action Program (FUSRAP)

The Formerly Utilized Sites Remedial Action Program (FUSRAP) was established in 1974 to identify, investigate, and if necessary, clean up or control sites that were contaminated as a result of activities conducted in support of the Nation's early atomic energy and weapons program. The activities were performed by the Manhattan Engineer District (MED) between 1942 and 1946 and/or under the Atomic Energy Commission (AEC) between 1947 and 1975. Both the MED and the AEC were predecessors of the United States (U.S.) Department of Energy (DOE).

Responsibility for the administration and execution of FUSRAP was transferred from the DOE to the U.S. Army Corps of Engineers in October of 1997. The Corps executes FUSRAP in accordance with, and subject to regulation under, the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended, and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP).

Site Description and History

The Niagara Falls Storage Site (NFSS) is a Federally owned, 191-acre site located in Lewiston, New York. The site was originally part of the former 7,500-acre Lake Ontario Ordnance Works (LOOW); a World War II explosives manufacturing plant. Between 1943 and 1954, the MED and AEC shipped radioactive materials to a portion of the LOOW for storage. In 1975, the AEC was dissolved and responsibility for the site was transferred to the Energy and Resource Development Agency (ERDA). The ERDA was abolished in 1977 and the responsibility for the site was then transferred to the DOE.

Between 1982 and 1986, the DOE consolidated radioactive materials from a portion of the LOOW into a 10-acre Interim Waste Containment Structure (IWCS) on the NFSS. The IWCS is an engineered landfill designed to retard radon emissions, infiltration from precipitation, and migration of contamination to groundwater.

Brief History of the Environmental Surveillance Program at NFSS

In 1979, prior to construction of the IWCS at the NFSS, the DOE initiated the environmental surveillance program (ESP) to assess the radon emissions from the NFSS and the potential for transport of radiological contaminants to surface water, sediment, and groundwater. The DOE ESP was expanded to monitor the performance of the IWCS once it was completed. After FUSRAP was transferred to the Corps from the DOE in 1997, the Corps continued to execute the ESP, with some revisions over the years. Findings from the ESP data collected at the NFSS are presented in an annual ESP Technical Memorandum (TM). The ESP TM's are posted to the following Corps' website under the "Environmental Monitoring" section:
http://www.lrb.usace.army.mil/Missions/HTRW/FUSRAP/NiagaraFallsStorageSite.aspx

Over 30 years of ESP data collected at the NFSS indicate that site controls are performing as designed to protect human health and the environment.

Current NFSS Environmental Surveillance Program

Environmental media currently monitored by the Corps include groundwater, surface water, and drainage ditch sediment for radiological and chemical parameters and air for radon and external gamma radiation. Currently, the Corps performs:

- Annual Radon-222 monitoring through the placement of radon flux canisters on the IWCS protective cap.
- Semi-annual radon and external gamma radiation monitoring through the placement of detectors around the IWCS and the perimeter of the site.
- Semi-annual surface water and sediment sampling at points along the west drainage ditch, central drainage ditch, and east (upstream) of the central drainage ditch.
- Quarterly surface water and sediment sampling at one point along central drainage ditch.
- Semi-annual groundwater monitoring for radiological, metals, anions, and water quality parameters.
- Quarterly groundwater monitoring for radiological, anions, and water quality parameters on select wells.
- Semi-annual groundwater monitoring on select wells for volatile organic compounds.

Semi-annual groundwater sampling performed by Corps personnel to support the ongoing Environmental Surveillance Program at the NFSS.

- Quarterly water level measurements in groundwater wells throughout the site to monitor the groundwater flow directions in the upper and lower water-bearing zones.

Current Site Conditions

The Corps issued a Remedial Investigation (RI) Report in December of 2007 and RI Addendum in April of 2011, which identified the nature and extent of contamination on the NFSS and evaluated the potential human health and environmental risks that this contamination poses to current and future users of the site and the adjacent community. The reports concluded that existing conditions at the NFSS do not pose a risk to current on-site workers or the surrounding community; risks were identified for potential long-term future receptors that work, live, and/or farm on the site.

Groundwater

The data from the RI, along with decades of data collected through the ESP, were collectively considered to refine the areas of groundwater contamination at the NFSS. Our findings indicate that uranium is the only radionuclide in groundwater detected at concentrations exceeding the drinking water standard. Although groundwater at the site is neither suitable for nor used as a public drinking water source, groundwater data are compared to drinking water standards as a conservative basis for evaluation.

Areas within the NFSS with concentrations of total uranium in groundwater greater than the drinking water standard include:

- The northwest corner, known as the Baker-Smith Area
- The vicinity of the IWCS
- The northeast portion of the site, known as the Acidification Area
- A few locations in the vicinity of former Building 401

Groundwater contamination in these areas is the result of historic site operations and past waste storage practices.

A fairly well-defined area of groundwater contaminated with chlorinated solvents (volatile organic compounds) is also located in the Acidification Area. This contamination is confined to the site. In fact, the groundwater flow and transport model prepared during the RI predicts that all areas of groundwater contamination currently confined to the site will not migrate beyond the boundary of the site over a period of at least 1,000 years.

Surface Water and Sediment in Drainage Ditches

ESP surface water and sediment sampling data were merged with the RI data set and evaluated to identify constituents of concern using the same technique as was used for the RI. This evaluation identified no constituents of concern for surface water. Constituents of potential concern were identified in sediment and include polycyclic aromatic hydrocarbons and metals. The NFSS is not believed to be the source of these constituents of potential concern and off-site sources are being evaluated.

Air

The annual ESP TMs consistently report that radon gas and external gamma radiation measurements recorded at the NFSS are well below regulatory criteria, confirming that the site is not releasing air emissions that would pose a risk to the neighboring community.

Modifications for the 2013 Environmental Surveillance Program

The primary goals of the ESP are to ensure (1) that the IWCS is functioning as designed and (2) protection of human health and the environment. Using data collected over decades, the Corps is modifying the monitoring effort to achieve these goals in the most effective and efficient manner. In the spring of 2013, the Corps will implement the following changes:

Groundwater

- Monitor a total of 54 wells because they offer optimal monitoring of IWCS integrity and/or the site boundary. These 54 wells are identified in Table 1, located on Figure 1, and summarized below:
    - 35 of the 39 wells previously monitored for the ESP (removed wells 415A, B02W20S, MW313, and 201A).
    - 2 existing wells, A43 and MW938, which were not previously monitored as part of the ESP.
    - 17 new wells, MW944 through MW960, installed during the Balance of Plant Field Investigation completed in the winter of 2012.

- Analyze all groundwater samples for total uranium, as well as radium-226 because it is the primary constituent in the residues in the IWCS; also analyze groundwater samples from select wells in the Acidification Area for volatile organic compounds (Table 1).

- Remove analytical parameters from the current groundwater monitoring list, including:

  - Plutonium and fission products (i.e., strontium, cesium, technetium, tritium) related to the Knolls Atomic Power Laboratory (KAPL) wastes historically stored at the site because data from the RI and ESP indicate that plutonium and fission products are typically not detected or are present at low concentrations, well below any regulatory criteria, and do not pose a risk to human health and the environment.
  - Thorium because it is immobile in site soils and migrates 2,500 times slower than the flow of on-site groundwater, which occurs at less than one foot per year. Also, uranium is a better indicator of contaminant mobility than thorium.
  - Metals because existing data provide a sufficient baseline for use as geochemical indicators of the potential for migration from soil to water.
  - Radium-228 because the primary constituent of concern for the NFSS is radium-226, which is a key component of the residues and is a better indicator of IWCS performance.

Surface Water and Sediment in Drainage Ditches

- Collect surface water and sediment samples at 9 of the 11 existing locations (two locations were eliminated because they were either dry or a redundant location) (Figure 2 and Table 2).

- Analyze surface water and sediment samples for uranium, radium-226, polycyclic aromatic hydrocarbons, and metals.

- Remove analytical parameters from the current surface water and sediment monitoring list, including:

  - Plutonium, fission products, thorium, and radium-228 for the same reasons they are being eliminated for groundwater.
  - Volatile organic compounds, polychlorinated biphenyls, and pesticides because a risk evaluation of RI and ESP data indicate they are not constituents of concern in surface water and sediment.

Air

- No changes to the current ESP for air, so monitoring of radon flux on the IWCS cover and radon and gamma radiation at various locations around the perimeter of the IWCS and the NFSS will continue (Figure 3).

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1776 NIAGARA STREET, BUFFALO, N.Y. 14207
Phone: 800-833-6390 (Option 4)
Email: fusrap@usace.army.mil
Website: http://www.lrb.usace.army.mil/Missions/HTRW/FUSRAP/NiagaraFallsStorageSite.aspx

Legend

Monitoring Well (Sampled Bi-Annually)

NFSS Site Boundary

0 175 350 700 Feet

US Army Corps of Engineers Buffalo District

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BUFFALO, NY

MONITORING WELL LOCATION MAP

Name: 130423_ESPSampleWells.mxd
Drawn By: H5TDESPM
Date Saved: 23 Apr 2013
Time Saved: 8:35:01 AM

NIAGARA FALLS STORAGE SITE
LEWISTON, NEW YORK

FIGURE 1

Document Path: K:\NFSSP\GIS\ArcMap\Sampling_Locations\130423_ESPSampleWells.mxd

Legend

- Surface Water/Sediment Sample Location
- NFSS Site Boundary

0 175 350 700 Feet

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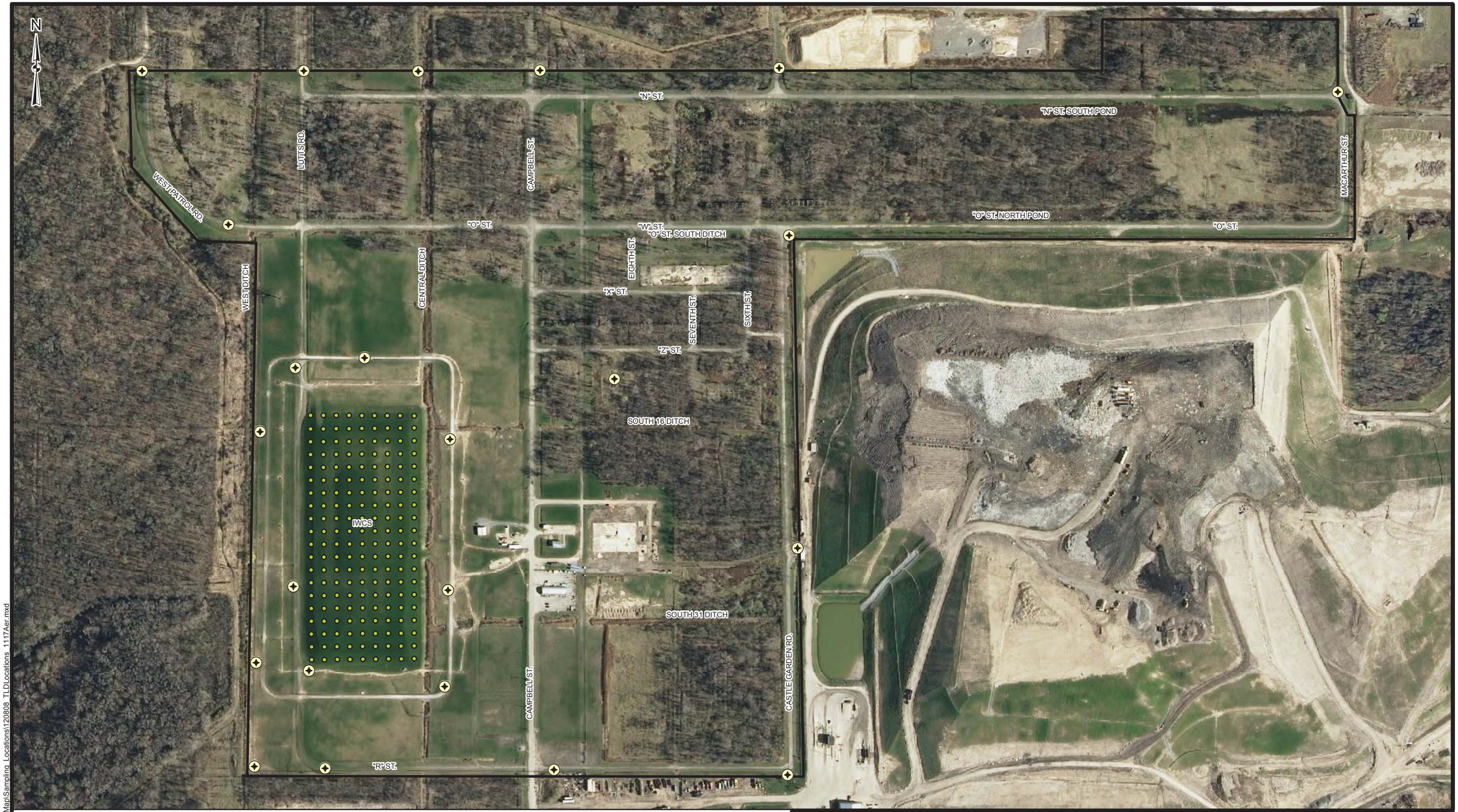
SURFACE WATER/SEDIMENT SAMPLING
LOCATION MAP

Name: 130321_SWaterSed_Aerial.mxd
Drawn By: H5TDESPM
Date Saved: 24 Apr 2013
Time Saved: 8:07:52 AM

NIAGARA FALLS STORAGE SITE
LEWISTON, NEW YORK

FIGURE 2

Document Path: K:\NFSSP\GIS\ArcMap\Sampling_Locations\130321_SWaterSed_Aerial.mxd



Legend

- Radon Flux Sample Location
- TLD/Radon Monitoring Location
- NFSS Site Boundary

0 175 350 700 Feet

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BUFFALO, NY

TLD/RADON MONITORING AND RADON FLUX SAMPLING LOCATION MAP

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Date Saved: 21 Mar 2013
Time Saved: 10:43:19 AM

NIAGARA FALLS STORAGE SITE
LEWISTON, NEW YORK

FIGURE 3

Document Path: K:\NFSSP\GIS\ArcMap\Sampling_Locations\120808_TLDLocations_1117Aer.mxd

Table 1
ESP Spring of 2013
Groundwater Sampling
Niagara Falls Storage Site

Well Location	UWBZ or LWBZ Well	Purpose	*Laboratory Analytical Parameters						**Field Parameters
			Total Uranium	Radium -226	VOCs	Alkalinity	TDS	Anions	
A45	UWBZ	N (IWCS)	X	X		X	X	X	X
OW04A[1]	LWBZ	N (IWCS)	X	X		X	X	X	X
OW04B[1]	UWBZ	N (IWCS)	X	X		X	X	X	X
BH49A	UWBZ	N (IWCS)	X	X		X	X	X	X
BH49	LWBZ	N (IWCS)	X	X		X	X	X	X
OW05A	LWBZ	N (IWCS)	X	X		X	X	X	X
OW05B	UWBZ	N (IWCS)	X	X		X	X	X	X
A50	UWBZ	E (IWCS)	X	X		X	X	X	X
MW862	UWBZ	E (IWCS)	X	X		X	X	X	X
MW863	LWBZ	E (IWCS)	X	X		X	X	X	X
OW11A	LWBZ	E (IWCS)	X	X		X	X	X	X
OW11B	UWBZ	E (IWCS)	X	X		X	X	X	X
OW12A	LWBZ	E (IWCS)	X	X		X	X	X	X
OW12B	UWBZ	E (IWCS)	X	X		X	X	X	X
OW06A	LWBZ	S (IWCS)	X	X		X	X	X	X
OW06B	UWBZ	S (IWCS)	X	X		X	X	X	X
OW13A	LWBZ	S (IWCS)	X	X		X	X	X	X
OW13B	UWBZ	S (IWCS)	X	X		X	X	X	X
OW07A	LWBZ	S (IWCS)	X	X		X	X	X	X
OW07B	UWBZ	S (IWCS)	X	X		X	X	X	X
OW03A	LWBZ	W (IWCS)	X	X		X	X	X	X
OW03B	UWBZ	W (IWCS)	X	X		X	X	X	X
OW15A	LWBZ	W (IWCS)	X	X		X	X	X	X
OW15B	UWBZ	W (IWCS)	X	X		X	X	X	X
A42	UWBZ	W (IWCS)	X	X		X	X	X	X
OW17A	LWBZ	W (IWCS)	X	X		X	X	X	X
OW17B	UWBZ	W (IWCS)	X	X		X	X	X	X
OW18B	UWBZ	W (IWCS)	X	X		X	X	X	X
A55	LWBZ	W (IWCS)	X	X		X	X	X	X
A43	UWBZ	W (IWCS)	X	X		X	X	X	X
505	UWBZ	EU 1	X	X		X	X	X	X
MW934	UWBZ	EU 4	X	X	X	X	X	X	X
411A	UWBZ	EU 4	X	X	X	X	X	X	X
302A	UWBZ	EU 8	X	X		X	X	X	X
MW921 or MW922[2]	UWBZ	NW (off-site)	X	X		X	X	X	X
MW 935	UWBZ	NW (IWCS)	X	X		X	X	X	X
MW938	UWBZ	NW (IWCS)	X	X		X	X	X	X
MW-944	UWBZ	EU 1	X	X		X	X	X	X
MW-945	UWBZ	EU 1	X	X		X	X	X	X
MW-946	UWBZ	EU 1	X	X		X	X	X	X
MW-947	UWBZ	EU 4	X	X	X	X	X	X	X
MW-948	UWBZ	EU 4	X	X	X	X	X	X	X
MW-949	LWBZ	EU 4	X	X	X	X	X	X	X
MW-950	UWBZ	S (IWCS)	X	X		X	X	X	X
MW-951	UWBZ	S (IWCS)	X	X		X	X	X	X
MW-952	UWBZ	E (IWCS)	X	X		X	X	X	X
MW-953	UWBZ	E (IWCS)	X	X		X	X	X	X
MW-954	UWBZ	E (IWCS)	X	X		X	X	X	X
MW-955	UWBZ	E (IWCS)	X	X		X	X	X	X
MW-956	UWBZ	S (IWCS)	X	X		X	X	X	X
MW-957	UWBZ	S (IWCS)	X	X		X	X	X	X
MW-958	UWBZ	S (IWCS)	X	X		X	X	X	X
MW-959	UWBZ	S (IWCS)	X	X		X	X	X	X
MW-960	UWBZ	S (IWCS)	X	X		X	X	X	X
Field Duplicate	-	-	X	X		X	X	X	X

***Laboratory Analytical Parameters**

VOC - Volatile Organic Compounds
TDS - Total Dissolved Solids
Anions: Chloride, Fluoride, Nitrate, Nitrite, Phosphate, Sulfate

****Field Parameters:**

pH
Temperature
Specific conductivity
Oxidation-Reduction Potential
Dissolved oxygen
Turbidity (If the turbidity reading for a sample is 50 NTUs or greater, the sample will be filtered in the field and both filtered and unfiltered samples at that location will be submitted to the lab for analysis.)

UWBZ - upper water bearing zone
LWBZ - lower water-bearing zone

indicates new well (Spring 2013)
indicates not sampled

[1] These wells are sampled quarterly
[2] MW921 or MW922 is sampled based on availability of water within these wells

Table 2

ESP Spring of 2013
Surface Water and Sediment Sampling
Niagara Falls Storage Site

*Laboratory Analytical Parameters					**Field Parameters
Sample Location	**Total Uranium**	**Radium -226**	**Metals**	**PAHs**	
SWSD009	X	X	X	X	X
SWSD010	X	X	X	X	X
SWSD011	X	X	X	X	X
SWSD021	X	X	X	X	X
SWSD022	X	X	X	X	X
SWSD023	X	X	X	X	X
SWSD025[1]	X	X	X	X	X
WDD2	X	X	X	X	X
WDD3	X	X	X	X	X
Field Duplicate	X	X	X	X	X

***Laboratory Analytical Parameters:**
PAH - Polyaromatic Hydrocarbons
[1] Sampled quarterly

****Field Parameters:**
pH
Temperature
Specific conductivity
Oxidation-Reduction Potential
Dissolved oxygen
Turbidity (If the turbidity reading for a sample is 50 NTUs or greater, the sample will be filtered in the field and both filtered and unfiltered samples at that location will be submitted to the lab for analysis.)