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Buffalo District

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NIAGARA FALLS STORAGE SITE
Formerly Utilized Sites Remedial Action Program

2013
ENVIRONMENTAL SURVEILLANCE TECHNICAL MEMORANDUM

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Acronyms and Abbreviations

AEC	Atomic Energy Commission
ASTM	American Society for Testing and Materials
CAP88-PC	Clean Air Act Assessment Package – 1988 (USEPA)
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
Ci	curies
DoD	Department of Defense
DoD QSM	Department of Defense Quality Systems Manual for Environmental Laboratories
DOH	Department of Health
ESP	environmental surveillance program
ft	feet
FUSRAP	Formerly Utilized Sites Remedial Action Program
Gal	gallon
HASL	Health and Safety Laboratory
IWCS	interim waste containment structure
KAPL	Knolls Atomic Power Laboratory
km	kilometers
LOOW	Lake Ontario Ordnance Works
MCL	maximum contaminant level
MDA	minimum detectable activity
MED	Manhattan Engineer District
MEI	maximally exposed off-site individual
m	meters
m^3	cubic meter(s)
µg/g	micrograms per gram
µg/L	micrograms per liter
mg/kg	milligrams per kilogram
NCRP	National Council on Radiation Protection and Measurements
NESHAPs	National Emission Standards for Hazardous Air Pollutants (USEPA)
NFSS	Niagara Falls Storage Site
NTUs	nephelometric turbidity units
NRC	Nuclear Regulatory Commission
NYS	New York State
NYSDEC	New York State Department of Environmental Conservation
OSL	optically stimulated luminescence
PAH	polycyclic aromatic hydrocarbon
pCi/g	picocuries per gram
pCi/L	picocuries per liter
Ra-226	radium-226
RCRA	Resource Conservation and Recovery Act
RSL	regional screening level
SCO	soil clean-up objective
SDWA	Safe Drinking Water Act
SI	international system of units
TDS	total dissolved solids
TED	total effective dose
TOGS	Division of Water Technical and Operational Guidance Series
U	lab qualifier – non-detect
U_3O_8	triuranium octoxide
USACE	United States Army Corps of Engineers
USDOE	United States Department of Energy
USEPA	United States Environmental Protection Agency
VOC	volatile organic compound

Units of Measurement and Conversion Factors - Radioactivity

Parameter	Conventional Units	SI Units	Conversion Factor
Dose	millirem (mrem)	milliSievert (mSv)	1 mrem = 0.01 mSv
Activity	picoCurie (pCi)	becquerel (Bq)	1 pCi = 0.037 Bq

Units of Measurement and Conversion Factors - Mass, Length, Area, and Volume

Parameter	SI Units	English Units	Conversion Factor
Mass	gram (g)	Ounce (oz)	1 g = 0.035 oz
	kilogram (kg)	Pound (lb)	1 kg = 2.2046 lb
Length	centimeter (cm)	Inch (in.)	1 cm = 0.394 in.
	meter (m)	foot (ft)	1 m = 3.281 ft
	kilometer (km)	mile (mi.)	1 km = 0.621 mi.
Area	hectare (ha)	acre	1 ha = 2.47 acres
Volume	milliliter (mL)	Fluid ounce (fl. oz.)	1 mL = 0.0338 fl. oz.
	liter (L)	gallon (gal)	1 L = 0.264 gal
	cubic meter (m^3)	Cubic yard (yd^3)	1 m^3 = 1.307 yd^3

EXECUTIVE SUMMARY

Purpose: The purpose of this technical memorandum is to document the scientific methods, criteria, data, and findings of the Environmental Surveillance Program (ESP) at the Niagara Falls Storage Site (NFSS). This program is executed by the U.S. Army Corps of Engineers (USACE) Buffalo District in support of our mission under the Formerly Utilized Sites Remedial Action Program (FUSRAP) to protect human health and the environment at the NFSS. This technical memorandum is published annually by the Buffalo District and is posted to the following USACE website under the "Environmental Monitoring" section: http://www.lrb.usace.army.mil/Missions/HTRW/FUSRAP/NiagaraFallsStorageSite.aspx.

Site Description and Background: The NFSS is located at 1397 Pletcher Road in the Town of Lewiston, NY, approximately 19 miles (30.6 km) north of Buffalo, NY. The NFSS is a federally-owned property that covers an area of 191 acres. The NFSS was originally part of a World War II explosives plant called the Lake Ontario Ordnance Works (LOOW) which was approximately 7,500 acres in size. Between 1944 and 1954 the Manhattan Engineer District (MED) and the Atomic Energy Commission (AEC) (a predecessor to the U.S. Department of Energy (USDOE)) brought radioactive wastes and residues to a small portion of the LOOW Site. Through the 1970s, the AEC gradually consolidated its operations and sold excess property to the public. In the 1980s, the USDOE constructed a 10-acre Interim Waste Containment Structure (IWCS) on the NFSS to contain the radioactive wastes and residues.

In 1974, FUSRAP was initiated and in October 1997, Congress transferred management of FUSRAP from the USDOE to the USACE. In addition to investigating and remediating site contaminants at the NFSS, the USACE has been given responsibility for maintaining the site and conducting the ESP. Environmental surveillance activities initiated in 1979 by the USDOE have evolved over the years to ensure that the wastes buried within the IWCS and contaminated on-site soil and groundwater do not pose a risk to human health and the environment. The program includes monitoring air, water, and sediments for radiological and chemical parameters.

In December 2007 and April 2011, the USACE Buffalo District completed the *Remedial Investigation Report for the NFSS* and *NFSS Remedial Investigation Report Addendum*, respectively that defined the nature and extent of contaminants on the NFSS and assessed potential long-term risks associated with those contaminants. Based upon findings from these investigations and public input, the USACE further enhanced the ESP to monitor those protective engineered controls that are in place for the IWCS, to ensure that they are functioning properly.

In 2013, the following modifications to the ESP were implemented:

- The number of wells monitored semi-annually increased from 39 to 54 (to include several wells installed in 2012) and the analytical parameters were refined to include total uranium, radium-226 and volatile organic compounds (for a limited number of wells); and

- The number of surface water and sediment locations sampled semi-annually decreased from 11 to 9 and the analytical parameters were refined to include total uranium, radium-226, polycyclic aromatic hydrocarbons, and metals.

No changes were made to air monitoring: radon-222 flux measurements are collected annually on the IWCS cap; and, radon-222 concentrations and gamma emissions are measured semi-annually at the IWCS perimeter and NFSS property boundary.

To evaluate environmental surveillance data, USDOE, U.S. Environmental Protection Agency (USEPA), Nuclear Regulatory Commission (NRC), and New York State Department of Environmental Conservation (NYSDEC) criteria, standards, and guidelines are used for comparison purposes.

Additional information about the site and the ESP is available on the USACE Buffalo District website: http://www.lrb.usace.army.mil/Missions/HTRW/FUSRAP/NiagaraFallsStorageSite.aspx.

Key Findings: The 2013 environmental surveillance analytical results confirm that site controls are continuing to perform as designed and are fully protective of human health and the environment.

Results of the 2013 surveillance program are consistent with previous years and show:

- Site radon-222 concentrations are below the USDOE off-site limit of 3.0 pCi/L and radon-222 flux measurements taken on the IWCS are less than the USDOE flux standard of 20 pCi/m^2/s
- The calculated dose to a receptor due to airborne particulates is below the USEPA guideline of 10 millirem/year (excluding radon), and the cumulative dose, which is calculated by adding the maximum external gamma dose to the maximum airborne particulate dose, is significantly less than the USDOE limit of 100 millirem/year
- Several metals and polycyclic aromatic hydrocarbons in sediment exceeded criteria, predominantly at an upstream sampling location
- Trace levels of chlorinated solvents in several groundwater monitoring wells and chloroform above criteria in one groundwater monitoring well, all located in the former Acidification Area or EU4
- Total uranium concentrations were relatively consistent with historical data in the 37 groundwater monitoring wells that were sampled during both the 2012 and 2013 ESP events

The 2013 groundwater analytical data showed that total uranium concentrations in 23 groundwater monitoring wells exceeded the uranium drinking water criterion (30 µg/L). Among the 23 wells, nine were also sampled in 2012 and the maximum total uranium concentrations in these wells remained relatively consistent.

The most elevated total uranium concentrations in groundwater were detected in wells installed in late 2012. The majority of these wells were placed east and south of the IWCS to investigate known areas of groundwater contamination and they exhibited significantly elevated total uranium concentrations. The source of the uranium in wells south of the IWCS is believed to be former storage piles and possibly residual contamination in and around former building 409. The source of uranium in wells east of the IWCS is believed to be residual soil contamination from former operations in this area, which included a railroad bed, storage piles, and a decontamination pad used during construction of the IWCS. In addition, residual contamination in the sanitary sewer near manhole 6, which was removed in 2013 as part of field investigative activities, may have contributed to groundwater contamination in this area. The USACE continues to investigate the source of this groundwater contamination and a report of the findings is anticipated by the end of 2014.

A trend analysis for total uranium in groundwater was performed for 38 monitoring wells in the ESP. The results showed no increasing or decreasing trends in 34 of the wells. A decreasing trend in total uranium concentrations was identified at wells A45, OW06B, and OW18B; a non-definitive increasing trend was identified at well OW12B. The available sample size for well OW12B is small and the test's statistical power (ability to accurately reject the null hypothesis) is limited by the sample size of data collected. As additional data is collected through the surveillance program the statistical power of the test will increase. The previous evaluation (1997 through 2012) had not determined a trend for well OW12B.

It is important to note that ESP groundwater sampling results are compared to federal and state drinking water standards as a conservative basis for evaluation. Most groundwater at the NFSS classifies as GSA saline groundwater and is neither used nor suitable as a public drinking water supply, based on analytical results for iron, sodium and sulfates that are found to be consistently above NYSDEC groundwater standards.

1.0 INTRODUCTION

The Niagara Falls Storage Site (NFSS) is being addressed by the U.S. Army Corps of Engineers (USACE) as part of the Formerly Utilized Sites Remedial Action Program (FUSRAP), subject to the provisions of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended, and the National Oil and Hazardous Substances Pollution Contingency Plan. The site is located in the town of Lewiston, New York, north of Buffalo (Figure 1).

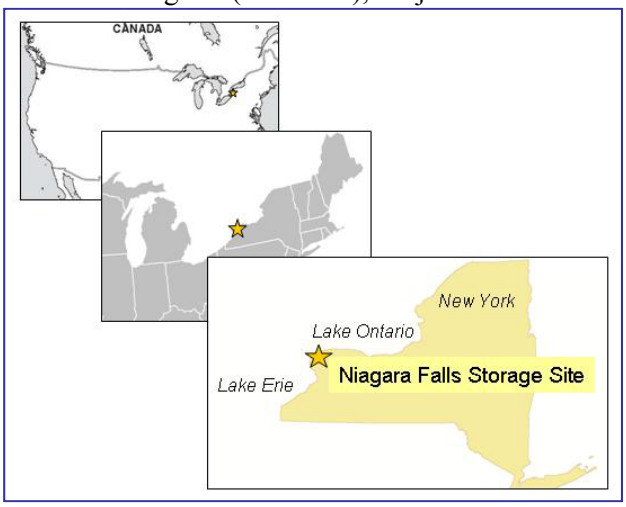

Figure 1: Location of Niagara Falls Storage Site

The USACE Buffalo District conducts an environmental surveillance program (ESP) and performs site operations, maintenance, and monitoring to ensure protection of human health and the environment. These activities are ongoing across the site, including at the Interim Waste Containment Structure (IWCS), which contains radiologically contaminated materials from cleanup actions conducted by the U.S. Department of Energy (USDOE) more than 20 years ago. The ESP is the focus of this report.

1.1 Brief History of the Niagara Falls Storage Site

The NFSS represents a portion of the former Lake Ontario Ordnance Works (LOOW) that was used by the USACE Manhattan Engineer District (MED) and U.S. Atomic Energy Commission (AEC) to store radioactive residues and other materials beginning in 1944. Nearly all the radioactive residues in the IWCS at NFSS originated from uranium processing activities conducted for MED and AEC at two locations: the Linde Air Products facility in Tonawanda, New York, and the Mallinckrodt Chemical Works refinery in St. Louis, Missouri. Other residues (called F-32) were generated from past processing activities at the Middlesex Sampling Plant in New Jersey.

The first materials sent to NFSS for storage were low-grade radioactive residues from processing pitchblende ore at the Linde Air Products facility. These residues resulted from processing ores with different uranium (U_3O_8) contents, and they are categorized as follows:

- R-10 residues: from processing ore with 3.5% U_3O_8,
- L-30 residues: from processing ore with 10% U_3O_8,
- L-50 residues: from processing ore with 7% U_3O_8, and
- F-32 residues: from processing ore (percent U_3O_8 unknown).

Beginning in 1949, highly radioactive residues from uranium processing at the Mallinckrodt Chemical Works – referred to as the K-65 residues – were shipped to NFSS in 208-L (55-gal) drums for storage. The uranium ore from which these residues were generated contained 35 to 60% U_3O_8. Between 1950 and 1952, the K-65 residues were transferred from the 208-L (55-gal) drums to a large concrete tower on site, referred to as Building 434. The residues remained in Building 434 until the 1980s when they were transferred by the USDOE to the IWCS. The K-65 residues represent the main hazard in the IWCS. Uncontained, the high levels of Ra-226 in these residues would emit substantial external gamma radiation and release radon-222 (Rn-222) gas to air. Without controls, the doses from external gamma irradiation and inhalation of Rn-222 progeny could harm anyone nearby.

In addition to these residues, radioactive wastes from a number of other federal government programs were sent to NFSS decades ago for storage or disposal. These included radioactive wastes from the Knolls Atomic Power Laboratory (KAPL) and the University of Rochester in New York State and the Middlesex Sampling Plant in New Jersey. The KAPL processing wastes contained some residual plutonium and fission product radioactivity (cesium-137 and strontium-90). These materials were transferred to the Oak Ridge Burial Grounds during the late 1950s, and most of the buildings where they were stored were later destroyed (EA 1998). Based on an investigation of the former storage sites (DOE 2012), it was concluded that all suspect areas were remediated for unrestricted use, and that "although minor KAPL residuals remain, particularly cesium-137, they are less than a risk-based screening benchmark. Therefore, they do not pose an unacceptable risk and do not require further remediation."

Radioactively contaminated materials from decommissioning wartime plants were also sent to the site for storage, including equipment from the Linde facility. Uranium and thorium billets and rods processed at other private facilities were also sent to NFSS for interim storage.

From 1981 to 1991, USDOE performed a number of cleanup activities at the site and nearby areas, which are termed vicinity properties. The radioactive materials generated by these activities were placed in an engineered structure on the west side of the NFSS property, the IWCS (Figure 2). Within the IWCS, the more highly contaminated residues (K-65, L-30, L-50, and F-32) were placed in existing concrete structures that had been part of the freshwater treatment plant for the LOOW site during the 1940s. The L-50 residues were placed in Buildings 413 and 414, which are cylindrical structures made of reinforced concrete that had been used as clarifier tanks at the treatment plant. The remaining residues were placed in several bays of Building 411 that was made of reinforced concrete and was originally designed to securely hold liquids.

Contaminated soil and debris from the USDOE cleanup of the site and vicinity properties were placed together with the R-10 residues within the IWCS and then compacted to increase stability. Soils that were contaminated by the K-65 residues during interim storage, referred to as tower soils, were placed in the north end of Building 411. The USDOE addressed the R-10 residues in the same manner as contaminated soil due to their similar radionuclide concentrations. Additional contaminated soils and debris were placed in the remaining areas of the IWCS in a manner to ensure the stability of the structure.

The IWCS was constructed by installing a clay dike and cutoff wall around the areas containing all the consolidated wastes. The dike and wall were built while USDOE was conducting interim remedial actions at the site, and the wall was tied into the underlying clay formation. A multi-layered cap was placed over the contents after the cleanup actions were completed. These past USDOE actions are described in further detail in the Remedial Investigation Report (USACE 2007) and the references cited therein.

In September 1986, the USDOE issued a record of decision under the National Environmental Policy Act to store the consolidated residues and other contaminated materials in the IWCS at the NFSS. That record of decision identified the IWCS as an acceptable interim solution, with a projected service life of 25 to 50 years. This represented the time frame during which the IWCS was considered safe for containing the radioactive residues and other wastes until a decision on their final disposition could be made. The service life of 25 to 50 years identified in the record of decision specifically applies to the IWCS cap; the design service life of the clay dike and cutoff walls surrounding the IWCS and the natural glaciolacustrine clay beneath the IWCS was identified as 200 to 1,000 years by Bechtel National, Inc. (BNI) (BNI 1986).

1.2 Overview of Environmental Surveillance Program

The ESP at the NFSS was initiated by the USDOE in 1979 prior to the construction of the IWCS. Air,

water, and external gamma radiation (and later streambed sediments) were monitored to ensure protection of human health and the environment from radioactive residues and wastes subsequently buried in the IWCS, as well as other on-site soil and groundwater contamination. In 1997, when responsibility for FUSRAP was transferred to the USACE, the USACE Buffalo District continued to follow the USDOE ESP with some revisions over the years. The USACE reports its findings annually in the form of this technical memorandum, which are posted to the NFSS website at: http://www.lrb.usace.army.mil/Missions/HTRW/FUSRAP/NiagaraFallsStorageSite.aspx.

The surveillance program has been designed to achieve the following objectives:

- to ensure protection of human health and the environment
- to verify compliance with environmental regulatory standards
- to verify that the IWCS is performing as designed

To meet these objectives, USACE monitors environmental media and regularly reassesses the adequacy of the program, making the necessary adjustments to the program, as warranted. Several modifications have been made to the surveillance program over time. These changes are identified on Table 1. Tables 2 and 3 show the ESP sampling schedule for groundwater and surface water/sediment, respectively, implemented in 2013. Sample locations, analytical parameters, and analytical methods are presented in detail in Section 2.0.

In addition to the collection and analysis of environmental samples, the ESP includes the calculation of dose to off-site receptors from airborne emissions of site soils using annual weather data collected at the Niagara Falls International Airport by the National Weather Service. The dose to off-site receptors based on gamma radiation measurements is also calculated and summed with the airborne emissions dose to determine the cumulative dose to the public from the NFSS.

1.3 Regional Hydrogeology

1.3.1 Groundwater

Within 50 feet of the ground surface, the NFSS and surrounding vicinity are underlain by two water-bearing zones separated by an aquitard or confining unit. The two water-bearing zones are identified as the upper water-bearing zone and the lower water-bearing zone and are described in more detail below.

The upper water-bearing zone is present in the surficial Brown Clay Unit, which is situated above the Gray Clay Unit (Figure 3). The Brown Clay Unit consists of a clayey silt and silty clay groundmass with occasional sand and gravel lenses. Coarse-grained deposits are present sporadically along the undulating contact between the Brown Clay Unit and the Gray Clay Unit. A geostatistical analysis of these coarse grained lenses in the upper water-bearing zone was performed to assess their continuity or whether they act as preferential migration pathways for contamination. Lithologic information from boring logs was spatially analyzed using semivariogram calculations and models. The results suggest the sand lenses in the upper water-bearing zone are intermittent and vertically and horizontally discontinuous, vary considerably in thickness, color, texture, extent, and saturation, and are not horizontally continuous over distances greater than 15 to 20 feet (4.57 to 6.1 meters) and vertical distances of 4 to 6 feet (1.22 to 1.83 meters). As a result, the occurrence of groundwater varies across the site (i.e., proximate wells may have noticeably different water levels depending on sand lens presence or not). Regional groundwater flow in the upper water-bearing zone is to the northwest towards Lake Ontario.

Underlying the Brown Clay Unit is the Gray Clay Unit, which consists of glacio-lacustrine clay and acts as an aquitard that separates the upper water-bearing zone from the lower water-bearing zone (Figure 3).

For purposes of classification, wells that terminate in the Gray Clay Unit are considered representative of the upper water-bearing zone. The Gray Clay Unit hydraulically separates the upper and lower water-bearing zones and minimizes transport between the two zones.

The lower water-bearing zone consists of unconsolidated glacial sediments (Alluvial Sand and Gravel and Red Silt Till) that overlie the upper fractured portion of the Queenston Formation (Figure 3). A regional groundwater divide (the Lockport Escarpment) exists approximately two miles south of the NFSS. Regional groundwater flow north of the divide is toward the northwest, whereas groundwater flow south of the divide is toward the southwest.

The lower water-bearing zone extends from the bottom of the Gray Clay Unit to the bottom of the weathered zone of the Queenston Formation. The entire zone varies from 10 feet to 38.5 feet (3.05 to 11.73 meters) in thickness and consists of the stratified sands and gravels of the Alluvial Sand and Gravel Unit, the dense silt and sands of the Red Silt Unit, and the weathered and fractured upper portions of the Queenston Formation, which is observed in the upper 10 feet of the bedrock. The lower water-bearing zone has higher permeability and more lateral continuity than the upper water-bearing zone. The lower water-bearing zone generally shows a westerly to northwesterly flow.

1.3.2 Surface Water Drainage

Prior to site development, surface drainage from the NFSS entered Four Mile, Six Mile, and Twelve Mile Creeks, which all flow northward to Lake Ontario. During the 1940s, drainage modifications routed surface water to a series of linear ditches that eventually coalesce into the Central Drainage Ditch north of the site. The Central Drainage Ditch enters into Four Mile Creek approximately 3 miles northwest of the NFSS. The vegetation that grows in the on-site ditches during the summer months dewaters the ditches via evapotranspiration between rainfall events. Groundwater elevations in wells proximal to the ditches are notably lower throughout the summer and early fall due to higher localized evapotranspiration (i.e., the wetland vegetation in and along the ditches creates a significant moisture deficit in the surrounding soils). Low baseflow conditions in the site ditches between rainfall events also indicate that groundwater does not significantly discharge into the ditches (i.e., surface drainage is the main contributor to flow).

2.0 SAMPLE COLLECTION AND ANALYSIS

2.1 Sampling Locations and Rationale

The purpose of the ESP is to ensure the protection of human health and the environment by monitoring the IWCS, as well as other site media, for the release of hazardous constituents.

To monitor the integrity of the IWCS, USACE collects:

- Annual radon-222 flux data through the placement of 180 radon flux canisters on the IWCS protective cap at discrete grid intersections and at three off-site (background) locations, shown on Figure 4
- Semi-annual groundwater samples from 43 monitoring wells, 13 wells screened in the lower water-bearing zone and 30 screened in the upper water-bearing zone, located in the vicinity of the IWCS (two wells are sampled on a quarterly basis) at the locations shown on Figure 5
- Semi-annual radon and external gamma radiation samples by placing Radtrak® detectors and optically stimulated luminescence dosimeters (OSLDs), respectively, at seven locations around the perimeter of the IWCS, as shown on Figure 6

In addition, USACE collects:

- Semi-annual groundwater samples from 11 monitoring wells, one well screened in the lower water-bearing zone and 10 screened in the upper water-bearing zone, at the locations shown on Figure 5 (note that well MW922 is sampled only if well MW921 is dry)
- Semi-annual radon and external gamma radiation samples by placing Radtrak® detectors and OSLDs, respectively, at 16 locations within and around the perimeter of the site and at three off-site (background) locations, as shown on Figure 6
- Semi-annual surface water and sediment sampling from a total of nine locations shown on Figure 7 along the West Drainage Ditch, Central Drainage Ditch, and east (upstream) of the Central Drainage Ditch (one location is sampled on a quarterly basis)
    - SWSD009, SWSD021, and SWSD023 were selected as “upstream” locations because they are located at the site boundary where surface water flows on to NFSS from off site
    - SWSD010, SWSD011, SWSD022, and SWSD025 are situated along the Central Drainage Ditch
    - WDD2 and WDD3 are located along the West Drainage Ditch
- Quarterly water level measurements in over 100 monitoring wells throughout the site to monitor the groundwater flow directions in the upper and lower water-bearing zones

2.2 Sampling Parameters and Laboratory Analytical Methods

Environmental surveillance monitoring of air, water, and sediment includes the following analytes:

- The IWCS cap and off-site locations are monitored for radon-222 flux
- The perimeter of the IWCS and the NFSS and off-site locations are monitored for radon-222 concentrations and gamma emissions
- Sediment is monitored for total uranium, radium-226, metals, and PAHs
- Surface water is monitored for total uranium, radium-226, metals, and PAHs; field measurements are recorded for dissolved oxygen, turbidity, pH, temperature, specific conductivity, and oxidation-reduction potential

- Groundwater is monitored for total uranium, radium-226, volatile organic compounds (VOCs) (limited to five wells), anions, and water quality parameters; field measurements are recorded for dissolved oxygen, turbidity, pH, temperature, specific conductivity, and oxidation-reduction potential

Standard analytical methods approved and published by USEPA and the American Society for Testing and Materials (ASTM) are used for chemical (i.e., all non-radiological) analyses. The laboratories conducting the radiological analyses adhere to USEPA, National Urban Security Technology (formerly the Environmental Measurements Laboratory) and ASTM standard methods. Radiological and chemical laboratories are accredited through the Department of Defense (DoD) Environmental Laboratory Accredited Program (ELAP). That accreditation is based on conformance to the DoD Quality Systems Manual (DoD QSM) for Environmental Laboratories. The laboratory analytical methods associated with sediment, surface water, and groundwater monitoring are presented in the following table:

Parameter	Analytical Method		
	Groundwater	**Surface Water**	**Sediment**
Volatile Organic Compounds	SW 846 8260 (select wells only)	---	---
Polycyclic Aromatic Hydrocarbons	---	SW 846 8270	SW 846 8270
Metals	---	SW 846 6020, 7470	SW 846 6020, 7470
Total Uranium	ASTM D5174.97, Trace Uranium by Pulsed Laser Phosphorimetry	ASTM D5174.97 Trace Uranium by Pulsed Laser Phosphorimetry	HASL-300m, Iso-uranium
Radium-226	EPA 903.1	EPA 903.1	EPA 901.1m
Anions • Chloride • Fluoride • Nitrate/Nitrite • Ortho-phosphate • Sulfate	EPA 300.0	EPA 300.0	---
Water Quality • Alkalinity • Total Dissolved Solids	SM-2320B SM-2540C	SM-2320B SM-2540C	---

--- Indicates that media is not analyzed for that parameter(s)

2.3 Sample Collection Techniques

All environmental surveillance activities at the NFSS are conducted in accordance with DOD Environmental Field Sampling Handbook (2013) and the Uniform Federal Policy for Quality Assurance Project Plans (UFP-QAPP). The UFP-QAPP provides procedures and guidance for consistently

implementing the national consensus standard ANSI/ASQ E-4, *Quality Systems for Environmental Data and Technology Programs,* for the collection and use of environmental data at federal facilities.

2.3.1 Groundwater and Surface Water

The collection of groundwater samples is performed using low-flow sampling techniques in accordance with USEPA's Ground Water Issue Low-Flow (Minimal Drawdown) Ground-Water Sampling Procedures (EPA/540/S-95/504). New polyethylene tubing is used for each well during each sampling event. Groundwater level measurements and sample collection techniques are also performed in accordance with USACE's Engineer Manual 1110-2-1421, *Groundwater Hydrology*.

Surface water sample collection is conducted utilizing a peristaltic pump due to the shallowness of the designated ditch locations. New polyethylene tubing is placed carefully below the water line to minimize disturbance of organic materials and sediments present in the ditch.

If turbidity measurements exceed 50 nephelometric turbidity units (NTUs) for any groundwater or surface water sample, the sample is field filtered via a disposable 0.45 micron in-line filter to remove solids and reduce the turbidity readings to below the 50 NTU threshold.

2.3.2 Sediment

Sediment is collected utilizing a stainless steel posthole digger suitable for fibrous and rooted areas encountered in the ditches due to phragmites. A sample consists of several grab samples (two to four inches [five to 10 centimeters] in depth) in the area of the center of the ditch below the water line. The cores are placed in a stainless steel pan and are composited into sample containers.

2.3.3 Radon Flux

Activated charcoal has been recognized and used as an effective means of trapping radon gas. At the NFSS, radon flux is measured once a year toward the end of summer. Metal canisters filled with activated charcoal and filter pads are placed on the ground in the morning and collected 24 hours later. The activated charcoal in the canister absorbs the radon gas that emanates from the surface over which the canister is placed. The radon is held by the charcoal and subsequently decays until equilibrium between radon and its short-lived daughters is established (a minimum of 3 hours). The radon flux is calculated in the laboratory through gamma spectroscopy using the area of canister exposed to the radon flux as well as the time that exposure took place.

2.3.4 Radon Gas

Radon gas concentrations are monitored by Landauer Radtrak® Detectors placed around the IWCS and the NFSS. The Radtrak® Detectors are placed on the fence at breathing height (5.6 feet (1.7 meters) above the ground) and replaced every six months.

The Radtrak® Detector consists of a small piece of special plastic or film inside a small container. The film is a radiosensitive element that records alpha particle emissions (alpha tracks) from the natural radioactive decay of radon. Air diffuses through a filter covering a hole in the container, and alpha particles from radon and its decay products strike the detector, causing alpha tracks on the film inside. At the end of the test the container is sealed and returned to a laboratory for reading i.e., the alpha tracks are counted using computer-assisted image analysis equipment. The number of alpha tracks along with the deployment time period provides the basis for calculating the average radon concentration.

2.3.5 Gamma Emissions

External gamma radiation is monitored at the NFSS by the placement of Landauer OSLDs around the IWCS and the NFSS at the same locations as the Radtrak® Detectors, i.e., on the fence at breathing height (5.6 feet (1.7 meters) above the ground). Two OSLDs are placed at each location for quality control. The OSLDs also are replaced every six months.

Optically stimulated luminescence technology is the newest advancement in passive radiation protection dosimetry that improves on the best features of traditional film and thermo luminescent dosimeter (TLD) technologies. The specific OSLDs used at NFSS are specially formulated aluminum oxide crystalline detector material, which is configured into a thin strip sandwiched within a multi-element filter pack. The filter pack is heat sealed with a laminated, light-tight paper wrapper creating an integrated, self-contained packet that is radio-frequency sealed inside a tamper-proof plastic blister pack to eliminate possible mishandling, light leaking, or lost detection elements.

Radiation exposure is measured at the laboratory by stimulating the aluminum oxide crystalline detector material with selected frequencies of laser light causing it to luminesce in proportion to the amount of radiation exposure.

3.0 REGULATORY GUIDELINES

The criteria in federal statutes and federal and state regulations and guidelines that are relevant to activities at the NFSS site are compared to ESP analytical data. However, the standards and criteria provided herein are for comparative purposes only; applicable or relevant and appropriate requirements and media-specific clean-up goals will be evaluated independently and presented in future CERCLA decision documents that will be available for public comment. Details are provided in the following sections.

3.1 Dose to the Public

The annual public dose limit from sources of radiation (excluding radon) is 100 millirem (mrem) above background. This standard is used by the Army, the USDOE, and the Nuclear Regulatory Commission (NRC). This limit is stated in Army Pamphlet 385-24, "The Army Radiation Safety Program," USDOE Order 458.1, "Radiation Protection of the Public and the Environment" (USDOE 2011), and NRC 10 CFR Part 20 "Standards for Protection Against Radiation."

Doses from sampled media and external gamma can be combined and compared to the public annual dose limit of 100 mrem. For purposes of this document, the maximum off-site dose to a receptor is calculated from the total of the external gamma dose and the internal dose from airborne materials.

3.2 Radioactive Constituents in Air

3.1.1 US Department of Energy Order 458.1

USDOE limits for radon concentrations in air from operations at USDOE-owned and USDOE-operated facilities are presented in Order 458.1. Based on the radioactive constituents in the wastes contained in the IWCS, it is unlikely that radon-220 would be emitted from the IWCS since the radon-220 half-life is approximately 55.6 seconds and this isotope would decay prior to permeating through the IWCS cap. It is, however, possible that radon-222 with a half-life of 3.8 days could be emitted. The USDOE limit for an annual average radon-222 concentration at the site boundary, not including background, is 3.0 pCi/L. To provide a conservative basis for comparison, on-site radon concentrations are evaluated against the site boundary limit of 3.0 pCi/L.

3.2.2 US Environmental Protection Agency Clean Air Act

The USEPA guidance action level for radon concentrations in indoor air (homes and buildings) is 4.0 pCi/L. Although this limit is specific to indoor air, it provides a conservative basis for comparison to the outdoor air results obtained during environmental surveillance activities. For further comparison, the average radon level in U.S. homes is about 1.25 pCi/L and the average outdoor value is 0.4 pCi/L (National Council on Radiation Protection and Measurements (NCRP) 2009).

Section 112 of the Clean Air Act authorized the USEPA to promulgate the National Emission Standards for Hazardous Air Pollutants (NESHAPs) which are provided in 40 Code of Federal Regulations (CFR) Part 61. 40 CFR Part 61 Subparts H and Q apply to the NFSS and are summarized below:

- 40 CFR 61.92, Subpart H, National Emission Standards for Emissions of Radionuclides Other Than Radon from USDOE Facilities: Emissions of radionuclides to the ambient air from USDOE facilities shall not exceed those amounts that would cause any member of the public to receive in any year an effective dose equivalent of 10 mrem per year.

- 40 CFR 61.192, Subpart Q, National Emission Standards for Radon Emissions from USDOE Facilities: No source at a USDOE facility shall emit into the air more than 20 picocuries per square meter per second (pCi/(m^2-sec)) (1.9 pCi/(ft^2-sec)) of radon-222 as an average for the entire source.

At the NFSS, USACE demonstrates compliance with 40 CFR 61.92 (Subpart H) by running the USEPA-approved CAP88-PC air dispersion model with site-specific input values, such as average radionuclide concentrations in soil and average annual wind speed data. Compliance with 40 CFR 61.192 (Subpart Q) is verified by annual monitoring of the IWCS cap for release of radon-222 flux.

3.3 Radioactive and Chemical Constituents in Groundwater

3.3.1 General Groundwater Quality

Shallow groundwater resources at NFSS demonstrate uniformly poor groundwater quality and availability in the general region. Regional studies and studies conducted near the site (La Sala 1968, Wehran 1977, and Acres American 1981) conclude that local groundwater quality is poor because of high mineralization. Additionally, local studies (Wehran, 1977 and Acres American 1981) indicate that the low permeability of the upper water bearing zone does not provide sustainable production quantities to standard wells for water supply use. On-site permeability testing at NFSS confirms the low permeability.

In 1988, the USDOE conducted a well survey and found eight wells within three miles (4.8 km) of the site. These eight wells are used mainly for irrigation and none of them are drinking water wells (USDOE 1994).

In 2007, the Niagara County Department of Health (DOH) updated its well inventory to include 9 potable wells (2 of which were a sole source for drinking water), 8 non-potable wells, 20 abandoned wells and 77 idle wells within the survey area. Based on the USDOE report and the recent Niagara County DOH inventory, groundwater is not the main source of drinking water; however, the New York State Department of Environmental Conservation (NYSDEC) Class GA groundwater standards are conservatively used to compare to ESP groundwater analytical results. Groundwater at the NFSS in both the upper and lower water-bearing zones consistently exceeds sodium and sulfate Class GA standards, exhibiting over 1000 mg/L total dissolved solids (TDS) and commonly exhibiting over 100 mg/L chloride. By definition, these levels indicate saline groundwater or a groundwater classification GSA (Title 6 New York Codes, Rules and Regulations (6 NYCRR) Part 701.16).

3.3.2 Federal Safe Drinking Water Act for Chemicals and Radionuclides

The Safe Drinking Water Act (SDWA) is the primary federal law applicable to the operation of a public water system and the development of drinking water quality standards [*USEPA Drinking Water Regulations and Health Advisories* (*USEPA* 1996)]. The regulations in 40 CFR Part 141 (National Primary Drinking Water Regulations) set maximum permissible levels, known as maximum contaminant levels (MCLs), for organic, inorganic, radionuclide (including uranium and combined radium) and microbial contaminants in drinking water.

The established (promulgated) MCL for combined concentrations of radium-226 and radium-228 is 5 pCi/L. The MCL for total uranium is 30 µg/L.

3.3.3 New York State Department of Environmental Conservation Groundwater Criteria for Chemicals and Radionuclides

NYSDEC has adopted the federal SDWA standards into its own regulations in 6 NYCRR Parts 700-705, "Water Quality Regulations for Surface and Groundwater" (NYSDEC 1996). NYSDEC also has independently established standards for some constituents. These standards are provided in the Division of Water Technical and Operational Guidance Series (TOGS) 1.1.1, "Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations," which indicate a limit for radium-226 in groundwater of 3 pCi/L.

In addition, the New York State DOH, per 10 NYCRR Part 5, Subpart 5-1, establishes a MCL of 30 micrograms per liter (µg/L) for uranium in drinking water, which apply to community water systems and is not applicable to groundwater at the site. Since this limit is identical to the federal criteria, only NYS criteria are referenced in the analytical results tables discussed in Section 4.0.

3.4 Radioactive and Chemical Constituents in Sediment

ESP sediment analytical results are compared to federal and state guidelines and standards, as well as site-specific background screening levels. Details are provided in the following sections.

3.4.1 Nuclear Regulatory Commission Dose-Based Screening Levels for Radionuclides

Sediment analytical results for uranium-234, uranium-235, and uranium-238 are compared to surface soil screening levels (or dose-based screening levels) presented in NRC document NUREG-1757 (NRC 2006). This document provides guidance on compliance with radiological criteria for NRC license termination in accordance with 10 CFR 20, Subpart E. Based on these surface soil screening values, the radiological dose to a member of the public using the site for any purposes, including farming, is limited to 25 mrem/year. The use of these dose-based screening levels is overly protective to human health because actual exposures to sediment would be much lower than the intense and chronic exposure assumed in developing these screening values. Furthermore, these screening values are in addition to background concentrations (i.e., do not include background concentrations) so where available, background concentrations have been added to the dose-based screening level for comparison to sediment results.

Sediment analytical results for radium-226 are compared to 5 pCi/g above background. The 5 pCi/g above background value is presented in 10 Code of Federal Regulations (CFR) Part 40 Appendix A Criterion 6(6), which stipulates that "The design requirements in this criterion for longevity and control of radon releases apply to any portion of a licensed and/or disposal site unless such portion contains a concentration of radium in land, averaged over areas of 100 square meters (100 meters squared is equivalent to 1,076 feet squared), which, as a result of byproduct material, does not exceed the background level by more than: (i) 5 picocuries per gram (pCi/g) of radium-226, or, in the case of thorium byproduct material, radium-228, averaged over the first 15 centimeters (cm) below the surface…"

3.4.2 New York State Department of Environmental Conservation Unrestricted Use Recommended Soil Clean-up Objectives for Chemicals

New York State regulatory criteria found in 6 NYCRR Part 375 Unrestricted Use Soil Cleanup Objectives (SCOs) are compared to sediment analytical data for polycyclic aromatic hydrocarbons (PAHs). When appropriate, Restricted Use (Residential or Industrial) SCOs are also cited for comparison to results. Unrestricted Use SCOs from 6 NYCRR 375 for certain PAH constituents are based on a survey of soil

background concentrations performed in New York State. It should be noted that sediment background concentrations would differ from soil background in many instances.

3.4.3 USEPA Regional Screening Levels and NFSS Background Criteria for Metals

For some of the more common metals, such as aluminum, calcium, and sodium, among others, there are no NYSDEC SCOs. Therefore, the analytical data for these metals are compared to USEPA Regional Screening Levels (RSLs) for soil (May 2013) (residential receptor). In the event that a NFSS background screening level found in Table 13-1 of the *NFSS Remedial Investigation Report Addendum* (USACE 2011) is greater than its corresponding RSL, the background screening level is selected for comparison. As noted in Section 3.4.2, sediment background concentrations presented in the *NFSS Remedial Investigation Report* (USACE 2007) would differ from soil background in many instances.

3.5 Radioactive and Chemical Constituents in Surface Water

The results from surface water samples collected from site drainage ditches are compared to NYSDEC standards presented in 6 NYCRR Part 703 Surface Water and Groundwater Quality Standards for Class B water aquatic life. NYSDEC Class B water classification is utilized because the on-site Central Drainage and West Drainage Ditches discharge into Four Mile Creek, which is classified by New York State as a Class B water source (USACE, 1999). If a standard for Class B water is not available for a specific parameter, the corresponding standard for groundwater or Class A water is used, as appropriate.

The NYSDEC standard (both groundwater and Class A drinking water) for radium-226 is 3 pCi/L. The NYSDOH drinking water standard for uranium is 30 µg/L.

Surface water collected in the drainage ditches at the site is not a source of drinking water, so the ESP analytical results are conservatively compared to the NYS standards for radionuclides, which are applicable to public water systems that provide drinking water to communities, and to standards for Class A surface water, which is also considered a source of drinking water.

4.0 ANALYTICAL DATA AND INTERPRETATION OF RESULTS

The 2013 ESP analytical results for groundwater, surface water, sediment, airborne particulate, radon, and gamma radiation are presented in this section. It is important to note that analytical results for radioactive constituents may be expressed as negative numbers. Negative numbers can occur when the average background activity of the laboratory counting instrument exceeds the measured sample activity because the background activity is subtracted from the measured sample activity to calculate the analytical result. Furthermore, for the purpose of interpretation, all values below the laboratory's minimum detectable activity (MDA) are interpreted as having unknown values between zero and the MDA, and are referred to herein as non-detects.

4.1 Air

To establish the annual dose to the public from radiological sources in air, doses at specific off-site receptor locations (e.g., nearest off-site resident and nearest off-site worker) are determined by combining (1) the calculated external gamma radiation doses based on gamma radiation dose measurements taken at the NFSS perimeter and (2) modeled doses from airborne particulate releases using soil data from the remedial investigation and annual average wind speed. The dose from the modeled airborne particulate releases is compared to the individual dose standard of 10 mrem per year specified in 40 CFR Part 61.92, Subpart H.

4.1.1 External Gamma Radiation

In 2013, external gamma radiation dose rates were measured continuously for the year using OSL dosimeters. The 2013 results, including both raw data and data corrected for background, are presented in Table 4.

The data are used to calculate the exposure (dose rate) to external gamma radiation for the receptor, considered to be the nearest resident and the nearest commercial/industrial worker. The locations of these receptors are based on a 2005 canvas of the site vicinity. The receptor dose rate is a function of (1) the normalized annual OSL dose rate based on the semi-annual dose rates measured at the site fence line, (2) the distance of the receptor from the fence line, and (3) the amount of time the receptor spends at his respective location. Results of this calculation are expressed as a dose rate to the individual in mrem per year.

Based on the 2013 OSL dosimeter results, the dose rates to the receptors are consistent with results from previous years, as follows:

- 0.020 mrem/year to a resident located 500 ft (152.4 meters) from the western perimeter fence, southwest of the site
- 0.0026 mrem/year to an off-site worker located 1,020 ft (310.9 meters) east of the site

Receptor dose rate calculations are presented in Sections 4.1 and 4.2 of Appendix A. Trend graphs depicting external gamma dose rates at the NFSS and IWCS perimeters from 1998 thru 2013 are presented on Figures 8 and 9, respectively.

4.1.2 Airborne Particulate Dose

To determine the dose from airborne particulates potentially released from NFSS during 2013, airborne particulate release rates are calculated using soil data collected during the remedial investigation between 1999 and 2004 and weather data for the year 2013 collected at the Niagara Falls International Airport.

Contributions from radon gas, which is not a particulate, are not considered in this calculation. The total airborne particulate release rate is input into the USEPA's CAP88-PC (Version 3.0) computer model to perform two calculations that:

- Determine resultant doses from airborne particulates to individuals at the distances to the nearest residence and to the nearest commercial/industrial facility, as measured from a central location on site, based on prevailing wind direction. Doses are then corrected for commercial/industrial facility occupancy at an assumed rate of 40 hours/week for 50 weeks/year. Residential occupancy is assumed to be full-time (i.e., 24 hours/day and 365 days/year [366 days for a leap year]). The individual receiving the higher of these calculated doses is identified as the maximally exposed off-site individual (MEI) for airborne particulate dose.

- Determine the airborne particulate collective dose to the population within 50 miles (80 km) of the site using a population file (2000 census data for New York State and 2001 census data for the Province of Ontario) to determine the number of people in circular grid sections radiating to 50 miles (80 km) from the center of site.

The first calculation (Appendix B) indicates that the 2013 airborne particulate dose to the MEI, a resident, 2,999 ft (914 meters) south-southwest of the site, was 0.0016 mrem. Consistent with results from previous years, this value is well below the 10 mrem per year standard, individual dose, specified in 40 CFR, Part 61.92, Subpart H.

The second calculation indicates that the annual airborne particulate collective dose to the population within 50 miles (80 km) of the site was 0.044 person-rem. This compares to an annual background dose to the same population of 5,425,000 person-rem. Census data are depicted on Figure 10. Details of the calculations, including methodology are presented in Appendix B.

4.1.3 Calculated Cumulative Dose

As a conservative measure, the cumulative dose to the MEI, which is calculated by adding the maximum external gamma dose to the maximum airborne particulate dose, is compared to the 100 mrem per year dose limit (excluding radon). Based on 2013 data, the cumulative dose is 0.0216 mrem (0.0016 mrem + 0.020 mrem), which is significantly less than the USDOE limit of 100 mrem per year (excluding radon) and the US average per capita background dose of approximately 620 mrem per year (NCRP 2009). (Please note that the US per capita dose from background radiation has been increased to 620 mrem/person due mainly to increased use of nuclear medical imaging.)

4.1.4 Radon Gas

Radon monitoring at NFSS is performed at a height that is representative of the human breathing zone (5.6 ft or 1.7 meters above ground level). Radon concentration diminishes significantly as distance from the ground increases and mixing with ambient air takes place.

Based on the radioactive constituents in the wastes contained in the IWCS, it is unlikely that radon-220 would be emitted from the IWCS; however, it is possible that radon-222 would be emitted. Air surveillance is conducted to determine the concentration of radon gas at NFSS using Radtrak® detectors that are designed to measure alpha particle emissions from both isotopes of radon (radon-220 and radon-222) and to collect passive, integrated data throughout the period of exposure. Because radon-220 is not a contaminant of concern at NFSS (due to the relatively low concentrations of radium-228 and the short half-life of radon-220), all concentrations are conservatively assumed to be radon-222. Results of semi-annual monitoring for 2013 are presented in Table 5. The corresponding surveillance locations are

shown on Figure 6.

Consistent with results from previous years, all site radon-222 results from the 2013 ESP were well below the USDOE off-site limit of 3.0 pCi/L above background. Results presented are without background subtracted and ranged from non-detect (less than 0.2 pCi/L) to 0.6 pCi/L. The background locations results ranged from non-detect (less than 0.2 pCi/L) to 0.3 pCi/L. The site average of 0.27 pCi/L (non-detects included in average) is comparable to that of the background average of 0.22 pCi/L and to that of the average outdoor value of 0.4 pCi/L (USEPA 1993).

4.1.5 Radon-222 Flux

Measurement of radon-222 flux provides an indication of the rate of radon-222 emission from a surface. Radon-222 flux is measured with activated charcoal canisters placed on a grid spaced 49.2 ft (15-meters) on center across the surface of the IWCS for a 24-hour exposure period. Sample locations are shown on Figure 4.

Measured results in 2013 for radon flux, presented on Table 6, ranged from non-detect to 0.141 pCi/m^2/s, with an average result (of detects and non-detects) of 0.056 pCi/m^2/s. Background measurements were non-detect. As in previous years, these results are well below the 20.0 pCi/m^2/s standard specified in 40 CFR Part 61, Subpart Q, are comparable to background, and demonstrate the effectiveness of the containment to mitigate the release of radon-222.

4.4 Surface Water

In 2013, all surface water samples were collected semi-annually (2nd and 4th quarters) from nine designated locations. Location SWSD025 also is sampled 1st and 3rd quarters and during significant rain events. Sample locations are presented in Figure 7.

A summary of the surface water sample collection effort is as follows:

- 2nd quarter samples were collected between April 23 and April 29, 2013
- 4th quarter samples were collected on October 15 and October 16, 2013
- 1st and 3rd quarter samples were also collected from SWSD025 on February 5 and August 13, 2013, respectively; 10 additional sampling events occurred at SWSD025 between May and October 2013 during significant rain events
- Analytical parameters included radium-226 and total uranium (also iso-uranium in the fall 2013)

All surface water samples are measured for turbidity prior to submission to the laboratory for analysis. If turbidity measurements are greater than 50 nephelometric turbidity units (NTUs), the sample is filtered and both the filtered and unfiltered samples are submitted to the laboratory for analysis (applies to radionuclides and metals only). Otherwise, only the unfiltered sample is collected and analyzed.

Details of the findings are presented in the following sections.

4.4.1 Surface Water Field Measurements

Prior to sampling, field parameters are measured at each surface water sampling location using a calibrated water quality meter. Field parameters include temperature, pH, specific conductance, oxidation-reduction potential, turbidity, and dissolved oxygen. The results are summarized on Table 7.

4.4.2 Surface Water Radiological Findings

In general, the 2013 analytical results for radionuclides in surface water, which are presented on Table 8, were:

- Below NYS Class B surface water criteria (or if not available, Class A or drinking water criteria)
- Comparable to past results

Details are presented in the following sections.

Radium-226

Radium-226 was not detected in 32 of 50 surface water samples collected in 2013. Among the 18 detections, the concentrations were well below the state drinking water limit of 3 pCi/L, with concentrations ranging from 0.143 pCi/L to 0.611 pCi/L, both collected at SWSD025 during rain events.

Total Uranium

Uranium was detected in all 50 surface water samples collected in 2013. The analytical data showed total uranium concentrations ranging from 0.681 µg/L (WDD2) to 29.2 µg/L (SWSD021). All the data were below 30 µg/L, the state drinking water limit for total uranium.

4.4.3 Surface Water Chemical Findings

Analysis of surface water samples for metals and PAHs was inadvertently omitted in 2013. These analyses will be performed in 2014.

4.5 Sediment

In accordance with the 2013 analytical schedule, sediment samples were collected from eight locations in the 2nd and 4th quarters (i.e., semi-annually) and one location (SWSD025) in all four quarters 1st, 2nd, 3rd, and 4th quarters (i.e., quarterly). Sampling locations are presented on Figure 7.

A summary of the sediment sample collection effort for 2013 is as follows:

- 2nd quarter samples were collected between April 23 and April 29, 2013
- 4th quarter samples were collected between October 15 and October 17, 2013
- Location SWSD025 was also sampled on February 5 and August 13, 2013 (1st and 3rd quarters)
- Analytical parameters include radionuclides (radium-226, uranium-234, uranium-235, and uranium-238), metals, and PAHs (1st and 3rd quarter samples from SWSD025 are analyzed for radionuclides only)

Details of the findings are presented in the following sections.

4.5.1 Sediment Radiological Findings

The 2013 analytical results for radionuclides in sediment are presented on Table 9. In general, the results were:

- Below criteria
- Comparable to past results

Radium-226

The 2013 analytical results for the 20 sediment samples collected and analyzed for radium-226 were below 5 pCi/g (above background) and exhibited activity levels ranging from 0.78 pCi/g (SWSD009) to 1.859 pCi/g (SWSD025). These results are consistent with historical data, as shown on the graph on Figure 11, which presents radium-226 concentrations in sediment between 1997 and 2013.

Uranium

The 2013 analytical results for uranium isotopes, uranium-234, uranium-235 and uranium-238, in sediment showed detections in the majority of samples collected. Among the detections, the isotopic activity levels ranged from 0.05 pCi/g to 4.49 pCi/g. All of the isotopic uranium data are well below their respective criteria and most are consistent with historical data; last year's findings (2012) ranged from 0.053 pCi/g to 2.80 pCi/g. One exception is the fall sediment sample collected at SWSD025, which exhibited a total uranium activity level approximately double the typical value at 8.34 pCi/g. A graphical representation of the analytical data is shown on Figure 12.

4.5.2 Sediment Chemical Findings

The 2013 analytical results for chemicals in sediment are presented on Tables 10 and 11 and are summarized below.

Metals

Several metals, including cadmium, copper, lead, manganese, mercury, nickel, and zinc, were detected in sediment at concentrations that exceed their respective NYS Unrestricted Use SCOs; however, all but cadmium and manganese were below their respective NYS Restricted Use SCOs (residential). In addition, calcium, total chromium, magnesium, potassium, sodium, and thallium exceeded the greater value between the EPA RSL or NFSS remedial investigation background screening level. These values are used for comparison in the absence of NYS SCOs. The analytical data are shown on Table 10.

PAHs

Several PAHs were detected in the sediment samples collected in 2013, with the highest concentrations found at sampling point SWSD023 located along the southern property boundary near the oil/water separator effluent that originates in Modern's parking area. The analytical results for most of the detected PAHs are below their respective NYS Unrestricted Use SCOs except for those in samples collected at SWSD023. The analytical findings for PAHs in sediment are shown on Table 11.

4.6 Groundwater

A total of 54 monitoring wells are sampled semi-annually; two of these wells, OW04A and OW04B, also are sampled quarterly. Sampling locations are presented on Figure 5. Water levels are measured on a quarterly basis in over 100 wells.

Highlights of the groundwater sample collection effort in 2013 are as follows:

- The semi-annual sampling took place between April 23 and 29 (2^{nd} quarter) and October 15 and

18 (4th quarter); wells OW04A and OW04B also were sampled on February 7 and August 13, 2013
- Groundwater samples were collected from 53 monitoring wells in the 2nd quarter event; well MW921 replaced MW922, which was dry; and, well MW947 was not sampled because it was dry
- Groundwater samples were collected from 54 monitoring wells in the 4th quarter event; wells MW946 and MW947 were dry and replaced by wells 808A and MW423, respectively
- Water level measurements were recorded from over 100 wells
- Groundwater samples were analyzed for radium-226, total uranium, VOCs (four wells only), and water quality parameters (such as alkalinity and total dissolved solids).

For comparative purposes, the NYSDEC Class GA (groundwater, which is considered potable) water quality standards (hereafter referred to as NYSDEC drinking water standards) are utilized. It is noted that groundwater at the NFSS is not a source of drinking water and is naturally a Class GSA saline water.

Details of the findings are presented in the following sections.

4.6.1 Groundwater Level Measurements

In 2013, groundwater levels were measured in 118 wells using an electronic depth-to-water meter. Potentiometric data were recorded from 75 wells in the upper water bearing zone and 43 wells in the lower water bearing zone (including six bedrock wells). Water level measurements are presented on Table 12.

Figures 13 through 16 show the piezometric surfaces and groundwater flow directions in the upper and lower units during seasonally high and low groundwater conditions. Groundwater contours initially are hand drawn to account for site features (e.g., the IWCS and drainage ditches) and then digitized using ArcGIS® to present the groundwater flow directions and gradients.

The screened intervals for wells completed in the upper water bearing zone range from 3.02 to 27.6 ft (0.92 to 8.4 meters (m)) below ground surface, while screened intervals for wells completed in the lower water bearing zone range from 22.4 to 104.5 ft (6.8 to 31.9 m) below ground surface. The 118 groundwater monitoring wells are located throughout the NFSS and provide significant areal coverage for groundwater flow characterization.

In the upper water-bearing zone, the depth to water ranged from -0.19 to 17.96 ft (-0.6 to 5.5 m) below ground surface during 2012 (the negative value reflects a minor artesian condition at well MW946 in April). The quarterly water-level fluctuations in the upper water-bearing zone averaged 1.23 ft (0.38 m) and showed high and low elevations on April 23, 2013, and October 10, 2013, respectively. In the lower groundwater system, the depth to water ranged from 2.86 to 10.55 ft (0.9 to 3.2 m) below ground surface during 2013. Quarterly water-level fluctuations in the lower groundwater system averaged 1.01 ft (0.3 m) and showed high and low elevations on August 13, 2013, and February 6, 2013, respectively.

The high-water elevations in the upper system ranged from 311.00 to 319.00 ft (94.8 to 97.3 m) above mean sea level, whereas the low-water condition ranged from 301.43 to 318.52 ft (91.9 to 97.1 m). The high-water elevation in the lower system ranged from 307.70 to 316.57 ft (93.8 to 96.5 m) above mean sea level, whereas the low-water condition ranged from 304.50 to 313.67 ft (92.8 to 95.6 m).

Water-level data indicate that the upper water-bearing zone responds more rapidly to the recharge and discharge seasons (wet and dry periods) than the lower confined groundwater system due to the intervening glacio-lacustrine clay aquitard. The two water-bearing zones demonstrate hydraulic

separation through independent water-level responses, as exemplified by the temporally different seasonal high and low conditions. The high-stress (dry) summer conditions normally lower water levels in the upper water-bearing zone and the lower water-bearing zone usually lags by several months due to the hydraulic separation by the aquitard (i.e., the high- and low-water measurements for each zone are separated by several months). Vertical gradients calculated using water levels obtained from monitoring well pairs indicate vertical groundwater flow normally occurs from the upper zone to the lower zone (or downward) in the mid-winter through early summer period, when evapotranspiration is less robust. From mid-summer to late fall, when evapotranspiration is more robust, vertical gradients in 11 of 46 well pairs become upward due to water-level declines in the upper system. This is most pronounced near the central drainage ditch, east of the IWCS; in other areas of the site, the downward gradient becomes weaker for that period. This seasonal flow variation mitigates the potential transport of contaminants from the upper zone into the lower zone.

4.6.2 Groundwater Field Parameters

Prior to sampling, field parameters are measured at each well using a calibrated water quality meter. Field parameters include temperature, pH, specific conductance, oxidation-reduction potential, turbidity, and dissolved oxygen. The results are summarized on Table 13.

4.6.3 Groundwater Quality Parameters

At the NFSS, water quality in the upper water-bearing zone is indicative of low recharge to a hydraulically slow flow system, which produces poor-quality (near-saline) groundwater containing high total dissolved solids and calcium/magnesium sulfates. Water quality in the lower water-bearing zone is poor due to high total dissolved solids. It is likely that the lower groundwater system receives recharge along the base of the Niagara Escarpment, situated approximately 2 miles (3.2 km) south of the site (USDOE 1994) and, to a lesser extent, via downward flow from the upper unit during spring recharge. Table 14 presents water quality parameter data for 2013.

Analytical results for sulfate were consistently above the NYS Class GA groundwater quality standards, while chloride and fluoride exceeded the NYS standards in only a few samples.

Sampling of wells during the RI confirms that groundwater in the area is naturally saline and of poor quality because of high mineralization (see La Sala 1968; Wehran 1977; Acres American 1981). Groundwater at the NFSS is not used as a public drinking water supply and is definable as a Class GSA water, although the comparison to the drinking water standards continues to be used to provide a conservative evaluation of groundwater analytical results.

4.6.4 Groundwater Radiological Findings

The 2013 analytical results for radionuclides in groundwater are presented on Table 15. In general, the majority of the results were consistent with historical results suggesting that groundwater is contaminated from legacy residue/waste handling and/or surface-storage practices.

Radium

Radium-226 was not detected in 80 of the 112 samples collected in 2013. Among the 32 detections, radium-226 concentrations ranged from 0.065 pCi/L to 0.956 pCi/L, which is below the NYS drinking water standard of 3 pCi/L. The highest activity level was detected in well MW957, which is screened in the upper-water bearing zone and situated south of the IWCS.

The range of radium-226 concentrations differentiated by upper and lower water bearing zones over the last two years is presented in the following table:

Radium-226 Findings
2012 and 2013

Number of Wells	Groundwater Zone Monitored	Concentration Range (pCi/L)		
		2012	2013 (only those wells also sampled for 2012 ESP)	2013 (all wells sampled in 2013)
40 wells in 2013 (26 in 2012)	Upper water bearing zone	Non-detect – 1.13	Non-detect - 0.868	Non-detect – 0.956
14 wells in 2013 (13 in 2012)	Lower water-bearing zone	Non-detect –0.977	Non-detect - 0.821	Non-detect - 0.821

Total Uranium

The 2013 groundwater analytical data showed that total uranium concentrations in 23 groundwater monitoring wells exceeded the uranium drinking water criterion (30 µg/L). Among the 23 wells, nine were also sampled in 2012 and the maximum total uranium concentrations in these wells remained relatively consistent, ranging from 25 µg/L to 353 µg/L in 2012 and 31 µg/L to 355 µg/L in 2013.

The most elevated total uranium concentrations were detected in wells installed in late 2012 as part of the Balance of Plant field investigation. The majority of these wells were placed east and south of the IWCS to investigate known areas of groundwater contamination and they exhibited significantly elevated total uranium concentrations. The two wells with the highest total uranium concentrations are: MW953 (4,843 µg/L) located east and across the Central Drainage Ditch from the IWCS and immediately east of well OW11B; and, MW951 (4,631 µg/L) located south of the IWCS and east of former Building 409.

As shown in the table below, when 2012 and 2013 data for the same wells are compared, the results are consistent:

Total Uranium Findings
2012 and 2013

Number of Wells	Groundwater Zone Monitored	Concentration Range (µg/L)		
		2012	2013 (only those wells also sampled for 2012 ESP)	2013 (all wells sampled in 2013)
40 wells in 2013 (26 in 2012)	Upper water bearing zone	6.69 - 353	5.25 – 355	5.25 – 4,843
14 wells in 2013 (13 in 2012)	Lower water-bearing zone	Non-detect –12.7	0.093 – 18.4	0.093 – 18.4

The source of uranium in wells east of the IWCS is believed to be residual soil contamination from former operations in this area, which included a railroad bed, storage piles, and a decontamination pad used during construction of the IWCS. In addition, residual contamination in the sanitary sewer near manhole 6, which was removed in 2013 as part of field investigative activities, may have contributed to groundwater contamination in this area. The source of the uranium in wells south of the IWCS is believed to be former storage piles and possibly residual contamination in and around former building 409. The USACE continues to investigate the source of this groundwater contamination and a report of the findings is anticipated by the end of 2014.

The analytical results are depicted on Figures 17, 18 and 19, and although the analytical data are compared to drinking water standards, groundwater at the NFSS is not a source of drinking water and is naturally a Class GSA saline water.

As previously reported, declining to dynamic steady-state (i.e., annually fluctuating about a mean) uranium trends in wells surrounding the IWCS are indicative of attenuating legacy sources (i.e., surface stored wastes) that impacted soil and groundwater prior to the IWCS construction. Analysis of trends for total uranium in groundwater is discussed in more detail in Section 4.6.6.

4.6.5 Groundwater Chemical Findings

Although most groundwater at the NFSS site classifies as GSA saline groundwater and is not used as a public drinking water supply, sampling results are compared to federal/state drinking water criteria as a conservative baseline.

VOCs

VOC analysis in groundwater is limited to the former Acidification Area in the north-central portion of the site, and is monitored by wells 411A, MW934, MW947, MW948, and MW949. Well MW423, located in the former Acidification Area, also was sampled in the 4th quarter of 2013 as a substitute for well MW947, which had an insufficient volume of water to sample. Among the wells sampled, only MW949 monitors the lower water bearing zone; all of the other wells monitor the upper water bearing zone.

The 2013 analytical results showed that several VOCs, primarily laboratory contaminants (e.g., acetone, methylene chloride, and chloroform), were detected at concentrations below state drinking water standards, with one exception: Chloroform was detected in well MW934 at a concentration of 35 µg/L, which exceeds the NYS drinking water standard of 7 µg/L. Analytical results for VOCs are presented in Table 16.

Chloroform concentrations in well MW934 have fluctuated over the years (i.e., since 2009 when the well was installed), ranging from 3.61 µg/L (2009) to 1,400 µg/L (2012). Although chloroform can be a laboratory contaminant, laboratory contamination is not likely the source of chloroform detected in well MW934 due to its persistence and sometimes elevated level. Chloroform can be a degradation product of carbon tetrachloride, a highly volatile solvent that does not easily bind to soil and may leach into groundwater where it can hydrolyze into chloroform; however, carbon tetrachloride has not been detected in any soil or water samples collected at the site. Therefore, the source of chloroform in well MW934 remains unknown.

Other VOCs detected in 2013 include trace concentrations of chlorinated solvent degradation products, trichloroethylene and cis-1,2-dichloroethylene, in well 411A and trace concentrations of carbon disulfide and 1,3-dichlorobenzene in well MW949.

4.6.6 Groundwater Trend Analysis

Total uranium groundwater concentrations (µg/L) over the course of the USACE ESP (1997 through 2013) were subjected to the Mann-Kendall test to determine if any surveillance well shows a statistically significant upward trend in concentration. Before long-term trends can be evaluated, seasonal or repetitive cyclical trends should be identified as they can account for changes in concentration over time. Temporal data plots were inspected to identify seasonality, or predictable increases or decreases in concentration within a time cycle. The data, collected primarily in the spring and fall, do not indicate a consistent repeating pattern and as such did not support the use of the seasonal Kendall test.

The Mann-Kendall test, described in the EPA document: *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities Unified Guidance* (USEPA, March 2009) and USACE Engineer Manual: *Environmental Quality – Environmental Statistics* (USACE, May 2013), is an accepted method for identifying the presence of a significant upward trend at surveillance wells. Under this method it is assumed that no discernible linear trend exists in concentration data over time (null hypothesis). To test this hypothesis the Mann-Kendall statistic (test statistic) is determined. The test statistic is a function of the sample data which quantifies the probability associated with the relative magnitudes of the sample data for a given sample size (n). The significance of this probability is determined by comparison to the critical value, a threshold value of statistical significance. The critical value is determined based on a 95% level of confidence associated with the standard normal distribution. If the test statistic exceeds the critical value, the null hypothesis is rejected and the alternative hypothesis (concentrations are trending) accepted. For small sample sizes ($n \leq 10$) a slightly different procedure is utilized, in which the probability is calculated directly and compared to the selected level of significance (0.05 for a 95% level of confidence); in this case, the null hypothesis is rejected if the probability is less than the level of significance. Rejection of the null hypothesis is considered to be strong evidence of an upward trend; if the null hypothesis is not rejected there is insufficient evidence for identifying a significant, non-zero trend.

The results of the total uranium groundwater concentration trend evaluation (spring and fall data from 1997 to 2013) are presented in the following two tables: the first table presents those wells that have sample sizes greater than 10; and, the second table presents those wells that have sample sizes less than or equal to 10.

As shown by the results in the tables, no increasing or decreasing trends in total uranium concentrations were identified in 34 of 38 wells used for analysis of trending throughout the site. A decreasing trend in total uranium concentrations was identified at wells A45, OW06B, and OW18B; a non-definitive increasing trend was identified at well OW12B. The available sample size ($n = 7$) for well OW12B is small; the previous evaluation (1997 through 2012) had not determined a trend for well OW12B. The test's statistical power (ability to accurately reject the null hypothesis) is limited by the sample size of data collected from the wells. As additional data is collected through the surveillance program the statistical power of the test will increase.

WELL	SAMPLE SIZE (N)	TEST STATISTIC	CRITICAL VALUE
A42	23	-1.08	-1.64
A45	***24***	***-2.75***	***-1.64***
A50	24	-0.25	-1.64
OW04B	34	-1.33	-1.64
OW06B	***25***	***-3.53***	***-1.64***
OW07B	14	-0.88	-1.64
OW11B	21	0.39	1.64
OW13B	17	-1.36	-1.64
OW15B	24	-0.57	-1.64
OW17B	23	-0.71	-1.64
OW18B	***13***	***-2.32***	***-1.64***
OW04A	20	1.04	1.64
302A	22	-1.10	-1.64
BH49A	13	-0.67	-1.64
505	12	1.45	1.64

NOTE: If Test Statistic exceeds the Critical Value, there is evidence of trending.

WELL	SAMPLE SIZE (N)	TEST PROBABILITY	LEVEL OF SIGNIFICANCE
OW03B	8	0.054	0.05
OW05B	8	0.274	0.05
OW12B	**7**	**0.035**	**0.05**
BH49	8	0.500	0.05
A43	4	0.167	0.05
A55	8	0.548	0.05
411A	9	0.460	0.05
OW03A	8	0.548	0.05
OW05A	9	0.130	0.05
OW06A	9	0.272	0.05
OW07A	9	0.306	0.05
OW11A	8	0.237	0.05
OW12A	7	0.281	0.05
OW13A	9	0.421	0.05
OW15A	8	0.360	0.05
OW17A	8	0.452	0.05
MW862	9	0.381	0.05
MW863	9	0.344	0.05
MW921	5	0.408	0.05
MW934	8	0.452	0.05
MW935	8	0.138	0.05
MW950	4	0.167	0.05
MW951	4	0.375	0.05

NOTE: If the Test Probability is less than the Level of Significance, there is evidence of trending.

Radium-226 concentrations (pCi/L) in groundwater are not evaluated for trending in this memorandum. Radium-226 groundwater concentrations over the course of the USACE ESP (1997 through 2013) are predominantly less than the laboratory detection limit, precluding the accurate assessment of trends. The test loses significant statistical power if most of the data are censored.

5.0 CONCLUSIONS

The objective of the ESP is to monitor the air, groundwater, surface water, and sediment for the release of contaminants to ensure the protection of human health and the environment. To achieve this objective, the USACE:

- Calculates the annual cumulative dose to the nearest receptor from NFSS sources based on (1) measured total external gamma radiation and (2) modeled airborne particulate dose using remedial investigation soil data and annual meteorological data
- Measures radon gas concentrations at several locations around the property boundary and radon flux on top of the IWCS
- Analyzes surface water and sediment samples for radionuclides, metals, and PAHs
- Analyzes groundwater samples for radionuclides

The results of the 2013 ESP showed that the IWCS is continuing to perform as designed and is fully protective of human health and the environment. The data indicated that most contaminant concentrations were below regulatory standards and criteria. Contaminants that exceeded criteria include:

- Metals and PAHs in sediment
- Total uranium at multiple groundwater sampling locations
- Chloroform in a groundwater monitoring well located in the EU4

The 2013 groundwater analytical data showed that total uranium concentrations in 23 groundwater monitoring wells exceeded the drinking water standard. All of the 23 wells are screened in the upper water bearing zone. Some of these wells are located along the northeastern, northern, and eastern boundaries of the site, but the majority of the wells are located east and south of the IWCS. The two wells exhibiting the highest total uranium concentrations were MW953 (4,843 µg/L) located east and across the Central Drainage Ditch from the IWCS and immediately east of well OW11B, and MW951 (4,631 µg/L) located south of the IWCS and east of former Building 409. Both of these wells were installed in 2012.

The source of uranium in wells east of the IWCS is believed to be residual soil contamination from former operations in this area, which included a railroad bed, storage piles, and a decontamination pad used during construction of the IWCS. In addition, residual contamination in the sanitary sewer near manhole 6, which has been removed and plugged, may have contributed to groundwater contamination in this area. The source of the uranium in wells south of the IWCS is believed to be former storage piles and residual contamination from building 409. The USACE continues to investigate the source of this groundwater contamination and a report of the findings is anticipated by the end of 2014.

A trend analysis for total uranium in groundwater was performed for the 38 monitoring wells in the ESP. The results showed no increasing or decreasing trends in 34 of the wells. A decreasing trend in total uranium concentrations was identified at wells A45, OW06B, and OW18B; a non-definitive increasing trend was identified at well OW12B. The available sample size for well OW12B is small and the test's statistical power (ability to accurately reject the null hypothesis) is limited by the sample size of data collected. As additional data is collected through the surveillance program the statistical power of the test will increase. The previous evaluation (1997 through 2012) had not determined a trend for well OW12B.

6.0 REFERENCES

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TABLES

Acronyms and Abbreviations

BKGD	background
CY	calendar year
DO	dissolved oxygen
DOE	Department of Energy
°F	degrees Fahrenheit.
ft	feet
IWCS	Interim Waste Containment Structure
J	data estimated
LWBZ	lower water bearing zone
MDA	method detection activity
MDL	method detection limit
MCL	maximum contaminant level
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
mrem	millirem
mrem/yr	millirem per year
mS/cm	milliSiemens per centimeter
mV	millivolts
NA	not applicable
NFSS	Niagara Falls Storage Site
NTU	nephelometric turbidity units
NYCRR	New York Codes, Rules, and Reulations
NYS	New York State
NYSDOH	New York State Department of Health
ORP	oxidation-reduction potential
OSL	optically stimulated luminescence
OSLD	optically stimulated luminescence dosimeter
pCi	picocurie
pCi/g	picocuries per gram
pCi/L	picocuries per liter
$pCi/m^2/s$	picocuries per meters-squared per second
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
R	data rejected
RI	remedial investigation
RSL	regional screening level
SDWA	Safe Drinking Water Act
Spec. Cond.	Specific conductance
TDS	total dissolved solids
TLD	thermo luminescent dosimeter
TOGS	Technical and Operational Guidance Series
U	not detected
µg/kg	microgram per kilogram
UWBZ	upper water bearing zone
VOC	volatile organic compound
µg/L	micrograms per liter

Table 1: Evolution of NFSS Environmental Surveillance Plan

White background: annual sampling frequency
Blue background: quarterly measurement frequency
Yellow background: semi-annual sampling frequency

Parameter	1997	2000	2003	2008	2009	2010 (fall) (spring 2010 same as 2009)	2013 (fall) (spring same as 2010)
Radon Flux (Radon-222 emissions)	-----	180 monitoring locations	183 monitoring locations	183 monitoring locations	183 monitoring locations	183 monitoring locations	183 monitoring locations
OSLs (external gamma dose)	18 locations 1 duplicate location	20 locations 1 duplicate location	20 locations 1 duplicate location	20 locations 1 duplicate location	26 locations 1 duplicate location	26 locations 1 duplicate location	26 locations 1 duplicate location
Radon-222, -220	18 locations 1 duplicate location	20 locations 1 duplicate location	20 locations 1 duplicate location	20 locations 1 duplicate location	26 locations 1 duplicate location	26 locations 1 duplicate location	26 locations 1 duplicate location
Groundwater level measurements	66 wells	66 wells	91 wells	91 wells	91 wells	101 wells	101 wells
Groundwater Sampling	8 wells: BO2W20S, A45, A50, OW04B, OW06B, OW07B, OW15B, OW17B	8 wells (same)	8 wells (same)	18 wells: The 10 groundwater wells added to the ESP include: OW18B, 313, 505, 302A, A42, BH49A, OW04A, OW11B, 415A, and 201A NOTE: OW13B replaced OW07B in 2004	18 wells (same)	Spring 2010 - Same as 2009 Fall 2010 – 39 wells (wells OW04A/4B are sampled quarterly; all others are sampled semi-annually)	54 wells: (wells listed on Table 2)
	Field Parameters: Dissolved oxygen, redox potential, turbidity, temperature, specific conductivity, pH	Field Parameters: Same	Field Parameters: Same	Field Parameters: Same	Field Parameters: Same	Field Parameters: Same	Field Parameters: Same
	Water quality analytes: calcium, magnesium, potassium, sodium alkalinity, bicarbonate, carbonate, chloride, nitrate-nitrogen, nitrite-nitrogen, phosphate, sulfate, Total Dissolved Solids, sulfate	Water quality analytes: Same	Water quality analytes: Same	Water quality analytes: alkalinity(calcium carbonate) and total dissolved solids Anions: chloride, fluoride, nitrate, nitrite, ortho-phosphate, sulfate	Water quality analytes: Same Anions: Same	Water quality analytes: Same Anions: Same	Water quality analytes: Same Anions: Same
	Radionuclides: Total uranium, radium, thorium	Radionuclides: Same	Radionuclides: Same	Radionuclides: Same (except analysis for Iso Uranium only for wells OW18B, 313, 505, 302A, A42, BH49A, OW04A, OW11B, and 415A and no radionuclide analysis for well 201A) Also added thorium-228	Radionuclides: Same	Radionuclides: Iso-uranium, Iso-thorium, Radium-226, -228 Strontium-90, Technetium-99, Cesium-137, Iso-plutonium, Tritium	Radionuclides: Total Uranium Radium-226
	Metals: Copper, lead, vanadium	Metals: Same	Metals: Same	Metals: Target analyte list, boron, and lithium Volatile Organic Compounds (VOCs): Only wells 415A and 201A	Metals: Same VOCs: same	Metals: Same VOCs: Only wells 415A, 411A, 201A, MW934, MW948, MW949, MW950	Metals: Same VOCs: Same

Table 1 Continued: Evolution of NFSS Environmental Surveillance Plan

Parameter	1997	2000	2003	2008	2009	2010	2013
Surface water:	SWSD009, SWSD010, SWSD011, SWSD021, SWSD022 Field Parameters: Dissolved oxygen, redox potential, turbidity, temperature, specific conductivity, pH Radionuclides: total uranium radium-226, -228 thorium-230, -232	Same 5 locations Field Parameters: Same Radionuclides: Uranium-234, -235, -238 radium-226, -228 thorium-230, -232	Same 5 locations Field Parameters: Same Radionuclides: Same	Same 5 locations plus 5 additional locations: SWSD023, SWSD024, WDD1, WDD2, WDD3, Field Parameters: Same Radionuclides: Uranium-234, -235, -238 radium-226, -228 thorium-228 (new), -230, -232 Metals: TAL metals, lithium, boron Organics: Polychlorinated Biphenyls (PCBs), pesticides, VOCs, Polycyclic Aromatic Hydrocarbons (PAHs)	Same 10 locations Field Parameters: Same Radionuclides: Same Metals: same Organics: same	Spring 2010 - Same 10 locations as 2009 Fall 2010: 11 locations (Added location SWSD025) Field Parameters: Same Radionuclides: Iso-uranium, Iso-thorium, Radium-226, -228 Strontium-90, Technetium-99, Cesium-137, Iso-plutonium, Tritium Metals: same Organics: same	9 locations (removed SWSD024 and WDD1) Field Parameters: Same Radionuclides: Total Uranium Radium-226 Metals: same Organics: PAHs only
Sediment:	SWSD011, SWSD021, SWSD010, SWSD022, SWSD009 Radionuclides: total uranium radium-226, -228 thorium-230, -232	Same 5 locations Radionuclides: Uranium-234, -235, -238 radium-226, -228 thorium-230, -232	Same 5 locations Radionuclides: Same	Same 5 locations plus 5 additional locations: WDD1, WDD2, WDD3, SWSD023, SWSD024 Radionuclides: Uranium-234, -235, -238 radium-226, -228 thorium-228 (new), -230, -232 Metals: TAL metals, lithium, boron Organics: PCBs, pesticides, VOCs, PAHs	Same 10 locations Radionuclides: Same Metals: same Organics: same	Spring 2010 - Same as 2009 Fall 2010: Radionuclides: Iso-uranium, Iso-thorium, Radium-226, -228 Strontium-90, Technetium-99, Cesium-137, Iso-plutonium, Tritium Metals: same Organics: same	9 locations (removed SWSD024 and WDD1) Radionuclides: Total Uranium Radium-226 Metals: same Organics: PAHs only

Table 2
2013 ESP
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 3

2013 ESP
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.)

Table 4
2013 External Gamma Radiation Dose Rates
Niagara Falls Storage Site

Monitoring Location	Monitoring Station[g]	Gross OSLD[a] Data[b] (mrem) (12/20/2012 - 06/26/13)[c]	Gross OSLD[a] Data[b] (mrem) (06/26/2013 - 12/23/13)[c]	Normalized Gross OSLD Data[d] (mrem/yr)	CY2013 Net OSLD[e] Data (mrem/yr)
NFSS Perimeter	1	17	13	29.8	7.6
	1	15	12	26.8	4.6
	7	13	12	24.8	2.6
	7	13	11	23.8	1.7
	11	11	9	19.8	-2.3
	11	12	9	20.8	-1.3
	12	11	11	21.8	-0.3
	12	12	12	23.8	1.7
	13	12	12	23.8	1.7
	13	13	11	23.8	1.7
	15	12	10	21.8	-0.3
	15	12	11	22.8	0.7
	28	17	16	32.7	10.6
	28	17	12	28.8	6.6
	29	17	16	32.7	10.6
	29	19	16	34.7	12.6
	32	19	15	33.7	11.6
	32	20	16	35.7	13.6
	36	16	12	27.8	5.6
	36	11	14	24.8	2.6
	45	11	12	22.8	0.7
	45	16	10	25.8	3.6
	50	18	14	31.7	9.6
	50	17	15	31.7	9.6
	55	15	10	24.8	2.6
	55	13	14	26.8	4.6
	60	16	13	28.8	6.6
	60	13	13	25.8	3.6
	65	21	16	36.7	14.5
	65	19	19	37.7	15.5
	122	14	12	25.8	3.6
	122	15	14	28.8	6.6
	123	13	11	23.8	1.7
	123	15	11	25.8	3.6
IWCS Perimeter	8	11	10	20.8	-1.3
	8	12	9	20.8	-1.3
	10	16	14	29.8	7.6
	10	16	14	29.8	7.6
	18	12	9	20.8	-1.3
	18	14	10	23.8	1.7
	21	14	13	26.8	4.6
	21	12	11	22.8	0.7
	23	15	12	26.8	4.6
	23	15	13	27.8	5.6
	24	13	10	22.8	0.7
	24	12	13	24.8	2.6
	40	11	10	20.8	-1.3
	40	11	12	22.8	0.7
Background[f]	105	11	9	19.8	
	105	10	8	17.9	
	116	12	10	21.8	
	116	12	11	22.8	
	120	13	13	25.8	
	120	14	11	24.8	
Average Background		12.0	10.3	22.2	

a OSLD - Optically Stimulated Luminescence dosimeters
b All data reported from the vendor are gross results in mrem per monitoring period.
c Exposure period date format mm/dd/yy.
d Gross data for each period are normalized to a daily dose rate, averaged, and then normalized for the length of the year (365 days).
e Net data are corrected by subtracting the average normalized background value.
f Background Locations: 105-Lewiston-Porter School, 116-Balmer Road and 120-Lewiston Water Pollution Control Center
g Each location includes 2 OSLDs in the event that one is damaged
h Location 32 is a field duplicate for location 12.

Table 5
2013 Radon Gas Concentrations[a]

Monitoring Location[b]	Station	Average Daily Concentration (pCi/L) 12/20/12-6/26/13[c]			Average Daily Concentration (pCi/L) 6/26/13-12/23/13[c]		
NFSS Perimeter	1	<0.2	±	0.02	<0.2	±	0.02
	7	0.3	±	0.03	<0.2	±	0.02
	11	0.4	±	0.04	<0.2	±	0.02
	12	0.3	±	0.03	<0.2	±	0.02
	12 (dup[d])	0.3	±	0.03	<0.2	±	0.02
	13	0.2	±	0.02	<0.2	±	0.02
	15	0.3	±	0.03	<0.2	±	0.02
	28	0.6	±	0.04	<0.2	±	0.02
	29	0.5	±	0.04	<0.2	±	0.02
	36	0.4	±	0.04	<0.2	±	0.02
	45	<0.2	±	0.02	<0.2	±	0.02
	50	<0.2	±	0.02	<0.2	±	0.02
	55	0.2	±	0.02	<0.2	±	0.02
	60	<0.2	±	0.02	<0.2	±	0.02
	65	0.3	±	0.03	<0.2	±	0.02
	122	<0.2	±	0.02	<0.2	±	0.02
	123	<0.2	±	0.02	<0.2	±	0.02
IWCS Perimeter	8	0.4	±	0.04	<0.2	±	0.02
	10	0.3	±	0.03	<0.2	±	0.02
	18	0.6	±	0.05	<0.2	±	0.02
	21	0.5	±	0.04	<0.2	±	0.02
	23	0.4	±	0.04	<0.2	±	0.02
	24	0.5	±	0.04	<0.2	±	0.02
	40	0.4	±	0.04	<0.2	±	0.02
Background	105	0.3	±	0.03	<0.2	±	0.02
	116	0.2	±	0.02	<0.2	±	0.02
	120	0.2	±	0.02	<0.2	±	0.02

a. Radon gas concentrations were measured with RadTrak® detectors. These detectors measure the combined concentration of radon-220 and radon-222 in air.
b. Monitoring locations are shown on site map.
c. Detectors were installed (start date) and removed (end date) on the dates listed.
d. A quality control duplicate is collected at the same time and location and is analyzed by the same method for evaluating precision in sampling and analysis.

Note: DOE off-site limit for radon-222 concentration is 3.00 pCi/L above background.
(<0.2) Indicates detection limit is reported. Actual result is less than this value.
1 pCi = 0.037 becquerel

Table 6
2013 Radon Flux Monitoring Results[a]
Niagara Falls Storage Site

NFSS Sample ID	Qualifier[d]	Radon-222 Flux (pCi/m^2/s)	±		MDA	NFSS Sample ID	Qualifier[d]	Radon-222 Flux (pCi/m^2/s)	±		MDA
1	U	0.033	±	0.027	0.067	51	U	0.015	±	0.024	0.062
2	U	0.053	±	0.031	0.083	52	U	0.033	±	0.022	0.056
3	U	0.031	±	0.021	0.059	53	U	-0.009	±	0.014	0.028
4	U	0.045	±	0.028	0.073	54	U	0.039	±	0.032	0.069
5	U	0.042	±	0.029	0.074	55	U	0.043	±	0.023	0.064
6	U	0.042	±	0.025	0.067	56	U	0.033	±	0.021	0.062
7	U	0.035	±	0.025	0.061	57	U	0.022	±	0.023	0.058
8	U	0.055	±	0.036	0.087	58	U	0.009	±	0.023	0.055
9	U	0.042	±	0.033	0.077	59	U	0.034	±	0.030	0.069
10	U	0.034	±	0.023	0.064	60		0.042	±	0.019	0.037
10-DUP[b]	U	0.045	±	0.025	0.069	60-DUP[b]	U	0.053	±	0.037	0.079
11	U	0.070	±	0.038	0.098	61	U	0.056	±	0.038	0.096
12	U	0.057	±	0.029	0.072	62	U	0.049	±	0.032	0.080
13	U	0.060	±	0.033	0.086	63	U	3.256	±	2.235	5.205
14	U	0.054	±	0.028	0.076	64	U	0.032	±	0.023	0.057
15	U	0.059	±	0.029	0.077	65	U	0.061	±	0.036	0.083
16	U	0.006	±	0.024	0.058	66	U	0.001	±	0.022	0.052
17	U	0.069	±	0.031	0.081	67	U	0.039	±	0.036	0.075
18	U	0.047	±	0.031	0.076	68	U	0.026	±	0.025	0.056
19		0.094	±	0.025	0.012	69	U	0.006	±	0.017	0.047
20	U	0.041	±	0.034	0.073	70	U	0.029	±	0.029	0.062
20-DUP[b]	U	0.058	±	0.034	0.078	70-DUP[b]	U	0.043	±	0.033	0.063
21	U	0.059	±	0.033	0.089	71	U	0.016	±	0.024	0.058
22		0.141	±	0.028	0.037	72	U	0.056	±	0.036	0.086
23	U	0.061	±	0.036	0.094	73	U	0.058	±	0.031	0.081
24	U	0.041	±	0.026	0.067	74	U	0.011	±	0.024	0.058
25	U	0.093	±	0.040	0.098	75	U	0.036	±	0.021	0.058
26	U	0.052	±	0.040	0.082	76	U	0.000	±	0.023	0.050
27	U	0.019	±	0.022	0.055	77	U	0.049	±	0.033	0.085
28	U	0.010	±	0.022	0.053	78	U	0.043	±	0.031	0.066
29	U	0.067	±	0.040	0.098	79	U	0.042	±	0.026	0.069
30	U	0.067	±	0.030	0.076	80	U	0.049	±	0.039	0.088
30-DUP[b]		0.065	±	0.019	0.041	80-DUP[b]	U	0.005	±	0.024	0.057
31	U	0.024	±	0.023	0.060	81	U	0.033	±	0.023	0.056
32	U	0.047	±	0.029	0.079	82	U	0.042	±	0.031	0.072
33	U	0.020	±	0.025	0.062	83	U	0.073	±	0.032	0.084
34	U	0.061	±	0.036	0.089	84	U	0.032	±	0.024	0.067
35	U	0.044	±	0.024	0.064	85	U	0.053	±	0.033	0.080
36	U	0.041	±	0.035	0.078	86	U	0.034	±	0.025	0.064
37	U	0.045	±	0.027	0.074	87	U	0.010	±	0.019	0.053
38	U	0.045	±	0.023	0.061	88	U	0.008	±	0.022	0.052
39	U	0.009	±	0.021	0.050	89	U	0.048	±	0.027	0.071
40	U	-0.004	±	0.022	0.046	90		0.108	±	0.028	0.012
40-DUP[b]	U	0.012	±	0.021	0.053	90-DUP[b]	U	0.100	±	0.042	0.110
41	U	0.068	±	0.034	0.089	91	U	0.040	±	0.024	0.064
42	U	0.051	±	0.031	0.083	92	U	0.006	±	0.016	0.042
43	U	0.061	±	0.030	0.080	93	U	0.035	±	0.030	0.066
44	U	0.054	±	0.030	0.073	94	U	0.043	±	0.028	0.070
45	U	0.022	±	0.027	0.069	95	U	0.004	±	0.016	0.045
46	U	0.013	±	0.020	0.050	96	U	0.035	±	0.024	0.064
47	U	0.009	±	0.020	0.050	97	U	0.009	±	0.017	0.046
48	U	0.015	±	0.027	0.066	98	U	0.061	±	0.041	0.094
49	U	0.050	±	0.027	0.072	99	U	0.055	±	0.031	0.073
50	U	0.040	±	0.030	0.069	100	U	0.039	±	0.025	0.066
50-DUP[b]	U	0.006	±	0.021	0.050	100-DUP[b]	U	0.013	±	0.023	0.056

Table 6 (cont.)

2013 Radon Flux Monitoring Results[a]

Niagara Falls Storage Site

NFSS Sample ID	Qualifier[d]	Radon-222 Flux (pCi/m^2/s)	±		MDA	NFSS Sample ID	Qualifier[d]	Radon-222 Flux (pCi/m^2/s)	±		MDA
101	U	0.029	±	0.017	0.050	151	U	0.042	±	0.034	0.075
102	U	0.006	±	0.024	0.057	152	U	0.059	±	0.032	0.086
103	U	0.034	±	0.021	0.059	153	U	0.002	±	0.014	0.038
104	U	0.029	±	0.022	0.056	154	U	0.001	±	0.023	0.054
105	U	0.018	±	0.023	0.061	155	U	0.033	±	0.027	0.062
106	U	0.060	±	0.028	0.075	156	U	0.016	±	0.024	0.058
107	U	0.012	±	0.018	0.049	157	U	0.050	±	0.034	0.084
108	U	0.070	±	0.036	0.090	158	U	0.050	±	0.029	0.071
109	U	0.060	±	0.029	0.077	159	U	0.033	±	0.027	0.061
110	U	0.039	±	0.030	0.065	160	U	0.093	±	0.042	0.107
110-DUP[b]	U	0.060	±	0.035	0.080	160-DUP[b]	U	0.072	±	0.034	0.091
111	U	0.052	±	0.028	0.076	161	U	0.021	±	0.019	0.055
112	U	0.036	±	0.027	0.061	162	U	0.058	±	0.033	0.084
113	U	0.015	±	0.017	0.051	163	U	0.052	±	0.035	0.093
114	U	0.038	±	0.031	0.068	164	U	0.064	±	0.030	0.080
115	U	0.013	±	0.023	0.056	165	U	0.054	±	0.030	0.080
116	U	-0.003	±	0.012	0.032	166	U	0.060	±	0.041	0.098
117	U	0.027	±	0.022	0.059	167	U	0.045	±	0.036	0.086
118	U	0.001	±	0.025	0.054	168	U	0.078	±	0.038	0.098
119	U	0.014	±	0.021	0.058	169	U	0.012	±	0.029	0.069
120	U	0.037	±	0.021	0.059	170	U	0.046	±	0.031	0.074
120-DUP[b]	U	0.039	±	0.026	0.064	170-DUP[b]	U	0.081	±	0.035	0.093
121	U	-0.003	±	0.021	0.047	171	U	0.032	±	0.025	0.066
122		0.053	±	0.019	0.045	172	U	0.054	±	0.034	0.086
123	U	0.033	±	0.023	0.064	173	U	-0.001	±	0.023	0.052
124	U	0.035	±	0.025	0.066	174	U	0.084	±	0.047	0.110
125	U	0.079	±	0.043	0.099	175	U	0.010	±	0.025	0.059
126	U	0.057	±	0.030	0.075	176	U	0.018	±	0.022	0.059
127	U	0.036	±	0.028	0.068	177	U	0.054	±	0.033	0.081
128	U	0.070	±	0.034	0.091	178	U	0.047	±	0.029	0.073
129	U	0.033	±	0.020	0.056	179	U	0.039	±	0.033	0.076
130	U	0.041	±	0.026	0.068	180	U	0.016	±	0.024	0.066
130-DUP[b]	U	0.039	±	0.028	0.064	180-DUP[b]	U	0.016	±	0.020	0.060
131	U	0.034	±	0.025	0.070	181[c]	U	0.003	±	0.022	0.053
132	U	0.037	±	0.026	0.064	182[c]	U	0.037	±	0.028	0.067
133	U	0.033	±	0.022	0.062	183[c]	U	0.036	±	0.028	0.070
134	U	0.058	±	0.035	0.083	Average background	U	0.02556 (pCi/m^2/s)			
135	U	0.043	±	0.028	0.071						
136	U	0.047	±	0.031	0.080						
137	U	0.064	±	0.035	0.086						
138	U	0.037	±	0.022	0.060						
139	U	0.002	±	0.019	0.047						
140	U	0.033	±	0.020	0.056						
140-DUP[b]	U	0.053	±	0.027	0.073						
141	U	0.045	±	0.030	0.081						
142	U	0.060	±	0.033	0.084						
143	U	0.056	±	0.035	0.088						
144	U	0.094	±	0.039	0.097						
145	U	0.027	±	0.026	0.058						
146		0.073	±	0.023	0.045						
147	U	0.006	±	0.019	0.046						
148	U	0.057	±	0.030	0.078						
149	U	0.013	±	0.016	0.048						
150	U	0.039	±	0.033	0.068						
150-DUP[b]	U	0.042	±	0.025	0.066						

IWCS	Value	Units
Average[e]	0.056	(pCi/m^2/s)
High[f]	0.141	(pCi/m^2/s)
Low	-0.009	(pCi/m^2/s)

NOTE: The EPA Standard for Radon-222 Flux is 20 pCi/m2/sec

a. Radon-222 flux was performed on August 22-23, 2013

b. Every 10th canister is counted twice as a quality control (QC) duplicate to evaluate analytical precision.

c. Background: 181-Lewiston-Porter Central School
182-Lewiston Water Pollution Control Center
183-Balmer Rd. (CWM Secondary Gate)

d. Validated Qualifier: U - indicates that no analyte was detected (Non-Detect).

e. Average of all values (detects and Un-detects)

f. Highest detectable finding.

Table 7
2013 Surface Water Field Parameter Measurements
Niagara Falls Storage Site

SURFACE WATER

Surace Water ID	Date	pH	Temperature (°F[a])	Spec. Cond.[b] (mS/cm[c])	DO[d] (mg/L[e])	Turbidity (NTU[h])	ORP[f] (mV[g])
Quaterly Sampling							
SWSD025[5]	2/5/2013	7.28	35.90	0.947	6.86	24.4	84
Biannual Sampling							
SWSD009	4/25/2013	8.40	54.4	1.840	6.78	85.6	41
SWSD010	4/23/2013	7.46	51.8	1.450	13.14	46.0	92
SWSD011	4/23/2013	6.83	46.1	1.060	12.92	66.2	-26
SWSD021	4/23/2013	7.81	49.1	0.843	13.95	73.2	133
SWSD022	4/23/2013	7.51	49.4	1.190	12.87	27.0	13
SWSD023	4/25/2013	7.35	59.5	1.470	13.65	98.7	1
SWSD025[5]	4/23/2013	7.46	47.1	1.200	11.36	23.2	31
WDD2	4/29/2013	7.89	60.9	1.160	7.77	10.3	145
WDD3	4/29/2013	7.87	60.9	1.130	6.75	17.8	139
Quarterly Sampling							
SWSD025[5]	8/13/2013	7.00	69.4	1.130	6.83	89.7	192
Biannual Sampling							
SWSD009	10/15/2013	7.76	70.6	1.350	5.81	22.2	37
SWSD010	10/16/2013	7.60	64.0	1.110	5.08	71.5	261
SWSD011	10/16/2013	7.28	62.1	1.100	4.78	95.9	186
SWSD021	10/16/2013	7.81	65.0	0.446	6.06	316.0	277
SWSD022	10/16/2013	7.62	64.0	0.956	7.05	149.0	265
SWSD023	10/15/2013	7.36	60.2	1.030	3.07	11.0	-2
SWSD025[5]	10/16/2013	7.59	62.2	1.040	5.36	156.0	244
WDD2	10/15/2013	7.43	57.0	1.610	9.33	12.9	102
WDD3	10/15/2013	7.58	57.5	1.850	4.76	10.0	99
Auto Sampler -Rain Event							
SWSD025[5]	5/29/2013	6.83	63.9	0.907	5.85	85.6	170
SWSD025[5]	6/2/2013	6.25	65.7	0.687	6.44	256.0	181
SWSD025[5]	6/13/2013	5.82	66.4	0.636	9.65	181.0	219
SWSD025[5]	7/(19&20)/2013 [8]	6.15	71.6	0.771	6.63	139.0	194
SWSD025[5]	7/29/2013	6.68	77.0	0.971	6.63	256.0	220.0
SWSD025[5]	8/(1&9)/2013 [8]	7.65	71.9	0.844	4.87	79.9	170.0
SWSD025[5]	8/28/2013	8.34	73.7	1.100	8.55	143.0	219.0
SWSD025[5]	8/28/2013	8.55	64.1	1.020	7.51	59.0	207.0
SWSD025[5]	10/(17&18)/2013 [8]	7.91	56.6	0.871		114.0	208
Surace Water ID	Date	pH	Temperature (°F[a])	Spec. Cond.[b] (mS/cm[c])	DO[d] (mg/L[e])	Turbidity (NTU[h])	ORP[f] (mV[g])

a. °F - Degrees Fahrenheit.
b. Spec. Cond. - Specific conductance.
c. uS/cm - microSiemens/centimeter.
d. DO - Dissolved oxygen.
e. mg/L - milligrams per liter.
f. ORP - Oxidation-Reduction potential.
g. mV - milliVolts.
h. NTU - Nephelometric turbidity units.
i. 1-Liter = 0.26 gallons
j. Milliter PM = milliter per minute (1000ml = 1.0 liter) -averaged rate

NA - Not Applicable
* - parameters not taken/meter malfunction
**-Grab sample due to low recharge and/or purged dry
[1] Well contained little or no water.
[2] MW922 was sampled as a substitute
[3] Grab sample (minimum or no purging)
[4] Insuffcient well volume, no sample taken.
[5] NYSDOH requested sampling location.
[6] Location was dry.
[7] Water quality meter probe parameter may have been affected by cold.
[8] Two samples taken on different dates -sample date is last sample obtained by auto sampler.

TABLE 8
SURFACE WATER ANALYTICAL RESULTS - RADIONUCLIDES
NIAGARA FALLS STORAGE SITE

Location Identifier :			SWSD009	SWSD009	SWSD010	SWSD010	SWSD011
Field Sample Identifier :			SWSD009	SWSD009	SWSD010	SWSD010	SWSD011
Sample Type :			Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			04/25/13	10/15/13	04/23/13	10/16/13	04/23/13
Parameter	**Units**	**Criteria[1]**					
RADIONUCLIDES							
RADIUM-226	*PCI/L*	3	0.0836 U	0.106 U	0.232 U	0 U	0.279 U
TOTAL URANIUM	*UG/L*	30	4.24	2.92	15.3	3.47	14.3
RADIONUCLIDES (FILTERED)							
RADIUM-226	*PCI/L*	3	0.319 J	Not Anaylzed	Not Anaylzed	0.194 U	0.276 U
TOTAL URANIUM	*UG/L*	30	4.25	Not Anaylzed	Not Anaylzed	3.41	13.7

Concentration Exceeds Criteria

(1) - TOGS 1.1.1 (June 1998) Class B surface water criteria (default to Groundwater or Class A standard if Class B is not provided). Sum of Radium-226 and Radium-228 (sum total of 5 pCi/l); Thorium (15 pCi/l for alpha emitters) . 10 NYCRR Part 5, Subpart 5-1 (NYSDOH); Total Uranium (30 ug/L or 27 pCi/L) total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, and H-3).

U - Not detected above the reported quantitation limit.; R - The data is rejected.; J - The reported concentration is an estimated value.

NOTE: The detection limits shown are MDL.

TABLE 8
SURFACE WATER ANALYTICAL RESULTS - RADIONUCLIDES
NIAGARA FALLS STORAGE SITE

Location Identifier :			SWSD011	SWSD021	SWSD021	SWSD022	SWSD022
Field Sample Identifier :			SWSD011	SWSD021	SWSD021	SWSD022	SWSD022
Sample Type :			Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			10/16/13	04/23/13	10/16/13	04/23/13	10/16/13
Parameter	**Units**	**Criteria[1]**					
RADIONUCLIDES							
RADIUM-226	*PCI/L*	3	0.0744 U	-0.083 U	0.156 J	0.0767 U	0.349 J
TOTAL URANIUM	*UG/L*	30	4.64	29.2	2.11	17.8	4.95
RADIONUCLIDES (FILTERED)							
RADIUM-226	*PCI/L*	3	0.576 J	0.206 U	0.0319 U	Not Anaylzed	0.444 J
TOTAL URANIUM	*UG/L*	30	4.54	29.2	1.72	Not Anaylzed	4.54

Concentration Exceeds Criteria

(1) - TOGS 1.1.1 (June 1998) Class B surface water criteria (default to Groundwater or Class A standard if Class B is not provided). Sum of Radium-226 and Radium-228 (sum total of 5 pCi/l); Thorium (15 pCi/l for alpha emitters) . 10 NYCRR Part 5, Subpart 5-1 (NYSDOH); Total Uranium (30 ug/L or 27 pCi/L) total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, and H-3).

U - Not detected above the reported quantitation limit.; R - The data is rejected.; J - The reported concentration is an estimated value.

NOTE: The detection limits shown are MDL.

TABLE 8
SURFACE WATER ANALYTICAL RESULTS - RADIONUCLIDES
NIAGARA FALLS STORAGE SITE

Location Identifier :			SWSD023	SWSD023	SWSD025	SWSD025	SWSD025
Field Sample Identifier :			SWSD023	SWSD023	SWSD025	SWSD025	SWSD025-R
Sample Type :			Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			04/25/13	10/15/13	02/05/13	04/23/13	05/29/13
Parameter	**Units**	**Criteria[1]**					
RADIONUCLIDES							
RADIUM-226	*PCI/L*	3	0.266 U	0.344 J	0.209 U	0.0834 U	0.544
TOTAL URANIUM	*UG/L*	30	4.86	1.75	22.2	15.8	3.12
RADIONUCLIDES (FILTERED)							
RADIUM-226	*PCI/L*	3	0.0707 U	Not Anaylzed	Not Anaylzed	Not Anaylzed	0.341
TOTAL URANIUM	*UG/L*	30	4.86	Not Anaylzed	Not Anaylzed	Not Anaylzed	2.6

Concentration Exceeds Criteria

(1) - TOGS 1.1.1 (June 1998) Class B surface water criteria (default to Groundwater or Class A standard if Class B is not provided). Sum of Radium-226 and Radium-228 (sum total of 5 pCi/l); Thorium (15 pCi/l for alpha emitters) . 10 NYCRR Part 5, Subpart 5-1 (NYSDOH); Total Uranium (30 ug/L or 27 pCi/L) total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, and H-3).

U - Not detected above the reported quantitation limit.; R - The data is rejected.; J - The reported concentration is an estimated value.

NOTE: The detection limits shown are MDL.

TABLE 8
SURFACE WATER ANALYTICAL RESULTS - RADIONUCLIDES
NIAGARA FALLS STORAGE SITE

Location Identifier :			SWSD025	SWSD025	SWSD025	SWSD025	SWSD025
Field Sample Identifier :			SWSD025-R	SWSD025-R	SWSD025-R	SWSD025-R	SWSD025-R
Sample Type :			Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			06/02/13	06/13/13	07/20/13	07/29/13	08/09/13
Parameter	**Units**	**Criteria[1]**					
RADIONUCLIDES							
RADIUM-226	*PCI/L*	3	0.161 U	0.255 J	0.178 U	0.307	0.379 J
TOTAL URANIUM	*UG/L*	30	2.8	7.04	4	8.06	3.97
RADIONUCLIDES (FILTERED)							
RADIUM-226	*PCI/L*	3	-0.114 U	0.143 J	0.123 U	0.129 U	-0.057 U
TOTAL URANIUM	*UG/L*	30	2.55	6.46	4.2	7.16	3.83

Concentration Exceeds Criteria

(1) - TOGS 1.1.1 (June 1998) Class B surface water criteria (default to Groundwater or Class A standard if Class B is not provided). Sum of Radium-226 and Radium-228 (sum total of 5 pCi/l); Thorium (15 pCi/l for alpha emitters) . 10 NYCRR Part 5, Subpart 5-1 (NYSDOH); Total Uranium (30 ug/L or 27 pCi/L) total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, and H-3).

U - Not detected above the reported quantitation limit.; R - The data is rejected.; J - The reported concentration is an estimated value.

NOTE: The detection limits shown are MDL.

TABLE 8
SURFACE WATER ANALYTICAL RESULTS - RADIONUCLIDES
NIAGARA FALLS STORAGE SITE

Location Identifier :			SWSD025	SWSD025	SWSD025	SWSD025	SWSD025
Field Sample Identifier :			SWSD025	SWSD025-R	SWSD025-R	SWSD025-R	SWSD025
Sample Type :			Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			08/13/13	08/28/13	09/12/13	09/21/13	10/16/13
Parameter	**Units**	**Criteria[1]**					
RADIONUCLIDES							
RADIUM-226	*PCI/L*	3	0.221 U	0.611 J	0.412	-0.153 U	-0.094 U
TOTAL URANIUM	*UG/L*	30	4.62	3.23	3.21	2.43	5.85
RADIONUCLIDES (FILTERED)							
RADIUM-226	*PCI/L*	3	0.0485 U	0.366 J	0.527 J	0.135 U	0 U
TOTAL URANIUM	*UG/L*	30	4.49	2.77	3.17	2.28	5.6

Concentration Exceeds Criteria

(1) - TOGS 1.1.1 (June 1998) Class B surface water criteria (default to Groundwater or Class A standard if Class B is not provided). Sum of Radium-226 and Radium-228 (sum total of 5 pCi/l); Thorium (15 pCi/l for alpha emitters) . 10 NYCRR Part 5, Subpart 5-1 (NYSDOH); Total Uranium (30 ug/L or 27 pCi/L) total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, and H-3).

U - Not detected above the reported quantitation limit.; R - The data is rejected.; J - The reported concentration is an estimated value.

NOTE: The detection limits shown are MDL.

TABLE 8
SURFACE WATER ANALYTICAL RESULTS - RADIONUCLIDES
NIAGARA FALLS STORAGE SITE

Location Identifier :			SWSD025	WDD2	WDD2	WDD3	WDD3
Field Sample Identifier :			SWSD025-R	WDD2	WDD2	WDD3	WDD3
Sample Type :			Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			10/18/13	04/29/13	10/15/13	04/29/13	10/15/13
Parameter	**Units**	**Criteria[1]**					
RADIONUCLIDES							
RADIUM-226	*PCI/L*	3	0.314	0.197 J	0.203 U	0.137 U	0.244 U
TOTAL URANIUM	*UG/L*	30	5	1.81	0.681	1.99	0.748
RADIONUCLIDES (FILTERED)							
RADIUM-226	*PCI/L*	3	0 U	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed
TOTAL URANIUM	*UG/L*	30	5.47	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed

Concentration Exceeds Criteria

(1) - TOGS 1.1.1 (June 1998) Class B surface water criteria (default to Groundwater or Class A standard if Class B is not provided). Sum of Radium-226 and Radium-228 (sum total of 5 pCi/l); Thorium (15 pCi/l for alpha emitters) . 10 NYCRR Part 5, Subpart 5-1 (NYSDOH); Total Uranium (30 ug/L or 27 pCi/L) total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, and H-3).

U - Not detected above the reported quantitation limit.; R - The data is rejected.; J - The reported concentration is an estimated value.

NOTE: The detection limits shown are MDL.

TABLE 9
SEDIMENT ANALYTICAL RESULTS - RADIONUCLIDES
NIAGARA FALLS STORAGE SITE

Location Identifier :			SWSD009	SWSD009	SWSD010	SWSD010	SWSD011
Field Sample Identifier :			SWSD009	SWSD009	SWSD010	SWSD010	SWSD011
Sample Type :			Sediment	Sediment	Sediment	Sediment	Sediment
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			04/25/13	10/15/13	04/24/13	10/17/13	04/23/13
Parameter	**Units**	**Criteria[1]**					
RADIONUCLIDES							
RADIUM-226	*PCI/G*	5	0.78	0.922	1.287	1.329	1.474
URANIUM-234	*PCI/G*	13	0.954	1.06	2.44	2.12	1.6
URANIUM-235	*PCI/G*	8	0.024 U	0.089 J	0.118 J	0.09 J	0.007 U
URANIUM-238	*PCI/G*	14	0.852	0.677	2.07	1.68	1.67
TOTAL URANIUM	*PCI/G*	-	1.806	1.826	4.628	3.89	3.27

Concentration Exceeds Criteria

(1) - 6 NYCRR Part 375, NYS Unrestricted Use Soil Cleanup Objectives for VOCs, Pesticides, PCBs, PAHs and Metals. USDOE Order 458.1 (June 2011) - Ra-226 and Ra-228 (sum total of 5 pCi/g),Thorium isotopes (sum total of 5 pCi/g) total dose not to exceed 25 mrem/yr for remaining radionuclides (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3, and U).

U - Not detected above the reported quantitation limit.; R - The data is rejected.; J - The reported concentration is an estimated value.

NOTE: The detection limits shown are MDL.

TABLE 9
SEDIMENT ANALYTICAL RESULTS - RADIONUCLIDES
NIAGARA FALLS STORAGE SITE

Location Identifier :			SWSD011	SWSD021	SWSD021	SWSD022	SWSD022
Field Sample Identifier :			SWSD011	SWSD021	SWSD021	SWSD022	SWSD022
Sample Type :			Sediment	Sediment	Sediment	Sediment	Sediment
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			10/17/13	04/24/13	10/17/13	04/24/13	10/17/13
Parameter	**Units**	**Criteria[1]**					
RADIONUCLIDES							
RADIUM-226	*PCI/G*	5	1.454	1.29	1.147	1.604	1.803
URANIUM-234	*PCI/G*	13	1.25	1.28	0.962	2.03	1.71
URANIUM-235	*PCI/G*	8	0.087 J	0.136 J	0 U	0.126	0.132
URANIUM-238	*PCI/G*	14	1.11	0.996	1.19	1.95	1.32
TOTAL URANIUM	*PCI/G*	-	2.447	2.412	2.152	4.106	3.162

Concentration Exceeds Criteria

(1) - 6 NYCRR Part 375, NYS Unrestricted Use Soil Cleanup Objectives for VOCs, Pesticides, PCBs, PAHs and Metals. USDOE Order 458.1 (June 2011) - Ra-226 and Ra-228 (sum total of 5 pCi/g),Thorium isotopes (sum total of 5 pCi/g) total dose not to exceed 25 mrem/yr for remaining radionuclides (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3, and U).

U - Not detected above the reported quantitation limit.; R - The data is rejected.; J - The reported concentration is an estimated value.

NOTE: The detection limits shown are MDL.

TABLE 9
SEDIMENT ANALYTICAL RESULTS - RADIONUCLIDES
NIAGARA FALLS STORAGE SITE

Location Identifier :			SWSD023	SWSD023	SWSD025	SWSD025	SWSD025
Field Sample Identifier :			SWSD023	SWSD023	SWSD025	SWSD025	SWSD025
Sample Type :			Sediment	Sediment	Sediment	Sediment	Sediment
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			04/25/13	10/15/13	02/05/13	04/23/13	08/13/13
Parameter	**Units**	**Criteria[1]**					
RADIONUCLIDES							
RADIUM-226	*PCI/G*	5	0.86	0.828	1.503	1.624	1.859
URANIUM-234	*PCI/G*	13	0.812	0.929	2.52	2.25	2.1
URANIUM-235	*PCI/G*	8	0.027 U	0.087 J	0.093 J	0.217	0.181
URANIUM-238	*PCI/G*	14	0.911	0.971	1.73	2.15	1.93
TOTAL URANIUM	*PCI/G*	-	1.723	1.987	4.343	4.617	4.211

Concentration Exceeds Criteria

(1) - 6 NYCRR Part 375, NYS Unrestricted Use Soil Cleanup Objectives for VOCs, Pesticides, PCBs, PAHs and Metals. USDOE Order 458.1 (June 2011) - Ra-226 and Ra-228 (sum total of 5 pCi/g),Thorium isotopes (sum total of 5 pCi/g) total dose not to exceed 25 mrem/yr for remaining radionuclides (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3, and U).

U - Not detected above the reported quantitation limit.; R - The data is rejected.; J - The reported concentration is an estimated value.

NOTE: The detection limits shown are MDL.

TABLE 9
SEDIMENT ANALYTICAL RESULTS - RADIONUCLIDES
NIAGARA FALLS STORAGE SITE

Location Identifier :			SWSD025	WDD2	WDD2	WDD3	WDD3
Field Sample Identifier :			SWSD025	WDD2	WDD2	WDD3	WDD3
Sample Type :			Sediment	Sediment	Sediment	Sediment	Sediment
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			10/17/13	04/29/13	10/15/13	04/29/13	10/15/13
Parameter	**Units**	**Criteria[1]**					
RADIONUCLIDES							
RADIUM-226	*PCI/G*	5	1.663	1.262	1.247	1.568	1.396
URANIUM-234	*PCI/G*	13	4.49	0.962	1.17	1.12	1.16
URANIUM-235	*PCI/G*	8	0.12 J	0.115 J	0.133	0.126	0.05 J
URANIUM-238	*PCI/G*	14	3.73	0.963	1.13	1.07	0.996
TOTAL URANIUM	*PCI/G*	-	8.34	2.04	2.433	2.316	2.206

Concentration Exceeds Criteria

(1) - 6 NYCRR Part 375, NYS Unrestricted Use Soil Cleanup Objectives for VOCs, Pesticides, PCBs, PAHs and Metals. USDOE Order 458.1 (June 2011) - Ra-226 and Ra-228 (sum total of 5 pCi/g),Thorium isotopes (sum total of 5 pCi/g) total dose not to exceed 25 mrem/yr for remaining radionuclides (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3, and U).

U - Not detected above the reported quantitation limit.; R - The data is rejected.; J - The reported concentration is an estimated value.

NOTE: The detection limits shown are MDL.

TABLE 10
SEDIMENT ANALYTICAL RESULTS - METALS
NIAGARA FALLS STORAGE SITE

Location Identifier :			SWSD009	SWSD009	SWSD010	SWSD010	SWSD011
Field Sample Identifier :			SWSD009	SWSD009	SWSD010	SWSD010	SWSD011
Sample Type :			Sediment	Sediment	Sediment	Sediment	Sediment
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			04/25/13	10/15/13	04/24/13	10/17/13	04/23/13
Parameter	**Units**	**Criteria[1]**					
METALS							
ALUMINUM	MG/KG	77000	13,000	21,000	21,000	24,000	21,000
ANTIMONY	MG/KG	NS	7	3.2	5.6	7	1.1
ARSENIC	MG/KG	13	5.2	3.4	9	9.4	8.8
BARIUM	MG/KG	350	110	110	130	120	150
BERYLLIUM	MG/KG	7.2	0.67	1.1	1	1.4	1.2
BORON	MG/KG	16000	17 J	18 J	31 J	26 J	36 J
CADMIUM	MG/KG	2.5	2	3.6	2.1	7.6	1.4
CALCIUM	MG/KG	58900	49,000	75,000	42,000	53,000	53,000
CHROMIUM, TOTAL	MG/KG	25.8	52	98	85	84	70
COBALT	MG/KG	36.7	8.6	6.4	14	15	15
COPPER	MG/KG	50	59	44	87	100	59
IRON	MG/KG	55000	21,000	36,000	37,000	44,000	38,000
LEAD	MG/KG	63	55	29	73	71	52
LITHIUM	MG/KG	160	19 J	28	32 J	39	42
MAGNESIUM	MG/KG	14800	11,000	18,000	15,000	18,000	14,000
MANGANESE	MG/KG	1600	620	740	860	980	1,200
MERCURY	MG/KG	0.18	0.14	0.15	0.19	0.23	0.12
MOLYBDENUM	MG/KG	390	2.1	1.4	5	4.4	1.7
NICKEL	MG/KG	30	23	20	37	40	37

Concentration Exceeds Criteria

(1) - 6 NYCRR Part 375, NYS Unrestricted Use Soil Cleanup Objectives, Resident Soil RSL (05/2013) and RI Background Screening Levels (12/2007).

U - Not detected above the reported quantitation limit.; R - The data is rejected.; J - The reported concentration is an estimated value.

NOTE: The detection limits shown are MDL.

TABLE 10
SEDIMENT ANALYTICAL RESULTS - METALS
NIAGARA FALLS STORAGE SITE

Location Identifier :			SWSD009	SWSD009	SWSD010	SWSD010	SWSD011
Field Sample Identifier :			SWSD009	SWSD009	SWSD010	SWSD010	SWSD011
Sample Type :			Sediment	Sediment	Sediment	Sediment	Sediment
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			04/25/13	10/15/13	04/24/13	10/17/13	04/23/13
Parameter	**Units**	**Criteria[1]**					
METALS							
POTASSIUM	*MG/KG*	2860	2,200	2,900	4,700	4,300	4,300
SELENIUM	*MG/KG*	3.9	1.8	3 U	2.4	1.5 U	2.8
SILVER	*MG/KG*	2	0.3	1.5 U	0.4	2.9 U	0.27
SODIUM	*MG/KG*	331	400	390	710	580	420
THALLIUM	*MG/KG*	0.78	0.16 J	1.3 J	0.28 J	2.5 J	0.34 J
VANADIUM	*MG/KG*	390	28	20	45	41	42
ZINC	*MG/KG*	109	350	160	400	360	460

Concentration Exceeds Criteria

(1) - 6 NYCRR Part 375, NYS Unrestricted Use Soil Cleanup Objectives, Resident Soil RSL (05/2013) and RI Background Screening Levels (12/2007).

U - Not detected above the reported quantitation limit.; R - The data is rejected.; J - The reported concentration is an estimated value.

NOTE: The detection limits shown are MDL.

TABLE 10
SEDIMENT ANALYTICAL RESULTS - METALS
NIAGARA FALLS STORAGE SITE

Location Identifier :			SWSD011	SWSD021	SWSD021	SWSD022	SWSD022
Field Sample Identifier :			SWSD011	SWSD021	SWSD021	SWSD022	SWSD022
Sample Type :			Sediment	Sediment	Sediment	Sediment	Sediment
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			10/17/13	04/24/13	10/17/13	04/24/13	10/17/13
Parameter	**Units**	**Criteria[1]**					
METALS							
ALUMINUM	*MG/KG*	77000	29,000	24,000	25,000	20,000	26,000
ANTIMONY	*MG/KG*	NS	4.9	0.64	0.93 J	3.1	3.5
ARSENIC	*MG/KG*	13	9.5	4.6	5.1	6.1	8
BARIUM	*MG/KG*	350	150	140	100	170	170
BERYLLIUM	*MG/KG*	7.2	1.5	1.2	1.2	1.1	1.4
BORON	*MG/KG*	16000	27	15 J	15 J	23 J	24 J
CADMIUM	*MG/KG*	2.5	7.8	0.8	5.5	1	6.2
CALCIUM	*MG/KG*	58900	52,000	50,000	50,000	30,000	45,000
CHROMIUM, TOTAL	*MG/KG*	25.8	70	49	52	48	49
COBALT	*MG/KG*	36.7	14	12	11	13	14
COPPER	*MG/KG*	50	66	28	33	50	64
IRON	*MG/KG*	55000	43,000	36,000	39,000	32,000	42,000
LEAD	*MG/KG*	63	40	16	9.2	46	42
LITHIUM	*MG/KG*	160	40	33	35	33 J	38
MAGNESIUM	*MG/KG*	14800	15,000	12,000	15,000	12,000	16,000
MANGANESE	*MG/KG*	1600	1,700	760	600	720	710
MERCURY	*MG/KG*	0.18	0.12	0.033	0.02	0.11	0.14
MOLYBDENUM	*MG/KG*	390	2	0.57	0.37 J	2.5	2.4
NICKEL	*MG/KG*	30	42	29	32	33	39

Concentration Exceeds Criteria

(1) - 6 NYCRR Part 375, NYS Unrestricted Use Soil Cleanup Objectives, Resident Soil RSL (05/2013) and RI Background Screening Levels (12/2007).

U - Not detected above the reported quantitation limit.; R - The data is rejected.; J - The reported concentration is an estimated value.

NOTE: The detection limits shown are MDL.

TABLE 10
SEDIMENT ANALYTICAL RESULTS - METALS
NIAGARA FALLS STORAGE SITE

Location Identifier :			SWSD011	SWSD021	SWSD021	SWSD022	SWSD022
Field Sample Identifier :			SWSD011	SWSD021	SWSD021	SWSD022	SWSD022
Sample Type :			Sediment	Sediment	Sediment	Sediment	Sediment
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			10/17/13	04/24/13	10/17/13	04/24/13	10/17/13
Parameter	**Units**	**Criteria[1]**					
METALS							
POTASSIUM	*MG/KG*	2860	4,500	3,700	4,700	3,900	4,000
SELENIUM	*MG/KG*	3.9	1.1 U	1.8	2.5 U	2.5	1 U
SILVER	*MG/KG*	2	2.1 U	0.12 J	1.3 U	0.26 J	1.9 U
SODIUM	*MG/KG*	331	590	210	240	280	370
THALLIUM	*MG/KG*	0.78	0.95 J	0.37 J	1.3 J	0.23 J	1.4 J
VANADIUM	*MG/KG*	390	41	34	32	37	37
ZINC	*MG/KG*	109	340	88	68	240	220

Concentration Exceeds Criteria

(1) - 6 NYCRR Part 375, NYS Unrestricted Use Soil Cleanup Objectives, Resident Soil RSL (05/2013) and RI Background Screening Levels (12/2007).

U - Not detected above the reported quantitation limit.; R - The data is rejected.; J - The reported concentration is an estimated value.

NOTE: The detection limits shown are MDL.

TABLE 10
SEDIMENT ANALYTICAL RESULTS - METALS
NIAGARA FALLS STORAGE SITE

Location Identifier :			SWSD023	SWSD023	SWSD025	SWSD025	WDD2
Field Sample Identifier :			SWSD023	SWSD023	SWSD025	SWSD025	WDD2
Sample Type :			Sediment	Sediment	Sediment	Sediment	Sediment
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			04/25/13	10/15/13	04/23/13	10/17/13	04/29/13
Parameter	**Units**	**Criteria[1]**					
METALS							
ALUMINUM	*MG/KG*	77000	9,200	11,000	22,000	23,000	28,000
ANTIMONY	*MG/KG*	NS	5.3	6.8	6.2	4	1.1
ARSENIC	*MG/KG*	13	7.8	10	8.7	9.1	5.4
BARIUM	*MG/KG*	350	100	100	190	140	240
BERYLLIUM	*MG/KG*	7.2	0.54	0.79	1.3	1.6	1.2
BORON	*MG/KG*	16000	16 U	13 J	42 U	25 J	29 U
CADMIUM	*MG/KG*	2.5	1.9	5.4	1.8	7.1	0.88
CALCIUM	*MG/KG*	58900	110,000	110,000	32,000	37,000	33,000
CHROMIUM, TOTAL	*MG/KG*	25.8	25	39	70	62	40
COBALT	*MG/KG*	36.7	11	8.2	17	15	14
COPPER	*MG/KG*	50	100	160	71	68	47
IRON	*MG/KG*	55000	21,000	27,000	37,000	44,000	48,000
LEAD	*MG/KG*	63	130	130	62	47	25
LITHIUM	*MG/KG*	160	13 J	18	37 J	39	45 J
MAGNESIUM	*MG/KG*	14800	45,000	46,000	17,000	16,000	13,000
MANGANESE	*MG/KG*	1600	770	600	1,000	690	2,100
MERCURY	*MG/KG*	0.18	0.25	0.34	0.16	0.15	0.077
MOLYBDENUM	*MG/KG*	390	7.6	6.9	5.2	3.8	3.4
NICKEL	*MG/KG*	30	26	29	42	40	36

Concentration Exceeds Criteria

(1) - 6 NYCRR Part 375, NYS Unrestricted Use Soil Cleanup Objectives, Resident Soil RSL (05/2013) and RI Background Screening Levels (12/2007).

U - Not detected above the reported quantitation limit.; R - The data is rejected.; J - The reported concentration is an estimated value.

NOTE: The detection limits shown are MDL.

TABLE 10
SEDIMENT ANALYTICAL RESULTS - METALS
NIAGARA FALLS STORAGE SITE

Location Identifier :			SWSD023	SWSD023	SWSD025	SWSD025	WDD2
Field Sample Identifier :			SWSD023	SWSD023	SWSD025	SWSD025	WDD2
Sample Type :			Sediment	Sediment	Sediment	Sediment	Sediment
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			04/25/13	10/15/13	04/23/13	10/17/13	04/29/13
Parameter	**Units**	**Criteria[1]**					
METALS							
POTASSIUM	*MG/KG*	2860	1,800	2,100	5,200	4,400	5,800
SELENIUM	*MG/KG*	3.9	1.6	2.7 U	2.8 J	1.5 U	2.8
SILVER	*MG/KG*	2	0.51	0.27 J	0.29 J	2.8 U	0.22 J
SODIUM	*MG/KG*	331	350	360	430	380	370
THALLIUM	*MG/KG*	0.78	0.16 J	0.81 J	1.3 U	2 J	0.25 J
VANADIUM	*MG/KG*	390	28	24	50	40	45
ZINC	*MG/KG*	109	860	850	380	330	260

Concentration Exceeds Criteria

(1) - 6 NYCRR Part 375, NYS Unrestricted Use Soil Cleanup Objectives, Resident Soil RSL (05/2013) and RI Background Screening Levels (12/2007).

U - Not detected above the reported quantitation limit.; R - The data is rejected.; J - The reported concentration is an estimated value.

NOTE: The detection limits shown are MDL.

TABLE 10
SEDIMENT ANALYTICAL RESULTS - METALS
NIAGARA FALLS STORAGE SITE

Location Identifier :			WDD2	WDD3	WDD3
Field Sample Identifier :			WDD2	WDD3	WDD3
Sample Type :			Sediment	Sediment	Sediment
Sample Depth Interval (ft) :			-	-	-
Date of Sample :			10/15/13	04/29/13	10/15/13
Parameter	**Units**	**Criteria[1]**			
METALS					
ALUMINUM	*MG/KG*	77000	20,000	21,000	20,000
ANTIMONY	*MG/KG*	NS	1.7 J	1.6	1.4 J
ARSENIC	*MG/KG*	13	4.1	4.2	5.8
BARIUM	*MG/KG*	350	130	200	130
BERYLLIUM	*MG/KG*	7.2	1.1	0.89 J	1.2
BORON	*MG/KG*	16000	18 J	30 U	15 J
CADMIUM	*MG/KG*	2.5	5	0.55	5.2
CALCIUM	*MG/KG*	58900	44,000	18,000	59,000
CHROMIUM, TOTAL	*MG/KG*	25.8	29	30	25
COBALT	*MG/KG*	36.7	9.3	11	11
COPPER	*MG/KG*	50	35	32	34
IRON	*MG/KG*	55000	36,000	32,000	38,000
LEAD	*MG/KG*	63	13	21	12
LITHIUM	*MG/KG*	160	30	33 J	31
MAGNESIUM	*MG/KG*	14800	10,000	10,000	14,000
MANGANESE	*MG/KG*	1600	1,500	3,300	1,200
MERCURY	*MG/KG*	0.18	0.042	0.069	0.036
MOLYBDENUM	*MG/KG*	390	1.8	4.1	1.5
NICKEL	*MG/KG*	30	26	27	28

Concentration Exceeds Criteria

(1) - 6 NYCRR Part 375, NYS Unrestricted Use Soil Cleanup Objectives, Resident Soil RSL (05/2013) and RI Background Screening Levels (12/2007).

U - Not detected above the reported quantitation limit.; R - The data is rejected.; J - The reported concentration is an estimated value.

NOTE: The detection limits shown are MDL.

TABLE 10
SEDIMENT ANALYTICAL RESULTS - METALS
NIAGARA FALLS STORAGE SITE

Location Identifier :			WDD2	WDD3	WDD3
Field Sample Identifier :			WDD2	WDD3	WDD3
Sample Type :			Sediment	Sediment	Sediment
Sample Depth Interval (ft) :			-	-	-
Date of Sample :			10/15/13	04/29/13	10/15/13
Parameter	**Units**	**Criteria[1]**			
METALS					
POTASSIUM	*MG/KG*	2860	3,700	4,800	3,500
SELENIUM	*MG/KG*	3.9	3.6 U	1.9 J	1 U
SILVER	*MG/KG*	2	1.8 U	0.19 J	1.9 U
SODIUM	*MG/KG*	331	340	360	340
THALLIUM	*MG/KG*	0.78	0.84 J	0.22 U	1.4 J
VANADIUM	*MG/KG*	390	26	34	28
ZINC	*MG/KG*	109	180	190	96

Concentration Exceeds Criteria

(1) - 6 NYCRR Part 375, NYS Unrestricted Use Soil Cleanup Objectives, Resident Soil RSL (05/2013) and RI Background Screening Levels (12/2007).

U - Not detected above the reported quantitation limit.; R - The data is rejected.; J - The reported concentration is an estimated value.

NOTE: The detection limits shown are MDL.

TABLE 11
SEDIMENT ANALYTICAL RESULTS - PAHs
NIAGARA FALLS STORAGE SITE

Location Identifier :			SWSD009	SWSD009	SWSD010	SWSD010	SWSD011
Field Sample Identifier :			SWSD009	SWSD009	SWSD010	SWSD010	SWSD011
Sample Type :			Sediment	Sediment	Sediment	Sediment	Sediment
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			04/25/13	10/15/13	04/24/13	10/17/13	04/23/13
Parameter	**Units**	**Criteria[1]**					
SEMI-VOLATILE ORGANIC ANALYSES							
2-METHYLNAPHTHALENE	*UG/KG*	-	21 J	1,500 U	27 U	2,600 U	22 U
ACENAPHTHENE	*UG/KG*	20000	46 J	1,500 U	24 U	2,600 U	20 U
ACENAPHTHYLENE	*UG/KG*	100000	22 J	1,500 U	44 J	2,600 U	19 U
ANTHRACENE	*UG/KG*	100000	120 J	100 J	76 J	2,600 U	28 J
BENZO(A)ANTHRACENE	*UG/KG*	1000	480	540 J	350 J	430 J	150 J
BENZO(A)PYRENE	*UG/KG*	1000	530	550 J	470 J	560 J	190 J
BENZO(B)FLUORANTHENE	*UG/KG*	1000	790	960 J	780	1,100 J	300 J
BENZO(G,H,I)PERYLENE	*UG/KG*	100000	390	370 J	370 J	470 J	180 J
BENZO(K)FLUORANTHENE	*UG/KG*	800	330	270 J	260 J	380 J	130 J
CHRYSENE	*UG/KG*	1000	550	860 J	460 J	650 J	210 J
DIBENZ(A,H)ANTHRACENE	*UG/KG*	330	45 U	1,500 U	87 U	2,600 U	71 U
FLUORANTHENE	*UG/KG*	100000	1,100	860 J	680	790 J	210 J
FLUORENE	*UG/KG*	30000	60 J	1,500 U	38 J	2,600 U	25 U
INDENO(1,2,3-C,D)PYRENE	*UG/KG*	500	290	240 J	280 J	310 J	130 J
NAPHTHALENE	*UG/KG*	12000	33 J	1,500 U	26 J	2,600 U	17 U
PHENANTHRENE	*UG/KG*	100000	400	400 J	200 J	280 J	90 J
PYRENE	*UG/KG*	100000	860	840 J	580	890 J	190 J

Concentration Exceeds Criteria

(1) - 6 NYCRR Part 375, NYS Unrestricted Use Soil Cleanup Objectives for VOCs, Pesticides, PCBs, PAHs and Metals. USDOE Order 458.1 (June 2011) - Ra-226 and Ra-228 (sum total of 5 pCi/g),Thorium isotopes (sum total of 5 pCi/g) total dose not to exceed 25 mrem/yr for remaining radionuclides (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3, and U).

U - Not detected above the reported quantitation limit.; R - The data is rejected.; J - The reported concentration is an estimated value.

NOTE: The detection limits shown are MDL.

TABLE 11
SEDIMENT ANALYTICAL RESULTS - PAHs
NIAGARA FALLS STORAGE SITE

Location Identifier :			SWSD011	SWSD021	SWSD021	SWSD022	SWSD022
Field Sample Identifier :			SWSD011	SWSD021	SWSD021	SWSD022	SWSD022
Sample Type :			Sediment	Sediment	Sediment	Sediment	Sediment
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			10/17/13	04/24/13	10/17/13	04/24/13	10/17/13
Parameter	**Units**	**Criteria[1]**					
SEMI-VOLATILE ORGANIC ANALYSES							
2-METHYLNAPHTHALENE	*UG/KG*	-	2,600 U	13 U	1,700 U	21 U	2,200 U
ACENAPHTHENE	*UG/KG*	20000	2,600 U	12 U	1,700 U	19 U	2,200 U
ACENAPHTHYLENE	*UG/KG*	100000	2,600 U	12 U	1,700 U	18 U	2,200 U
ANTHRACENE	*UG/KG*	100000	2,600 U	13 U	1,700 U	36 J	2,200 U
BENZO(A)ANTHRACENE	*UG/KG*	1000	230 J	30 J	1,700 U	140 J	180 J
BENZO(A)PYRENE	*UG/KG*	1000	290 J	33 J	1,700 U	210 J	180 J
BENZO(B)FLUORANTHENE	*UG/KG*	1000	500 J	51 J	1,700 U	350 J	300 J
BENZO(G,H,I)PERYLENE	*UG/KG*	100000	260 J	27 J	1,700 U	180 J	2,200 U
BENZO(K)FLUORANTHENE	*UG/KG*	800	2,600 U	28 U	1,700 U	120 J	2,200 U
CHRYSENE	*UG/KG*	1000	270 J	50 J	1,700 U	220 J	150 J
DIBENZ(A,H)ANTHRACENE	*UG/KG*	330	2,600 U	43 U	1,700 U	67 U	2,200 U
FLUORANTHENE	*UG/KG*	100000	340 J	62 J	1,700 U	250 J	270 J
FLUORENE	*UG/KG*	30000	2,600 U	15 U	1,700 U	24 U	2,200 U
INDENO(1,2,3-C,D)PYRENE	*UG/KG*	500	180 J	20 J	1,700 U	140 J	2,200 U
NAPHTHALENE	*UG/KG*	12000	2,600 U	11 U	1,700 U	16 U	2,200 U
PHENANTHRENE	*UG/KG*	100000	2,600 U	35 J	1,700 U	100 J	2,200 U
PYRENE	*UG/KG*	100000	330 J	38 J	1,700 U	200 J	260 J

Concentration Exceeds Criteria

(1) - 6 NYCRR Part 375, NYS Unrestricted Use Soil Cleanup Objectives for VOCs, Pesticides, PCBs, PAHs and Metals. USDOE Order 458.1 (June 2011) - Ra-226 and Ra-228 (sum total of 5 pCi/g),Thorium isotopes (sum total of 5 pCi/g) total dose not to exceed 25 mrem/yr for remaining radionuclides (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3, and U).

U - Not detected above the reported quantitation limit.; R - The data is rejected.; J - The reported concentration is an estimated value.

NOTE: The detection limits shown are MDL.

TABLE 11
SEDIMENT ANALYTICAL RESULTS - PAHs
NIAGARA FALLS STORAGE SITE

Location Identifier :			SWSD023	SWSD023	SWSD025	SWSD025	WDD2
Field Sample Identifier :			SWSD023	SWSD023	SWSD025	SWSD025	WDD2
Sample Type :			Sediment	Sediment	Sediment	Sediment	Sediment
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			04/25/13	10/15/13	04/23/13	10/17/13	04/29/13
Parameter	**Units**	**Criteria[1]**					
SEMI-VOLATILE ORGANIC ANALYSES							
2-METHYLNAPHTHALENE	*UG/KG*	-	6,900 U	7,900 U	28 U	2,600 U	30 U
ACENAPHTHENE	*UG/KG*	20000	330 J	7,900 U	26 U	2,600 U	28 U
ACENAPHTHYLENE	*UG/KG*	100000	6,900 U	7,900 U	25 U	2,600 U	26 U
ANTHRACENE	*UG/KG*	100000	390 J	410 J	44 J	2,600 U	30 U
BENZO(A)ANTHRACENE	*UG/KG*	1000	1,400 J	1,700 J	200 J	310 J	110 J
BENZO(A)PYRENE	*UG/KG*	1000	1,300 J	1,500 J	270 J	380 J	130 J
BENZO(B)FLUORANTHENE	*UG/KG*	1000	1,900 J	2,400 J	420 J	680 J	180 J
BENZO(G,H,I)PERYLENE	*UG/KG*	100000	1,100 J	1,300 J	250 J	280 J	44 U
BENZO(K)FLUORANTHENE	*UG/KG*	800	780 J	1,100 J	180 J	2,600 U	110 J
CHRYSENE	*UG/KG*	1000	1,800 J	2,300 J	290 J	280 J	150 J
DIBENZ(A,H)ANTHRACENE	*UG/KG*	330	1,100 U	1,300 U	92 U	2,600 U	98 U
FLUORANTHENE	*UG/KG*	100000	3,200 J	3,500 J	330 J	460 J	150 J
FLUORENE	*UG/KG*	30000	6,900 U	7,900 U	33 U	2,600 U	35 U
INDENO(1,2,3-C,D)PYRENE	*UG/KG*	500	690 J	660 J	190 J	230 J	60 J
NAPHTHALENE	*UG/KG*	12000	6,900 U	7,900 U	23 U	2,600 U	24 U
PHENANTHRENE	*UG/KG*	100000	1,200 J	1,200 J	140 J	190 J	47 J
PYRENE	*UG/KG*	100000	3,200 J	3,700 J	330 J	550 J	170 J

Concentration Exceeds Criteria

(1) - 6 NYCRR Part 375, NYS Unrestricted Use Soil Cleanup Objectives for VOCs, Pesticides, PCBs, PAHs and Metals. USDOE Order 458.1 (June 2011) - Ra-226 and Ra-228 (sum total of 5 pCi/g),Thorium isotopes (sum total of 5 pCi/g) total dose not to exceed 25 mrem/yr for remaining radionuclides (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3, and U).

U - Not detected above the reported quantitation limit.; R - The data is rejected.; J - The reported concentration is an estimated value.

NOTE: The detection limits shown are MDL.

TABLE 11
SEDIMENT ANALYTICAL RESULTS - PAHs
NIAGARA FALLS STORAGE SITE

Location Identifier :			WDD2	WDD3	WDD3
Field Sample Identifier :			WDD2	WDD3	WDD3
Sample Type :			Sediment	Sediment	Sediment
Sample Depth Interval (ft) :			-	-	-
Date of Sample :			10/15/13	04/29/13	10/15/13
Parameter	**Units**	**Criteria[1]**			
SEMI-VOLATILE ORGANIC ANALYSES					
2-METHYLNAPHTHALENE	*UG/KG*	-	2,500 U	27 U	1,900 U
ACENAPHTHENE	*UG/KG*	20000	2,500 U	24 U	1,900 U
ACENAPHTHYLENE	*UG/KG*	100000	2,500 U	23 U	1,900 U
ANTHRACENE	*UG/KG*	100000	2,500 U	27 U	1,900 U
BENZO(A)ANTHRACENE	*UG/KG*	1000	2,500 U	56 J	1,900 U
BENZO(A)PYRENE	*UG/KG*	1000	2,500 U	67 J	1,900 U
BENZO(B)FLUORANTHENE	*UG/KG*	1000	230 J	110 J	1,900 U
BENZO(G,H,I)PERYLENE	*UG/KG*	100000	2,500 U	98 J	1,900 U
BENZO(K)FLUORANTHENE	*UG/KG*	800	2,500 U	57 U	1,900 U
CHRYSENE	*UG/KG*	1000	2,500 U	83 J	1,900 U
DIBENZ(A,H)ANTHRACENE	*UG/KG*	330	2,500 U	87 U	1,900 U
FLUORANTHENE	*UG/KG*	100000	2,500 U	93 J	1,900 U
FLUORENE	*UG/KG*	30000	2,500 U	31 U	1,900 U
INDENO(1,2,3-C,D)PYRENE	*UG/KG*	500	2,500 U	45 J	1,900 U
NAPHTHALENE	*UG/KG*	12000	2,500 U	21 U	1,900 U
PHENANTHRENE	*UG/KG*	100000	2,500 U	39 J	1,900 U
PYRENE	*UG/KG*	100000	180 J	94 J	1,900 U

Concentration Exceeds Criteria

(1) - 6 NYCRR Part 375, NYS Unrestricted Use Soil Cleanup Objectives for VOCs, Pesticides, PCBs, PAHs and Metals. USDOE Order 458.1 (June 2011) - Ra-226 and Ra-228 (sum total of 5 pCi/g),Thorium isotopes (sum total of 5 pCi/g) total dose not to exceed 25 mrem/yr for remaining radionuclides (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3, and U).

U - Not detected above the reported quantitation limit.; R - The data is rejected.; J - The reported concentration is an estimated value.

NOTE: The detection limits shown are MDL.

TABLE 12
2013 GROUNDWATER LEVEL MEASUREMENTS

Summary of Water Level Measurements
First Quarter 2013 (February 6, 2013)

Well No.	Reference Elevation (ft)	Depth to Water (ft)	Groundwater Elevation (ft)
A23A	321.90	12.00	309.90
A42	319.70	5.33	314.37
A43	320.50	6.05	314.45
A45	321.70	8.78	312.92
A50	321.30	9.28	312.02
A51	321.20	6.75	314.45
A52	321.10	6.19	314.91
A54	320.70	10.60	310.10
A55	320.60	10.30	310.30
A56	322.30	13.54	308.76
A57	321.40	13.90	307.50
BH5	321.32	12.39	308.93
BH12	320.85	9.87	310.98
BH15	320.16	9.32	310.84
BH48	322.04	10.85	311.19
BH49	320.23	11.72	308.51
BH49A	320.65	2.58	318.07
BH50	319.25	11.51	307.74
BH51	321.24	9.84	311.40
BH57	322.84	10.25	312.59
BH59	321.45	10.60	310.85
BH60	322.32	8.65	313.67
BH61	318.50	14.00	304.50
BH62	318.60	13.50	305.10
BH63	323.01	9.85	313.16
BH64	319.32	Well Cap Frozen	
BH70	321.29	11.03	310.26
B02W19D	319.90	7.32	312.58
B02W20D	322.00	8.68	313.32
B02W20S	322.00	3.20	318.80
OW01B	321.49	3.38	318.11
OW02A	321.50	12.60	308.90
OW02B	321.55	3.55	318.00
OW03A	321.67	12.20	309.47
OW03B	321.38	4.36	317.02
OW04A	320.52	11.26	309.26
OW04B	320.17	3.37	316.80
OW05A	319.59	10.25	309.34
OW05B	319.68	3.54	316.14
OW06A	322.34	11.66	310.68
OW06B	322.28	5.80	316.48

Summary of Water Level Measurements
Second Quarter 2013 (April 23, 2013)

Well No.	Reference Elevation (ft)	Depth to Water (ft)	Groundwater Elevation (ft)
A23A	321.90	10.45	311.45
A42	319.70	5.95	313.75
A43	320.50	5.95	314.55
A45	321.70	9.70	312.00
A50	321.30	10.30	311.00
A51	321.20	8.85	312.35
A52	321.10	6.70	314.40
A54	320.70	9.90	310.80
A55	320.60	10.00	310.60
A56	322.30	12.90	309.40
A57	321.40	12.55	308.85
BH5	321.32	10.16	311.16
BH12	320.85	8.21	312.64
BH15	320.16	7.25	312.91
BH48	322.04	7.27	314.77
BH49	320.23	9.85	310.38
BH49A	320.65	3.70	316.95
BH50	319.25	8.70	310.55
BH51	321.24	7.65	313.59
BH57	322.84	8.40	314.44
BH59	321.45	9.03	312.42
BH60	322.32	6.75	315.57
BH61	318.50	11.02	307.48
BH62	318.60	10.55	308.05
BH63	323.01	8.01	315.00
BH64	319.32	4.15	315.17
BH70	321.29	9.31	311.98
B02W19D	319.90	5.60	314.30
B02W20D	322.00	6.80	315.20
B02W20S	322.00	3.00	319.00
OW01B	321.49	3.63	317.86
OW02A	321.50	10.65	310.85
OW02B	321.55	3.95	317.60
OW03A	321.67	10.31	311.36
OW03B	321.38	4.70	316.68
OW04A	320.52	9.41	311.11
OW04B	320.17	4.35	315.82
OW05A	319.59	5.35	314.24
OW05B	319.68	4.10	315.58
OW06A	322.34	10.20	312.14
OW06B	322.28	6.35	315.93

Summary of Water Level Measurements
Third Quarter 2013 (August 13, 2013)

Well No.	Reference Elevation (ft)	Depth to Water (ft)	Groundwater Elevation (ft)
A23A	321.90	9.30	312.60
A42	319.70	6.41	313.29
A43	320.50	6.12	314.38
A45	321.70	10.64	311.06
A50	321.30	12.32	308.98
A51	321.20	11.49	309.71
A52	321.10	8.24	312.86
A54	320.70	7.81	312.89
A55	320.60	7.50	313.10
A56	322.30	10.85	311.45
A57	321.40	11.34	310.06
BH5	321.32	9.30	312.02
BH12	320.85	7.00	313.85
BH15	320.16	6.15	314.01
BH48	322.04	8.05	313.99
BH49	320.23	8.97	311.26
BH49A	320.65	4.41	316.24
BH50	319.25	8.65	310.60
BH51	321.24	6.65	314.59
BH57	322.84	7.25	315.59
BH59	321.45	7.95	313.50
BH60	322.32	5.75	316.57
BH61	318.50	10.80	307.70
BH62	318.60	9.60	309.00
BH63	323.01	7.05	315.96
BH64	319.32	6.65	312.67
BH70	321.29	8.40	312.89
B02W19D	319.90	4.45	315.45
B02W20D	322.00	5.75	316.25
B02W20S	322.00	4.20	317.80
OW01B	321.49	5.63	315.86
OW02A	321.50	6.97	314.53
OW02B	321.55	4.46	317.09
OW03A	321.67	9.46	312.21
OW03B	321.38	4.87	316.51
OW04A	320.52	8.38	312.14
OW04B	320.17	5.61	314.56
OW05A	319.59	7.49	312.10
OW05B	319.68	6.43	313.25
OW06A	322.34	9.91	312.43
OW06B	322.28	6.31	315.97

Summary of Water Level Measurements
Fourth Quarter 2013 (October 10, 2013)

Well No.	Reference Elevation (ft)	Depth to Water (ft)	Groundwater Elevation (ft)
A23A	321.90	9.81	312.09
A42	319.70	6.76	312.94
A43	320.50	7.11	313.39
A45	321.70	10.11	311.59
A50	321.30	10.33	310.97
A51	321.20	7.01	314.19
A52	321.10	8.18	312.92
A54	320.70	8.43	312.27
A55	320.60	8.12	312.48
A56	322.30	11.47	310.83
A57	321.40	11.78	309.62
BH5	321.32	10.30	311.02
BH12	320.85	7.59	313.26
BH15	320.16	6.95	313.21
BH48	322.04	8.35	313.69
BH49	320.23	9.81	310.42
BH49A	320.65	2.87	317.78
BH50	319.25	10.30	308.95
BH51	321.24	7.70	313.54
BH57	322.84	8.15	314.69
BH59	321.45	8.48	312.97
BH60	322.32	6.53	315.79
BH61	318.50	12.40	306.10
BH62	318.60	10.95	307.65
BH63	323.01	7.95	315.06
BH64	319.32	6.49	312.83
BH70	321.29	8.98	312.31
B02W19D	319.90	5.00	314.90
B02W20D	322.00	6.55	315.45
B02W20S	322.00	3.70	318.30
OW01B	321.49	6.13	315.36
OW02A	321.50	10.51	310.99
OW02B	321.55	4.98	316.57
OW03A	321.67	10.24	311.43
OW03B	321.38	4.83	316.55
OW04A	320.52	9.25	311.27
OW04B	320.17	4.81	315.36
OW05A	319.59	8.32	311.27
OW05B	319.68	6.64	313.04
OW06A	322.34	9.58	312.76
OW06B	322.28	5.99	316.29

TABLE 12
2013 GROUNDWATER LEVEL MEASUREMENTS

Summary of Water Level Measurements
First Quarter 2013 (February 6, 2013)

Well No.	Reference Elevation (ft)	Depth to Water (ft)	Groundwater Elevation (ft)
OW07A	319.77	9.02	310.75
OW07B	319.69	4.33	315.36
OW08A	318.91	8.95	309.96
OW08B	318.97	4.08	314.89
OW09A	318.66	8.10	310.56
OW09B	318.82	2.69	316.13
OW10A	320.01	9.10	310.91
OW10B	320.13	2.83	317.30
OW11A	319.05	7.70	311.35
OW11B	319.09	3.03	316.06
OW12A	320.42	9.25	311.17
OW12B	319.09	3.89	315.20
OW13A	321.54	10.94	310.60
OW13B	321.09	2.86	318.23
OW14A	320.52	11.90	308.62
OW14B	320.73	2.74	317.99
OW15A	320.30	12.32	307.98
OW15B	320.12	2.63	317.49
OW16A	320.63	11.60	309.03
OW16B	320.06	3.03	317.03
OW17A	320.31	10.50	309.81
OW17B	320.29	2.78	317.51
OW18A	321.09	10.38	310.71
OW18B	320.76	3.73	317.03

NEW WELLS - 2000

Well No.	Reference Elevation (ft)	Depth to Water (ft)	Groundwater Elevation (ft)
201A	321.47	4.10	317.37
203A	321.87	4.50	317.37
213A	321.37	6.60	314.77
215A	320.26	4.77	315.49
302A	320.53	4.77	315.76
303A	321.83	3.70	318.13
404A	323.73	8.40	315.33
411A	322.05	4.30	317.75
415A	321.27	3.75	317.52
505	317.80	19.90	297.90
603A**	320.57	2.24	318.33
606A	321.49	3.91	317.58
808A	319.27	3.41	315.86
810A	318.44	4.52	313.92
816A	320.62	2.30	318.32

**603 - Water in casing frozen.

Summary of Water Level Measurements
Second Quarter 2013 (April 23, 2013)

Well No.	Reference Elevation (ft)	Depth to Water (ft)	Groundwater Elevation (ft)
OW07A	319.77	7.50	312.27
OW07B	319.69	4.60	315.09
OW08A	318.91	7.20	311.71
OW08B	318.97	4.70	314.27
OW09A	318.66	6.50	312.16
OW09B	318.82	3.55	315.27
OW10A	320.01	7.65	312.36
OW10B	320.13	3.65	316.48
OW11A	319.05	6.35	312.70
OW11B	319.09	3.65	315.44
OW12A	320.42	7.80	312.62
OW12B	319.09	4.95	314.14
OW13A	321.54	9.30	312.24
OW13B	321.09	4.35	316.74
OW14A	320.52	9.95	310.57
OW14B	320.73	4.50	316.23
OW15A	320.30	10.35	309.95
OW15B	320.12	3.75	316.37
OW16A	320.63		
OW16B	320.06	4.50	315.56
OW17A	320.31	8.80	311.51
OW17B	320.29	3.15	317.14
OW18A	321.09	8.70	312.39
OW18B	320.76	4.25	316.51

NEW WELLS - 2000

Well No.	Reference Elevation (ft)	Depth to Water (ft)	Groundwater Elevation (ft)
201A	321.47	4.80	316.67
203A	321.87	4.60	317.27
213A	321.37	5.75	315.62
215A	320.26	4.19	316.07
302A	320.53	4.48	316.05
303A	321.83	3.70	318.13
404A	323.73	7.15	316.58
411A	322.05	4.25	317.80
415A	321.27	3.51	317.76
505	317.80	5.51	312.29
603A	320.57	2.20	318.37
606A	321.49	4.00	317.49
808A	319.27	2.35	316.92
810A	318.44	4.47	313.97
816A	320.62	2.64	317.98

Summary of Water Level Measurements
Third Quarter 2013 (August 13, 2013)

Well No.	Reference Elevation (ft)	Depth to Water (ft)	Groundwater Elevation (ft)
OW07A	319.77	6.30	313.47
OW07B	319.69	7.20	312.49
OW08A	318.91	6.21	312.70
OW08B	318.97	6.51	312.46
OW09A	318.66	5.44	313.22
OW09B	318.82	6.47	312.35
OW10A	320.01	6.65	313.36
OW10B	320.13	5.73	314.40
OW11A	319.05	5.98	313.07
OW11B	319.09	5.33	313.76
OW12A	320.42	6.64	313.78
OW12B	319.09	8.23	310.86
OW13A	321.54	8.15	313.39
OW13B	321.09	5.75	315.34
OW14A	320.52	8.85	311.67
OW14B	320.73	5.85	314.88
OW15A	320.30	9.20	311.10
OW15B	320.12	6.10	314.02
OW16A	320.63	8.60	312.03
OW16B	320.06	5.15	314.91
OW17A	320.31	5.45	314.86
OW17B	320.29	4.75	315.54
OW18A	321.09	7.50	313.59
OW18B	320.76	5.30	315.46

NEW WELLS - 2000

Well No.	Reference Elevation (ft)	Depth to Water (ft)	Groundwater Elevation (ft)
201A	321.47	4.80	316.67
203A	321.87	4.50	317.37
213A	321.37	7.55	313.82
215A	320.26	12.60	307.66
302A	320.53	5.55	314.98
303A	321.83	6.25	315.58
404A	323.73	9.30	314.43
411A	322.05	6.60	315.45
415A	321.27	7.40	313.87
505	317.80	11.95	305.85
603A	320.57	3.20	317.37
606A	321.49	6.15	315.34
808A	319.27	6.20	313.07
810A	318.44	11.65	306.79
816A	320.62	2.25	318.37

Summary of Water Level Measurements
Fourth Quarter 2013 (October 10, 2013)

Well No.	Reference Elevation (ft)	Depth to Water (ft)	Groundwater Elevation (ft)
OW07A	319.77	6.98	312.79
OW07B	319.69	8.44	311.25
OW08A	318.91	8.93	309.98
OW08B	318.97	6.59	312.38
OW09A	318.66	6.05	312.61
OW09B	318.82	8.65	310.17
OW10A	320.01	7.25	312.76
OW10B	320.13	6.45	313.68
OW11A	319.05	5.69	313.36
OW11B	319.09	5.58	313.51
OW12A	320.42	7.16	313.26
OW12B	319.09	9.45	309.64
OW13A	321.54	8.89	312.65
OW13B	321.09	6.77	314.32
OW14A	320.52	9.71	310.81
OW14B	320.73	4.28	316.45
OW15A	320.30	10.07	310.23
OW15B	320.12	5.02	315.10
OW16A	320.63	9.39	311.24
OW16B	320.06	4.11	315.95
OW17A	320.31	8.33	311.98
OW17B	320.29	4.38	315.91
OW18A	321.09	8.21	312.88
OW18B	320.76	4.39	316.37

NEW WELLS - 2000

Well No.	Reference Elevation (ft)	Depth to Water (ft)	Groundwater Elevation (ft)
201A	321.47	4.40	317.07
203A	321.87	4.50	317.37
213A	321.37	9.95	311.42
215A	320.26	12.65	307.61
302A	320.53	5.55	314.98
303A	321.83	5.55	316.28
404A	323.73	9.65	314.08
411A	322.05	5.50	316.55
415A	321.27	9.25	312.02
505	317.80	16.00	301.80
603A	320.57	2.75	317.82
606A	321.49	6.90	314.59
808A	319.27	10.50	308.77
810A	318.44	15.70	302.74
816A	320.62	2.10	318.52

TABLE 12
2013 GROUNDWATER LEVEL MEASUREMENTS

Summary of Water Level Measurements
First Quarter 2013 (February 6, 2013)

NEW WELLS - 2003			
Well No.	Reference Elevation (ft)	Depth to Water (ft)	Groundwater Elevation (ft)
MW228	320.85	5.72	315.13
MW229	320.61	9.31	311.30
MW313	320.88	4.82	316.06
MW314*	318.94	22.10	296.84
MW422*	321.36	22.25	299.11
MW423	322.39	5.61	316.78
MW424	320.93	3.10	317.83
MW860	320.06	5.72	314.34
MW861	319.92	10.88	309.04
MW862	319.62	4.41	315.21
MW863	319.61	9.21	310.40

NEW WELLS - 2009			
Well No.	Reference Elevation (ft)	Depth to Water (ft)	Groundwater Elevation (ft)
MW921	319.88	16.41	303.47
MW922	318.56	5.71	312.85
MW923	319.53	8.05	311.48
MW930	323.16	5.10	318.06
MW934	322.20	4.20	318.00
MW935	319.33	4.39	314.94
MW936	320.64	2.70	317.94
MW938	319.54	4.10	315.44
MW941	318.98	3.21	315.77
MW943	321.60	3.15	318.45

NEW WELLS - 2012			
Well No.	Reference Elevation (ft)	Depth to Water (ft)	Groundwater Elevation (ft)
MW944	318.64	6.00	312.64
MW945	320.24	5.50	314.74
MW946	319.65	5.40	314.25
MW947*	322.53	21.39	322.53
MW948	321.04	5.73	315.31
MW949	320.96	11.02	309.94
MW950	322.03	4.40	317.63
MW951	320.84	4.85	315.99
MW952	320.16	4.25	315.91
MW953	319.94	5.36	314.58
MW954	319.85	4.72	315.13
MW955	320.09	4.36	315.73
MW956	323.13	8.20	314.93
MW957	324.48	8.03	316.45
MW958	319.77	5.83	313.94
MW959	320.56	4.81	315.75
MW960	321.02	4.10	316.92

*MW422 - Dry bottom of well recorded.
*MW314 - Dry bottom of well recorded.
*MW947 - Dry bottom of well recorded.

Summary of Water Level Measurements
Second Quarter 2013 (April 23, 2013)

NEW WELLS - 2003			
Well No.	Reference Elevation (ft)	Depth to Water (ft)	Groundwater Elevation (ft)
MW228	320.85	4.90	315.95
MW229	320.61	7.80	312.81
MW313	320.88	3.95	316.93
MW314	318.94	6.00	312.94
MW422*	321.36	22.25	299.11
MW423	322.39	4.56	317.83
MW424	320.93	3.30	317.63
MW860	320.06	7.85	312.21
MW861	319.92	10.20	309.72
MW862	319.62	6.50	313.12
MW863	319.61	7.75	311.86

NEW WELLS - 2009			
Well No.	Reference Elevation (ft)	Depth to Water (ft)	Groundwater Elevation (ft)
MW921	319.88	5.60	314.28
MW922	318.56	3.61	314.95
MW923	319.53	4.28	315.25
MW930	323.16	4.80	318.36
MW934	322.20	3.70	318.50
MW935	319.33	5.20	314.13
MW936	320.64	3.50	317.14
MW938	319.54	5.60	313.94
MW941	318.98	3.50	315.48
MW943	321.60	4.30	317.30

NEW WELLS - 2012			
Well No.	Reference Elevation (ft)	Depth to Water (ft)	Groundwater Elevation (ft)
MW944	318.64	4.63	314.01
MW945	320.24	5.47	314.77
MW946	319.65	2.74	316.91
MW947*	322.53	21.39	322.53
MW948	321.04	3.10	317.94
MW949	320.96	8.63	312.33
MW950	322.03	4.90	317.13
MW951	320.84	6.90	313.94
MW952	320.16	4.80	315.36
MW953	319.94	5.65	314.29
MW954	319.85	4.50	315.35
MW955	320.09	5.95	314.14
MW956	323.13	7.65	315.48
MW957	324.48	8.20	316.28
MW958	319.77	4.90	314.87
MW959	320.56	5.15	315.41
MW960	321.02	6.40	314.62

*MW422 - Dry bottom of well recorded.
*MW947 - Dry bottom of well recorded.

Summary of Water Level Measurements
Third Quarter 2013 (August 13, 2013)

NEW WELLS - 2003			
Well No.	Reference Elevation (ft)	Depth to Water (ft)	Groundwater Elevation (ft)
MW228	320.85	6.50	314.35
MW229	320.61	5.35	315.26
MW313	320.88	6.6	314.28
MW314	318.94	14.15	304.79
MW422	321.36	18.30	303.06
MW423	322.39	9.90	312.49
MW424	320.93	7.10	313.83
MW860	320.06	9.24	310.82
MW861	319.92	8.07	311.85
MW862	319.62	6.91	312.71
MW863	319.61	6.71	312.90

NEW WELLS - 2009			
Well No.	Reference Elevation (ft)	Depth to Water (ft)	Groundwater Elevation (ft)
MW921	319.88	9.05	310.83
MW922	318.56	6.75	311.81
MW923	319.53	7.2	312.33
MW930	323.16	9.95	313.21
MW934	322.20	9.25	312.95
MW935	319.33	6.15	313.18
MW936	320.64	5.05	315.59
MW938	319.54	7.1	312.44
MW941	318.98	4.7	314.28
MW943	321.60	4.98	316.62

NEW WELLS - 2012			
Well No.	Reference Elevation (ft)	Depth to Water (ft)	Groundwater Elevation (ft)
MW944	318.64	8.00	310.64
MW945	320.24	12.00	308.24
MW946	319.65	7.00	312.65
MW947	322.53	18.90	322.53
MW948	321.04	7.00	314.04
MW949	320.96	8.50	312.46
MW950	322.03	6.05	315.98
MW951	320.84	7.01	313.83
MW952	320.16	6.16	314.00
MW953	319.94	7.53	312.41
MW954	319.85	6.91	312.94
MW955	320.09	6.67	313.42
MW956	323.13	8.13	315.00
MW957	324.48	9.75	314.73
MW958	319.77	8.25	311.52
MW959	320.56	7.34	313.22
MW960	321.02	6.46	314.56

Summary of Water Level Measurements
Fourth Quarter 2013 (October 10, 2013)

NEW WELLS - 2003			
Well No.	Reference Elevation (ft)	Depth to Water (ft)	Groundwater Elevation (ft)
MW228	320.85	6.15	314.70
MW229	320.61	7	313.61
MW313	320.88	9.6	311.28
MW314	318.94	11.85	307.09
MW422*	321.36	22.25	299.11
MW423	322.39	6.02	316.37
MW424	320.93	6.50	314.43
MW860	320.06	5.70	314.36
MW861	319.92	8.81	311.11
MW862	319.62	4.74	314.88
MW863	319.61	7.16	312.45

NEW WELLS - 2009			
Well No.	Reference Elevation (ft)	Depth to Water (ft)	Groundwater Elevation (ft)
MW921	319.88	15.15	304.73
MW922	318.56	7.30	311.26
MW923	319.53	18.00	301.53
MW930	323.16	10.10	313.06
MW934	322.20	12.35	309.85
MW935	319.33	4.60	314.73
MW936	320.64	4.24	316.40
MW938	319.54	6.45	313.09
MW941	318.98	4.40	314.58
MW943	321.60	4.72	316.88

NEW WELLS - 2012			
Well No.	Reference Elevation (ft)	Depth to Water (ft)	Groundwater Elevation (ft)
MW944	318.64	11.00	307.64
MW945	320.24	16.18	304.06
MW946	319.65	12.50	307.15
MW947	322.53	21.10	322.53
MW948	321.04	9.70	311.34
MW949	320.96	9.40	311.56
MW950	322.03	6.26	315.77
MW951	320.84	6.35	314.49
MW952	320.16	6.41	313.75
MW953	319.94	7.06	312.88
MW954	319.85	7.71	312.14
MW955	320.09	6.84	313.25
MW956	323.13	8.81	314.32
MW957	324.48	10.60	313.88
MW958	319.77	8.21	311.56
MW959	320.56	7.73	312.83
MW960	321.02	5.89	315.13

*MW422 - Dry bottom of well recorded.

Table 13
2013 Groundwater Field Parameter Measurements
Niagara Falls Storage Site

GROUNDWATER

Well ID	Date	pH	Temperature (°F[a])	Spec. Cond.[b] (mS/cm[c])	DO[d] (mg/L[e])	Turbidity (NTU[h])	ORP[f] (mV[g])	Volume Purged (Liters[i])	Discharge milliter PM[j]
Quaterly Sampling									
OW04A	2/7/2013	7.51	56.5	0.84	4.70	0.0	206.0	1500.0	150
OW04B	2/7/2013	7.46	49.9	1.21	6.71	0.0	222.0	1500.0	150
Biannual Sampling									
505	4/25/2013	6.82	48.2	6.03	0.54	0.0	-106.0	3510.0	100
302A	4/25/2013	7.05	56.8	7.36	1.40	5.2	133.0	2850.0	90
411A	4/25/2013	7.11	54.3	3.00	1.07	0.0	-65.0	3350.0	90
A42	4/23/2013	6.87	54.4	1.35	0.80	0.0	147.0	6000.0	200
A43	4/25/2013	7.05	52.9	2.17	1.89	0.0	140.0	5850.0	220
A45	4/23/2013	7.26	52.0	2.08	1.40	0.0	14.0	7075.0	215
A50	4/23/2013	7.03	55.0	1.78	1.86	0.0	104.0	2850.0	100
A55	4/23/2013	12.64	57.1	5.92	0.88	41.0	-258.0	7050.0	160
BH49	4/29/2013	8.70	56.5	1.90	5.72	8.1	-179.0	2115.0	105
BH49A	4/29/2013	7.59	53.8	1.64	0.91	0.0	-31.0	2595.0	115
MW862	4/26/2013	7.14	51.9	1.98	1.35	0.0	199.0	4710.0	140
MW863	4/26/2013	8.05	53.7	2.05	1.66	0.0	91.0	4725.0	175
MW921	4/24/2013	6.74	57.9	4.38	2.15	0.0	209.0	2400.0	100
MW934[3]	4/25/2013	5.82	49.4	1.62	2.50	9.3	234.0	3750.0	115
MW935	4/23/2013	7.09	52.0	2.52	5.08	16.9	2.0	2750.0	90
MW938	4/25/2013	7.20	56.0	3.68	1.01	17.1	33.0	3150.0	100
MW944	4/24/2013	6.82	54.8	0.42	2.09	0.0	198.0	3270.0	100
MW945	4/24/2013	6.82	55.1	0.55	0.87	27.2	-80.0	4320.0	100
MW946	4/24/2013	7.29	50.8	5.87	7.30	1.1	-11.0	5125.0	115
MW948	4/24/2013	6.99	54.2	3.96	7.35	0.0	131.0	5050.0	140
MW949	4/24/2013	8.69	53.9	2.98	7.16	0.0	-88.0	5650.0	175
MW950	4/29/2013	7.17	52.8	3.36	0.95	0.0	191.0	4305.0	150
MW951	4/29/2013	7.07	52.2	2.06	0.74	0.0	-126.0	5535.0	220
MW952	4/24/2013	7.12	53.1	1.96	5.56	20.0	230.0	2640.0	95
MW953	4/25/2013	6.97	52.2	1.40	2.61	0.0	191.0	3000.0	100
MW954	4/25/2013	6.99	48.0	2.69	4.37	0.0	192.0	3150.0	100
MW955	4/25/2013	7.34	54.3	1.66	2.61	0.0	189.0	3000.0	100
MW956	4/29/2013	7.08	54.5	2.27	2.27	17.5	156.0	3000.0	100
MW957	4/25/2013	7.02	52.7	2.47	8.33	2.6	68.0	3195.0	105
MW958	4/29/2013	7.23	52.4	1.22	5.11	0.0	137.0	3000.0	100
MW959	4/29/2013	7.13	53.0	2.16	1.68	1.9	155.0	3000.0	100
MW960	4/29/2013	7.04	54.8	1.68	0.88	0.0	-76.0	4530.0	150
OW03A	4/25/2013	7.35	54.9	2.04	0.90	0.0	-111.0	3350.0	110
OW03B	4/25/2013	7.66	47.9	2.08	1.84	0.0	197.0	3350.0	110
OW04A	4/24/2014	8.47	56.1	1.22	3.74	0.0	140.0	4830.0	145
OW04B	4/24/2013	6.88	51.1	1.96	0.53	15.7	201.0	8865.0	260
OW05A	4/29/2013	7.39	56.5	1.37	0.57	25.9	7.0	2685.0	100
OW05B	4/29/2013	7.00	56.0	1.53	1.10	21.3	125.0	2280.0	80
OW06A	4/26/2013	7.69	51.2	1.97	0.93	1.9	-140.0	3150.0	100
OW06B	4/26/2013	7.24	48.0	1.86	1.06	0.0	203.0	3450.0	100
OW07A	4/26/2013	7.89	55.0	2.05	2.46	0.0	-7.0	4515.0	185
OW07B	4/29/2013	7.04	56.3	1.91	3.74	8.8	136.0	3000.0	90
OW11A	4/24/2013	7.78	52.7	0.43	1.30	7.1	-15.0	3060.0	100
OW11B	4/24/2013	7.63	52.8	1.50	2.03	0.0	185.0	2700.0	120
OW12A	4/26/2013	7.32	52.8	1.80	0.61	0.0	58.0	3775.0	135
OW12B	4/26/2013	7.24	47.4	0.93	0.90	0	132.0	3100.0	120
OW13A	4/26/2013	7.54	55.7	1.92	1.00	0.0	-113.0	4950.0	200
OW13B	4/29/2013	7.47	52.0	2.67	0.82	0.0	-3.0	4275.0	125
OW15A	4/29/2013	6.88	54.4	2.02	0.63	12.1	-100.0	2700.0	100
OW15B	4/26/2013	7.46	55.1	0.83	1.38	0.0	1.7	3090.0	120
OW17A	4/26/2013	7.32	52.0	2.67	0.48	0.0	26.0	3000.0	100
OW17B	4/26/2013	7.81	52.6	1.44	0.41	0.0	85.0	2520.0	110
OW18B	4/26/2013	7.82	54.7	2.01	0.87	0.0	92.0	3790.0	130
Quaterly Sampling									
OW04A	8/13/2013	7.77	62.0	1.25	1.54	3.8	64.0	3000.0	200
OW04B	8/13/2013	7.06	60.0	1.82	0.66	0.0	80.0	3000.0	200
Well ID	Date	pH	Temperature (°F[a])	Spec. Cond.[b] (mS/cm[c])	DO[d] (mg/L[e])	Turbidity (NTU[h])	ORP[f] (mV[g])	Volume Purged (Liters[i])	Discharge milliter PM[j]

Table 13
2013 Groundwater Field Parameter Measurements
Niagara Falls Storage Site

Well ID	Date	pH	Temperature (°F[a])	Spec. Cond.[b] (mS/cm[c])	DO[d] (mg/L[e])	Turbidity (NTU[h])	ORP[f] (mV[g])	Volume Purged (Liters[i])	Discharge milliter PM[j]
Biannual Sampling									
505	10/17/13	6.67	58.0	6.53	1.06	0.0	-92.0	3690.0	120
302A	10/16/2013	6.91	63.2	77.60	0.81	0.0	55.0	3960.0	120
411A	10/16/2013	6.97	61.6	3.20	0.45	0.0	-100.0	3050.0	100.0
808A	10/18/13	6.92	60.1	5.67	0.60	9.3	-25.0	3735.0	125
A42	10/16/13	6.90	62.1	1.36	0.45	0.0	61.0	1070.0	125
A43	10/16/13	6.80	63.7	2.07	0.45	0.0	-52.0	1770.0	125
A45	10/15/2013	7.46	59.0	2.10	0.69	11.5	-115.0	4560.0	140
A50	10/15/2013	7.73	66.7	1.70	1.16	0.0	-36.0	2670.0	100
BH49	10/17/13	8.64	59.3	1.23	1.41	1.3	-276.0	3000.0	100
BH49A	10/17/13	7.25	62.6	1.92	2.03	3.5	-225.0	2100.0	100
MW423	10/18/2013	7.14	57.5	1.54	0.82	14.5	-283.0	4680.0	140
MW862	10/15/2013	7.43	63.9	1.93	0.81	0.0	-171.0	2370.0	95
MW863	10/15/2013	8.25	57.9	2.03	1.19	0.0	-241.0	3000.0	100
MW921	10/17/2013	6.86	62.5	4.85	0.83	0.0	45.0	2400.0	80
MW934[3]	10/16/2013	6.97	62.8	3.59	0.53	0.0	24.0	3000.0	100
MW935	10/15/2013	7.12	60.7	2.97	0.62	5.3	-73.0	3690.0	120
MW938	10/16/2013	6.91	61.7	3.94	0.48	0.0	-111.0	2238.0	100
MW944	10/18/2013	6.98	55.2	1.41	5.20	0.1	-4.0	3180.0	100
MW945	10/18/2013	6.78	55.4	3.09	1.65	2.0	-30.0	2760.0	190
MW946	10/17/2013	6.97	60.6	6.65	0.71	0.0	-49.0	2160.0	80
MW948	10/16/2013	7.04	62.7	4.27	0.50	0.0	20.0	3000.0	100
MW949	10/17/2013	8.60	57.3	3.03	0.99	0.0	-155.0	2400.0	80
MW950	10/18/2013	7.09	61.8	3.28	0.96	0.0	4.0	3500.0	100
MW951	10/18/2013	7.47	57.4	2.04	0.68	2.1	-52.0	5625.0	200
MW952	10/17/2013	6.94	64.2	2.24	1.59	8.9	276.0	4825.0	110
MW953	10/17/2013	6.90	66.9	2.01	1.76	1.7	256.0	4525.0	130
MW954	10/17/2013	7.04	66.2	2.41	0.84	1.4	-58.0	4575.0	135
MW955	10/17/2013	7.90	64.0	1.67	2.02	1.7	-77.0	3850.0	110
MW956	10/18/2013	7.62	59.9	2.17	0.72	1.5	-87.0	2760.0	80
MW957	10/18/2013	6.83	60.3	2.48	0.41	3.5	-84.0	3000.0	100
MW958	10/18/2013	6.77	60.1	1.39	2.42	2.3	12.0	2850.0	80
MW959	10/18/2013	7.70	60.2	1.94	0.82	0.0	-65.0	2500.0	80
MW960	10/15/2013	6.95	69.5	1.62	0.97	0.0	-98.0	4050.0	120
OW03A	10/15/13	7.10	59.6	2.10	0.65	0.0	-109.0	3300.0	100
OW03B	10/15/13	6.97	59.8	1.93	0.94	3.3	-108.0	3840.0	100
OW04A	10/15/2013	8.02	60.8	1.34	1.54	0.0	-77.0	3425.0	90
OW04B	10/15/2013	7.17	60.6	1.88	0.66	0.0	61.0	7275.0	150
OW05A	10/17/13	7.79	59.5	1.52	2.15	15.0	-152.0	2700.0	100
OW05B	10/17/13	7.15	64.4	1.76	1.09	10.5	-164.0	2400.0	100
OW06A	10/18/13	7.28	55.2	1.87	0.50	0.0	-161.0	2400.0	100
OW06B	10/18/13	6.96	59.2	1.82	0.37	15.6	-158.0	2400.0	100
OW07A	10/18/13	7.39	57.7	2.16	1.40	7.3	-94.0	2955.0	100
OW07B	10/18/13	6.87	59.8	2.03	1.17	1.6	122.0	1735.0	100
OW11A	10/17/13	8.26	61.2	1.52	1.52	11.3	-158.0	3500.0	100
OW11B	10/17/13	7.88	60.4	1.55	1.55	6.4	-114.0	3500.0	100
OW12A	10/18/13	7.53	61.3	1.68	0.99	3.7	-101.0	1100.0	100
OW12B	10/18/13	7.23	61.5	0.97	1.41	3	0.0	5790.0	100
OW13A	10/17/13	7.58	62.9	1.93	0.43	0.0	-115.0	3375.0	150
OW13B	10/17/13	7.15	62.1	2.65	0.50	0.0	-56.0	2640.0	100
OW15A	10/17/13	7.76	57.8	2.29	0.57	0.0	-103.0	2100.0	100
OW15B	10/17/13	7.30	62.7	1.10	0.53	0.0	1.0	2070.0	100
OW17A	10/16/13	7.89	61.7	2.56	1.00	0.0	-104.0	3600.0	100
OW17B	10/16/13	7.42	63.6	1.41	0.82	0.0	143.0	3660.0	100
OW18B	10/17/13	7.29	64.0	1.93	0.48	0.0	5.0	4950.0	100
Well ID	Date	pH	Temperature (°F[a])	Spec. Cond.[b] (mS/cm[c])	DO[d] (mg/L[e])	Turbidity (NTU[h])	ORP[f] (mV[g])	Volume Purged (Liters[i])	Discharge milliter PM[j]

a. °F - Degrees Fahrenheit.
b. Spec. Cond. - Specific conductance.
c. uS/cm - microSiemens/centimeter.
d. DO - Dissolved oxygen.
e. mg/L - milligrams per liter.
f. ORP - Oxidation-Reduction potential.
g. mV - milliVolts.
h. NTU - Nephelometric turbidity units.
i. 1-Liter = 0.26 gallons
j. Milliter PM = milliter per minute (1000ml = 1.0 liter) -averaged rate

NA - Not Applicable
* - parameters not taken/meter malfunction
**-Grab sample due to low recharge and/or purged dry
[1] Well contained little or no water.
[2] MW922 was sampled as a substitute
[3] Grab sample (minimum or no purging)
[4] Insuffcient well volume, no sample taken.
[5] NYSDOH requested sampling location.
[6] Location was dry.
[7] Water quality meter probe parameter may have been affected by cold.
[8] Two samples taken on different dates -sample date is last sample obtained by auto sampler.

TABLE 14
GROUNDWATER ANALYTICAL RESULTS - WATER QUALITY PARAMETERS
NIAGARA FALLS STORAGE SITE

Location Identifier :			302A	302A	411A	411A	505
Field Sample Identifier :			302A	302A	411A	411A	505
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			04/25/13	10/16/13	04/25/13	10/16/13	04/25/13
Parameter	**Units**	**Criteria[1]**					
MISCELLANEOUS							
ALKALINITY, BICARBONATE (As CaCO3)	*MG/L*	-	550	560	0 U	800	890
ALKALINITY, CARBONATE (As CaCO3)	*MG/L*	-	0 U	20 U	0 U	20 U	0 U
ALKALINITY, HYDROXIDE (AS CACO3)	*MG/L*	-	0 U	20 U	0 U	20 U	0 U
ALKALINITY, TOTAL	*MG/L*	500	550	560	790	800	890
BROMIDE	*MG/L*	2	1.8	1.7	0.45 J	0.3 J	3.3
CHLORIDE (AS CL)	*MG/L*	250	440	450	26	22	220
DISSOLVED SOLIDS, TOTAL	*MG/L*	-	8,900	8,600	3,400	2,000	5,700
FLUORIDE	*MG/L*	1.5	0.19 J	0.52 J	0.43 J	0.68 J	0.68 J
NITROGEN, NITRATE (AS N)	*MG/L*	10	0.17 U	0.08 U	0.44 J	0.08 U	0.17 U
NITROGEN, NITRITE (AS N)	*MG/L*	1	0.15 U	0.1 U	0.15 U	0.1 U	0.15 U
PHOSPHORUS, TOTAL ORTHOPHOSPHATE (AS PO4)	*MG/L*	-	0.12 U	0.17 U	0.12 U	0.17 U	0.12 U
SULFATE	*MG/L*	250	4,900	4,900	960	840	3,100

Concentration Exceeds Criteria

(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

U - Not detected above the reported quantitation limit.; R - The data is rejected.; J - The reported concentration is an estimated value.

NOTE: The detection limits shown are MDL.

TABLE 14
GROUNDWATER ANALYTICAL RESULTS - WATER QUALITY PARAMETERS
NIAGARA FALLS STORAGE SITE

Location Identifier :			505	808A	A42	A42	A43
Field Sample Identifier :			505	808A	A42	A42	A43
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			10/17/13	10/18/13	04/23/13	10/16/13	04/25/13
Parameter	**Units**	**Criteria[1]**					
MISCELLANEOUS							
ALKALINITY, BICARBONATE (As CaCO3)	*MG/L*	-	980	620	0 U	440	590
ALKALINITY, CARBONATE (As CaCO3)	*MG/L*	-	20 U	20 U	0 U	20 U	0 U
ALKALINITY, HYDROXIDE (AS CACO3)	*MG/L*	-	20 U	20 U	0 U	20 U	0 U
ALKALINITY, TOTAL	*MG/L*	500	980	620	430	440	590
BROMIDE	*MG/L*	2	3.3	2.8	0.58 J	0.33 J	0.86
CHLORIDE (AS CL)	*MG/L*	250	250	250	20	26	27
DISSOLVED SOLIDS, TOTAL	*MG/L*	-	6,500	5,200	980	970	1,800
FLUORIDE	*MG/L*	1.5	0.53 J	0.64 J	0.38 J	0.21 U	0.36 J
NITROGEN, NITRATE (AS N)	*MG/L*	10	0.08 U	0.08 U	0.36 J	0.08 U	0.37 J
NITROGEN, NITRITE (AS N)	*MG/L*	1	0.39 J	0.1 U	0.15 U	0.1 U	0.15 U
PHOSPHORUS, TOTAL ORTHOPHOSPHATE (AS PO4)	*MG/L*	-	0.17 U	0.17 U	0.12 U	0.17 U	0.12 U
SULFATE	*MG/L*	250	3,400	2,800	290	330	690

Concentration Exceeds Criteria

(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

U - Not detected above the reported quantitation limit.; R - The data is rejected.; J - The reported concentration is an estimated value.

NOTE: The detection limits shown are MDL.

TABLE 14
GROUNDWATER ANALYTICAL RESULTS - WATER QUALITY PARAMETERS
NIAGARA FALLS STORAGE SITE

Location Identifier :			A43	A45	A45	A50	A50
Field Sample Identifier :			A43	A45	A45	A50	A50
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			10/16/13	04/23/13	10/15/13	04/23/13	10/15/13
Parameter	**Units**	**Criteria[1]**					
MISCELLANEOUS							
ALKALINITY, BICARBONATE (As CaCO3)	*MG/L*	-	600	0 U	480	0 U	450
ALKALINITY, CARBONATE (As CaCO3)	*MG/L*	-	20 U	0 U	20 U	0 U	20 U
ALKALINITY, HYDROXIDE (AS CACO3)	*MG/L*	-	20 U	0 U	20 U	0 U	20 U
ALKALINITY, TOTAL	*MG/L*	500	600	470	480	450	450
BROMIDE	*MG/L*	2	0.65	0.43 J	0.33 J	0.62 J	0.38 J
CHLORIDE (AS CL)	*MG/L*	250	26	66	62	22	20
DISSOLVED SOLIDS, TOTAL	*MG/L*	-	1,700	1,900	1,700	1,400	1,300
FLUORIDE	*MG/L*	1.5	0.47 J	0.31 J	0.3 J	0.42 J	0.36 J
NITROGEN, NITRATE (AS N)	*MG/L*	10	0.08 U	0.38 J	0.08 U	0.42 J	0.08 U
NITROGEN, NITRITE (AS N)	*MG/L*	1	0.1 U	0.15 U	0.1 U	0.15 U	0.1 U
PHOSPHORUS, TOTAL ORTHOPHOSPHATE (AS PO4)	*MG/L*	-	0.17 U	0.12 U	0.17 U	0.12 U	0.17 U
SULFATE	*MG/L*	250	680	720	740	560	600

Concentration Exceeds Criteria

(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

U - Not detected above the reported quantitation limit.; R - The data is rejected.; J - The reported concentration is an estimated value.

NOTE: The detection limits shown are MDL.

TABLE 14
GROUNDWATER ANALYTICAL RESULTS - WATER QUALITY PARAMETERS
NIAGARA FALLS STORAGE SITE

Location Identifier :			A55	A55	BH49	BH49	BH49A
Field Sample Identifier :			A55	A55	BH49	BH49	BH49A
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			04/23/13	10/15/13	04/29/13	10/17/13	04/29/13
Parameter	**Units**	**Criteria[1]**					
MISCELLANEOUS							
ALKALINITY, BICARBONATE (As CaCO3)	*MG/L*	-	0 U	20 U	0 U	48	0 U
ALKALINITY, CARBONATE (As CaCO3)	*MG/L*	-	85	27	0 U	30	0 U
ALKALINITY, HYDROXIDE (AS CACO3)	*MG/L*	-	470	20	0 U	20 U	0 U
ALKALINITY, TOTAL	*MG/L*	500	560	47	140	78	400
BROMIDE	*MG/L*	2	0.82	0.57	0.41 J	0.27 J	0.32 J
CHLORIDE (AS CL)	*MG/L*	250	69 J	64	34	29	41
DISSOLVED SOLIDS, TOTAL	*MG/L*	-	2,700	2,400	970	680	1,300
FLUORIDE	*MG/L*	1.5	0.16 U	0.37 J	0.22 J	0.26 J	0.5 J
NITROGEN, NITRATE (AS N)	*MG/L*	10	0.41 J	0.08 U	0.17 U	0.08 U	0.17 U
NITROGEN, NITRITE (AS N)	*MG/L*	1	0.15 U	0.34 J	0.15 U	0.1 U	0.15 U
PHOSPHORUS, TOTAL ORTHOPHOSPHATE (AS PO4)	*MG/L*	-	1,500 J	0.17 U	0.12 U	0.17 U	0.12 U
SULFATE	*MG/L*	250	1,200	1,500	460	370	530

Concentration Exceeds Criteria

(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

U - Not detected above the reported quantitation limit.; R - The data is rejected.; J - The reported concentration is an estimated value.

NOTE: The detection limits shown are MDL.

TABLE 14
GROUNDWATER ANALYTICAL RESULTS - WATER QUALITY PARAMETERS
NIAGARA FALLS STORAGE SITE

Location Identifier :			BH49A	MW423	MW862	MW862	MW863
Field Sample Identifier :			BH49A	MW423	MW862	MW862	MW863
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			10/17/13	10/18/13	04/26/13	10/15/13	04/26/13
Parameter	**Units**	**Criteria[1]**					
MISCELLANEOUS							
ALKALINITY, BICARBONATE (As CaCO3)	*MG/L*	-	410	680	580	600	230
ALKALINITY, CARBONATE (As CaCO3)	*MG/L*	-	20 U	20 U	0 U	20 U	0 U
ALKALINITY, HYDROXIDE (AS CACO3)	*MG/L*	-	20 U	20 U	0 U	20 U	0 U
ALKALINITY, TOTAL	*MG/L*	500	410	680	580	600	230
BROMIDE	*MG/L*	2	0.26 J	0.06 U	0.68 J	0.43 J	0.66 J
CHLORIDE (AS CL)	*MG/L*	250	47	9.2	84	98	30
DISSOLVED SOLIDS, TOTAL	*MG/L*	-	1,300	940	1,700	1,400	1,700
FLUORIDE	*MG/L*	1.5	0.41 J	0.43 J	0.29 J	0.44 J	0.32 J
NITROGEN, NITRATE (AS N)	*MG/L*	10	0.08 U	0.08 U	0.17 U	0.08 U	0.4 J
NITROGEN, NITRITE (AS N)	*MG/L*	1	0.1 U	0.1 U	0.15 U	0.1 U	0.15 U
PHOSPHORUS, TOTAL ORTHOPHOSPHATE (AS PO4)	*MG/L*	-	0.17 U	0.17 U	0.12 U	0.17 U	0.12 U
SULFATE	*MG/L*	250	550	200	460	430	900

Concentration Exceeds Criteria

(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

U - Not detected above the reported quantitation limit.; R - The data is rejected.; J - The reported concentration is an estimated value.

NOTE: The detection limits shown are MDL.

TABLE 14
GROUNDWATER ANALYTICAL RESULTS - WATER QUALITY PARAMETERS
NIAGARA FALLS STORAGE SITE

Location Identifier :			MW863	MW921	MW921	MW934	MW934
Field Sample Identifier :			MW863	MW921	MW921	MW934	MW934
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			10/15/13	04/24/13	10/17/13	04/25/13	10/16/13
Parameter	**Units**	**Criteria[1]**					
MISCELLANEOUS							
ALKALINITY, BICARBONATE (As CaCO3)	*MG/L*	-	250	0 U	810	0 U	740
ALKALINITY, CARBONATE (As CaCO3)	*MG/L*	-	20 U	0 U	20 U	0 U	20 U
ALKALINITY, HYDROXIDE (AS CACO3)	*MG/L*	-	20 U	0 U	20 U	0 U	20 U
ALKALINITY, TOTAL	*MG/L*	500	250	820	810	730	740
BROMIDE	*MG/L*	2	0.47 J	2.4	2.7	0.77	0.58
CHLORIDE (AS CL)	*MG/L*	250	29	190	220	50	49
DISSOLVED SOLIDS, TOTAL	*MG/L*	-	1,600	4,200	4,500	2,300	3,200
FLUORIDE	*MG/L*	1.5	0.21 U	0.24 J	0.42 J	0.41 J	0.62 J
NITROGEN, NITRATE (AS N)	*MG/L*	10	0.08 U	0.4 J	0.08 U	0.37 J	1.2 J
NITROGEN, NITRITE (AS N)	*MG/L*	1	0.1 U	0.15 U	0.1 U	0.15 U	0.1 U
PHOSPHORUS, TOTAL ORTHOPHOSPHATE (AS PO4)	*MG/L*	-	0.17 U	0.12 U	0.17 U	0.12 U	0.17 U
SULFATE	*MG/L*	250	890	870	2,300	1,600	1,700

Concentration Exceeds Criteria

(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

U - Not detected above the reported quantitation limit.; R - The data is rejected.; J - The reported concentration is an estimated value.

NOTE: The detection limits shown are MDL.

TABLE 14
GROUNDWATER ANALYTICAL RESULTS - WATER QUALITY PARAMETERS
NIAGARA FALLS STORAGE SITE

Location Identifier :			MW935	MW935	MW938	MW938	MW944
Field Sample Identifier :			MW935	MW935	MW938	MW938	MW944
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			04/23/13	10/15/13	04/25/13	10/16/13	04/24/13
Parameter	**Units**	**Criteria[1]**					
MISCELLANEOUS							
ALKALINITY, BICARBONATE (As CaCO3)	*MG/L*	-	0 U	530	740	750	0 U
ALKALINITY, CARBONATE (As CaCO3)	*MG/L*	-	0 U	20 U	0 U	20 U	0 U
ALKALINITY, HYDROXIDE (AS CACO3)	*MG/L*	-	0 U	20 U	0 U	20 U	0 U
ALKALINITY, TOTAL	*MG/L*	500	500	530	740	750	570
BROMIDE	*MG/L*	2	0.35 J	0.29 J	0.59 J	0.46 J	0.39 J
CHLORIDE (AS CL)	*MG/L*	250	20	25	34	37	14
DISSOLVED SOLIDS, TOTAL	*MG/L*	-	2,000	2,400	3,300	3,300	1,100
FLUORIDE	*MG/L*	1.5	0.6 J	0.46 J	0.29 J	0.43 J	0.17 J
NITROGEN, NITRATE (AS N)	*MG/L*	10	0.7	0.5	0.4 J	0.08 U	0.42 J
NITROGEN, NITRITE (AS N)	*MG/L*	1	0.64	0.1 U	0.15 U	0.1 U	0.15 U
PHOSPHORUS, TOTAL ORTHOPHOSPHATE (AS PO4)	*MG/L*	-	0.12 U	0.17 U	0.12 U	0.17 U	0.12 U
SULFATE	*MG/L*	250	960	1,100	1,600	1,700	330

Concentration Exceeds Criteria

(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

U - Not detected above the reported quantitation limit.; R - The data is rejected.; J - The reported concentration is an estimated value.

NOTE: The detection limits shown are MDL.

TABLE 14
GROUNDWATER ANALYTICAL RESULTS - WATER QUALITY PARAMETERS
NIAGARA FALLS STORAGE SITE

Location Identifier :			MW944	MW945	MW945	MW946	MW948
Field Sample Identifier :			MW944	MW945	MW945	MW946	GW948
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			10/18/13	04/24/13	10/18/13	04/24/13	04/24/13
Parameter	**Units**	**Criteria[1]**					
MISCELLANEOUS							
ALKALINITY, BICARBONATE (As CaCO3)	*MG/L*	-	510	0 U	750	0 U	0 U
ALKALINITY, CARBONATE (As CaCO3)	*MG/L*	-	20 U	0 U	20 U	0 U	0 U
ALKALINITY, HYDROXIDE (AS CACO3)	*MG/L*	-	20 U	0 U	20 U	0 U	0 U
ALKALINITY, TOTAL	*MG/L*	500	510	690	750	570	530
BROMIDE	*MG/L*	2	0.22 J	1.1	1.7	2.6	0.88
CHLORIDE (AS CL)	*MG/L*	250	9.1	73	140	300	98
DISSOLVED SOLIDS, TOTAL	*MG/L*	-	1,000	1,600	2,400	6,800	2,800
FLUORIDE	*MG/L*	1.5	0.21 U	0.36 J	0.51 J	0.59 J	0.45 J
NITROGEN, NITRATE (AS N)	*MG/L*	10	0.43 J	0.17 U	0.34 J	0.46 J	0.39 J
NITROGEN, NITRITE (AS N)	*MG/L*	1	0.1 U	0.15 U	0.38 J	0.15 U	0.15 U
PHOSPHORUS, TOTAL ORTHOPHOSPHATE (AS PO4)	*MG/L*	-	0.17 U	0.12 U	0.17 U	0.12 U	0.12 U
SULFATE	*MG/L*	250	310	500	1,000	4,000	2,400

Concentration Exceeds Criteria

(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

U - Not detected above the reported quantitation limit.; R - The data is rejected.; J - The reported concentration is an estimated value.

NOTE: The detection limits shown are MDL.

TABLE 14
GROUNDWATER ANALYTICAL RESULTS - WATER QUALITY PARAMETERS
NIAGARA FALLS STORAGE SITE

Location Identifier :			MW948	MW949	MW949	MW950	MW950
Field Sample Identifier :			MW948	MW949	MW949	MW950	MW950
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			10/16/13	04/24/13	10/17/13	04/29/13	10/18/13
Parameter	**Units**	**Criteria[1]**					
MISCELLANEOUS							
ALKALINITY, BICARBONATE (As CaCO3)	*MG/L*	-	580	0 U	61	0 U	520
ALKALINITY, CARBONATE (As CaCO3)	*MG/L*	-	20 U	0 U	20 U	0 U	20 U
ALKALINITY, HYDROXIDE (AS CACO3)	*MG/L*	-	20 U	0 U	20 U	0 U	20 U
ALKALINITY, TOTAL	*MG/L*	500	580	68	61	500	520
BROMIDE	*MG/L*	2	0.91	1.2	0.78	0.52 J	0.47 J
CHLORIDE (AS CL)	*MG/L*	250	94	84	89	53	63
DISSOLVED SOLIDS, TOTAL	*MG/L*	-	4,100	2,800	2,700	3,000	2,500
FLUORIDE	*MG/L*	1.5	0.56 J	0.25 J	0.21 U	0.44 J	0.41 J
NITROGEN, NITRATE (AS N)	*MG/L*	10	0.08 U	0.4 J	0.41 J	0.17 U	0.08 U
NITROGEN, NITRITE (AS N)	*MG/L*	1	0.1 U	0.15 U	0.1 U	0.15 U	0.4 J
PHOSPHORUS, TOTAL ORTHOPHOSPHATE (AS PO4)	*MG/L*	-	0.17 U	0.12 U	0.17 U	0.12 U	0.17 U
SULFATE	*MG/L*	250	2,200	1,700	1,600	1,600	1,300

Concentration Exceeds Criteria

(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

U - Not detected above the reported quantitation limit.; R - The data is rejected.; J - The reported concentration is an estimated value.

NOTE: The detection limits shown are MDL.

TABLE 14
GROUNDWATER ANALYTICAL RESULTS - WATER QUALITY PARAMETERS
NIAGARA FALLS STORAGE SITE

Location Identifier :			MW951	MW951	MW952	MW952	MW953
Field Sample Identifier :			MW951	MW951	MW952	MW952	MW953
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			04/29/13	10/18/13	04/24/13	10/17/13	04/25/13
Parameter	**Units**	**Criteria[1]**					
MISCELLANEOUS							
ALKALINITY, BICARBONATE (As CaCO3)	*MG/L*	-	0 U	570	0 U	370	390
ALKALINITY, CARBONATE (As CaCO3)	*MG/L*	-	0 U	20 U	0 U	20 U	0 U
ALKALINITY, HYDROXIDE (AS CACO3)	*MG/L*	-	0 U	20 U	0 U	20 U	0 U
ALKALINITY, TOTAL	*MG/L*	500	570	570	340	370	390
BROMIDE	*MG/L*	2	0.29 U	0.32 J	0.44 J	0.29 J	0.29 U
CHLORIDE (AS CL)	*MG/L*	250	72	82	53	52	23
DISSOLVED SOLIDS, TOTAL	*MG/L*	-	1,500	1,500	2,900	1,800	1,700
FLUORIDE	*MG/L*	1.5	0.3 J	0.51 J	0.51 J	0.48 J	0.44 J
NITROGEN, NITRATE (AS N)	*MG/L*	10	0.17 U	0.08 U	0.48 J	0.3 J	0.39 J
NITROGEN, NITRITE (AS N)	*MG/L*	1	0.15 U	0.1 U	0.15 U	0.1 U	0.15 U
PHOSPHORUS, TOTAL ORTHOPHOSPHATE (AS PO4)	*MG/L*	-	0.12 U	0.17 U	0.12 U	0.17 U	0.12 U
SULFATE	*MG/L*	250	540	550	810	850	740

Concentration Exceeds Criteria

(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

U - Not detected above the reported quantitation limit.; R - The data is rejected.; J - The reported concentration is an estimated value.

NOTE: The detection limits shown are MDL.

TABLE 14
GROUNDWATER ANALYTICAL RESULTS - WATER QUALITY PARAMETERS
NIAGARA FALLS STORAGE SITE

Location Identifier :			MW953	MW954	MW954	MW955	MW955
Field Sample Identifier :			MW953	MW954	MW954	MW955	MW955
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			10/17/13	04/25/13	10/17/13	04/25/13	10/17/13
Parameter	**Units**	**Criteria[1]**					
MISCELLANEOUS							
ALKALINITY, BICARBONATE (As CaCO3)	*MG/L*	-	410	430	460	430	420
ALKALINITY, CARBONATE (As CaCO3)	*MG/L*	-	20 U	0 U	20 U	0 U	20 U
ALKALINITY, HYDROXIDE (AS CACO3)	*MG/L*	-	20 U	0 U	20 U	0 U	20 U
ALKALINITY, TOTAL	*MG/L*	500	410	430	460	430	420
BROMIDE	*MG/L*	2	0.06 U	0.34 J	0.19 J	0.47 J	0.15 J
CHLORIDE (AS CL)	*MG/L*	250	24	46	31	22	21
DISSOLVED SOLIDS, TOTAL	*MG/L*	-	1,600	2,400	2,000	1,400	1,300
FLUORIDE	*MG/L*	1.5	0.47 J	0.41 J	0.45 J	0.35 J	0.42 J
NITROGEN, NITRATE (AS N)	*MG/L*	10	0.08 U	0.4 J	0.08 U	0.17 U	0.08 U
NITROGEN, NITRITE (AS N)	*MG/L*	1	0.1 U	0.15 U	0.1 U	0.15 U	0.1 U
PHOSPHORUS, TOTAL ORTHOPHOSPHATE (AS PO4)	*MG/L*	-	0.17 U	0.12 U	0.17 U	0.12 U	0.17 U
SULFATE	*MG/L*	250	770	1,200	930	530	560

Concentration Exceeds Criteria

(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

U - Not detected above the reported quantitation limit.; R - The data is rejected.; J - The reported concentration is an estimated value.

NOTE: The detection limits shown are MDL.

TABLE 14
GROUNDWATER ANALYTICAL RESULTS - WATER QUALITY PARAMETERS
NIAGARA FALLS STORAGE SITE

Location Identifier :			MW956	MW956	MW957	MW957	MW958
Field Sample Identifier :			MW956	MW956	MW957	MW957	MW958
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			04/29/13	10/18/13	04/25/13	10/18/13	04/29/13
Parameter	**Units**	**Criteria[1]**					
MISCELLANEOUS							
ALKALINITY, BICARBONATE (As CaCO3)	*MG/L*	-	0 U	550	0 U	580	0 U
ALKALINITY, CARBONATE (As CaCO3)	*MG/L*	-	0 U	20 U	0 U	20 U	0 U
ALKALINITY, HYDROXIDE (AS CACO3)	*MG/L*	-	0 U	20 U	0 U	20 U	0 U
ALKALINITY, TOTAL	*MG/L*	500	530	550	570	580	440
BROMIDE	*MG/L*	2	0.37 J	0.38 J	0.61 J	0.58	0.29 U
CHLORIDE (AS CL)	*MG/L*	250	35	37	19	25	31
DISSOLVED SOLIDS, TOTAL	*MG/L*	-	1,800	1,700	2,100	2,000	800
FLUORIDE	*MG/L*	1.5	0.54 J	0.49 J	0.51 J	0.54 J	0.44 J
NITROGEN, NITRATE (AS N)	*MG/L*	10	0.17 U	0.08 U	0.36 J	0.08 U	0.17 U
NITROGEN, NITRITE (AS N)	*MG/L*	1	0.15 U	0.1 U	0.15 U	0.1 U	0.15 U
PHOSPHORUS, TOTAL ORTHOPHOSPHATE (AS PO4)	*MG/L*	-	0.12 U	0.17 U	0.12 U	0.17 U	0.12 U
SULFATE	*MG/L*	250	410	770	920	920	200

Concentration Exceeds Criteria

(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

U - Not detected above the reported quantitation limit.; R - The data is rejected.; J - The reported concentration is an estimated value.

NOTE: The detection limits shown are MDL.

TABLE 14
GROUNDWATER ANALYTICAL RESULTS - WATER QUALITY PARAMETERS
NIAGARA FALLS STORAGE SITE

Location Identifier :			MW958	MW959	MW959	MW960	MW960
Field Sample Identifier :			MW958	MW959	MW959	MW960	MW960
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			10/18/13	04/29/13	10/18/13	04/29/13	10/15/13
Parameter	**Units**	**Criteria[1]**					
MISCELLANEOUS							
ALKALINITY, BICARBONATE (As CaCO3)	*MG/L*	-	460	0 U	480	0 U	530
ALKALINITY, CARBONATE (As CaCO3)	*MG/L*	-	20 U	0 U	20 U	0 U	20 U
ALKALINITY, HYDROXIDE (AS CACO3)	*MG/L*	-	20 U	0 U	20 U	0 U	20 U
ALKALINITY, TOTAL	*MG/L*	500	460	500	480	530	530
BROMIDE	*MG/L*	2	0.06 U	0.32 J	0.57	0.29 U	0.06 U
CHLORIDE (AS CL)	*MG/L*	250	33	66	36	59	58
DISSOLVED SOLIDS, TOTAL	*MG/L*	-	810	1,700	1,500	1,300	1,100
FLUORIDE	*MG/L*	1.5	0.5 J	0.56 J	0.57 J	0.3 J	0.41 J
NITROGEN, NITRATE (AS N)	*MG/L*	10	0.63	0.17 U	0.08 U	0.17 U	0.08 U
NITROGEN, NITRITE (AS N)	*MG/L*	1	0.1 U	0.15 U	0.1 U	0.15 U	0.1 U
PHOSPHORUS, TOTAL ORTHOPHOSPHATE (AS PO4)	*MG/L*	-	0.17 U	0.12 U	0.17 U	0.12 U	0.17 U
SULFATE	*MG/L*	250	210	710	700	380	350

Concentration Exceeds Criteria

(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

U - Not detected above the reported quantitation limit.; R - The data is rejected.; J - The reported concentration is an estimated value.

NOTE: The detection limits shown are MDL.

TABLE 14
GROUNDWATER ANALYTICAL RESULTS - WATER QUALITY PARAMETERS
NIAGARA FALLS STORAGE SITE

Location Identifier :			OW03A	OW03A	OW03B	OW03B	OW04A
Field Sample Identifier :			OW03A	OW03A	OW03B	OW03B	OW04A
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			04/25/13	10/15/13	04/25/13	10/15/13	04/24/13
Parameter	**Units**	**Criteria[1]**					
MISCELLANEOUS							
ALKALINITY, BICARBONATE (As CaCO3)	*MG/L*	-	480	490	500	530	0 U
ALKALINITY, CARBONATE (As CaCO3)	*MG/L*	-	0 U	20 U	0 U	20 U	0 U
ALKALINITY, HYDROXIDE (AS CACO3)	*MG/L*	-	0 U	20 U	0 U	20 U	0 U
ALKALINITY, TOTAL	*MG/L*	500	480	490	500	530	180
BROMIDE	*MG/L*	2	0.55 J	0.34 J	0.45 J	0.29 J	0.64 J
CHLORIDE (AS CL)	*MG/L*	250	31	29	27	30	31
DISSOLVED SOLIDS, TOTAL	*MG/L*	-	1,700	1,600	1,600	1,400	980
FLUORIDE	*MG/L*	1.5	0.54 J	0.5 J	0.42 J	0.4 J	0.25 J
NITROGEN, NITRATE (AS N)	*MG/L*	10	0.17 U	0.4 J	0.38 J	0.08 U	0.51
NITROGEN, NITRITE (AS N)	*MG/L*	1	0.15 U	0.1 U	0.15 U	0.1 U	0.15 U
PHOSPHORUS, TOTAL ORTHOPHOSPHATE (AS PO4)	*MG/L*	-	0.12 U	0.17 U	0.12 U	0.17 U	0.12 U
SULFATE	*MG/L*	250	710	740	660	590	500

Concentration Exceeds Criteria

(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

U - Not detected above the reported quantitation limit.; R - The data is rejected.; J - The reported concentration is an estimated value.

NOTE: The detection limits shown are MDL.

TABLE 14
GROUNDWATER ANALYTICAL RESULTS - WATER QUALITY PARAMETERS
NIAGARA FALLS STORAGE SITE

Location Identifier :			OW04A	OW04A	OW04B	OW04B	OW04B
Field Sample Identifier :			OW04A	OW04A	OW04B	OW04B	OW04B
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			08/13/13	10/15/13	04/24/13	08/13/13	10/15/13
Parameter	**Units**	**Criteria[1]**					
MISCELLANEOUS							
ALKALINITY, BICARBONATE (As CaCO3)	*MG/L*	-	20 U	170	0 U	20 U	340
ALKALINITY, CARBONATE (As CaCO3)	*MG/L*	-	20 U	20 U	0 U	20 U	20 U
ALKALINITY, HYDROXIDE (AS CACO3)	*MG/L*	-	Not Anaylzed	20 U	0 U	Not Anaylzed	20 U
ALKALINITY, TOTAL	*MG/L*	500	160	170	330	330	340
BROMIDE	*MG/L*	2	0.43 J	0.44 J	0.29 U	0.29 U	0.06 U
CHLORIDE (AS CL)	*MG/L*	250	34	30	140	100	88
DISSOLVED SOLIDS, TOTAL	*MG/L*	-	990	940	1,700	1,600	1,300
FLUORIDE	*MG/L*	1.5	0.26 J	0.41 J	0.6 J	0.66 J	0.67 J
NITROGEN, NITRATE (AS N)	*MG/L*	10	0.17 U	0.08 U	0.39 J	0.17 U	0.08 U
NITROGEN, NITRITE (AS N)	*MG/L*	1	0.15 U	0.1 U	0.15 U	0.15 U	0.1 U
PHOSPHORUS, TOTAL ORTHOPHOSPHATE (AS PO4)	*MG/L*	-	0.35 J	0.17 U	0.12 U	0.12 U	0.17 U
SULFATE	*MG/L*	250	530	480	620	630	550

Concentration Exceeds Criteria

(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

U - Not detected above the reported quantitation limit.; R - The data is rejected.; J - The reported concentration is an estimated value.

NOTE: The detection limits shown are MDL.

TABLE 14
GROUNDWATER ANALYTICAL RESULTS - WATER QUALITY PARAMETERS
NIAGARA FALLS STORAGE SITE

Location Identifier :			OW05A	OW05A	OW05B	OW05B	OW06A
Field Sample Identifier :			OW05A	OW05A	OW05B	OW05B	OW06A
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			04/29/13	10/17/13	04/29/13	10/17/13	04/26/13
Parameter	**Units**	**Criteria[1]**					
MISCELLANEOUS							
ALKALINITY, BICARBONATE (As CaCO3)	*MG/L*	-	0 U	250	0 U	400	190
ALKALINITY, CARBONATE (As CaCO3)	*MG/L*	-	0 U	20 U	0 U	20 U	0 U
ALKALINITY, HYDROXIDE (AS CACO3)	*MG/L*	-	0 U	20 U	0 U	20 U	0 U
ALKALINITY, TOTAL	*MG/L*	500	270	250	390	400	190
BROMIDE	*MG/L*	2	0.43 J	0.49 J	0.29 U	0.06 U	0.69 J
CHLORIDE (AS CL)	*MG/L*	250	35	41	14	15	32
DISSOLVED SOLIDS, TOTAL	*MG/L*	-	980	940	1,200	1,200	1,700
FLUORIDE	*MG/L*	1.5	0.38 J	0.46 J	0.3 J	0.48 J	0.39 J
NITROGEN, NITRATE (AS N)	*MG/L*	10	0.17 U	0.08 U	0.17 U	0.54	0.37 J
NITROGEN, NITRITE (AS N)	*MG/L*	1	0.15 U	0.1 U	0.15 U	0.1 U	0.15 U
PHOSPHORUS, TOTAL ORTHOPHOSPHATE (AS PO4)	*MG/L*	-	0.12 U	0.17 U	0.12 U	0.17 U	0.47 J
SULFATE	*MG/L*	250	460	440	530	520	800

Concentration Exceeds Criteria

(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

U - Not detected above the reported quantitation limit.; R - The data is rejected.; J - The reported concentration is an estimated value.

NOTE: The detection limits shown are MDL.

TABLE 14
GROUNDWATER ANALYTICAL RESULTS - WATER QUALITY PARAMETERS
NIAGARA FALLS STORAGE SITE

Location Identifier :			OW06A	OW06B	OW06B	OW07A	OW07A
Field Sample Identifier :			OW06A	OW06B	OW06B	OW07A	OW07A
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			10/18/13	04/26/13	10/18/13	04/26/13	10/18/13
Parameter	**Units**	**Criteria[1]**					
MISCELLANEOUS							
ALKALINITY, BICARBONATE (As CaCO3)	*MG/L*	-	270	530	530	0 U	180
ALKALINITY, CARBONATE (As CaCO3)	*MG/L*	-	20 U	0 U	20 U	0 U	20 U
ALKALINITY, HYDROXIDE (AS CACO3)	*MG/L*	-	20 U	0 U	20 U	0 U	20 U
ALKALINITY, TOTAL	*MG/L*	500	270	530	530	190	180
BROMIDE	*MG/L*	2	0.42 J	0.61 J	0.32 J	0.91	0.75
CHLORIDE (AS CL)	*MG/L*	250	30	57	61	42	41
DISSOLVED SOLIDS, TOTAL	*MG/L*	-	1,500	1,400	1,200	1,700	1,700
FLUORIDE	*MG/L*	1.5	0.45 J	0.52 J	0.36 J	0.39 J	0.4 J
NITROGEN, NITRATE (AS N)	*MG/L*	10	0.08 U	0.45 J	0.08 U	0.44 J	0.41 J
NITROGEN, NITRITE (AS N)	*MG/L*	1	0.1 U	0.15 U	0.1 U	0.15 U	0.1 U
PHOSPHORUS, TOTAL ORTHOPHOSPHATE (AS PO4)	*MG/L*	-	0.17 U	0.12 U	0.17 U	0.12 U	0.17 U
SULFATE	*MG/L*	250	760	460	440	910	930

Concentration Exceeds Criteria

(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

U - Not detected above the reported quantitation limit.; R - The data is rejected.; J - The reported concentration is an estimated value.

NOTE: The detection limits shown are MDL.

TABLE 14
GROUNDWATER ANALYTICAL RESULTS - WATER QUALITY PARAMETERS
NIAGARA FALLS STORAGE SITE

Location Identifier :			OW07B	OW07B	OW11A	OW11A	OW11B
Field Sample Identifier :			OW07B	OW07B	OW11A	OW11A	OW11B
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			04/29/13	10/18/13	04/24/13	10/17/13	04/24/13
Parameter	**Units**	**Criteria[1]**					
MISCELLANEOUS							
ALKALINITY, BICARBONATE (As CaCO3)	*MG/L*	-	0 U	410	0 U	280	0 U
ALKALINITY, CARBONATE (As CaCO3)	*MG/L*	-	0 U	20 U	0 U	20 U	0 U
ALKALINITY, HYDROXIDE (AS CACO3)	*MG/L*	-	0 U	20 U	0 U	20 U	0 U
ALKALINITY, TOTAL	*MG/L*	500	420	410	270	280	320
BROMIDE	*MG/L*	2	0.29 U	0.24 J	0.52 J	0.37 J	0.29 U
CHLORIDE (AS CL)	*MG/L*	250	16	17	25	25	15
DISSOLVED SOLIDS, TOTAL	*MG/L*	-	1,600	1,500	1,200	1,200	1,200
FLUORIDE	*MG/L*	1.5	0.38 J	0.61 J	0.41 J	0.4 J	0.37 J
NITROGEN, NITRATE (AS N)	*MG/L*	10	0.17 U	0.08 U	0.39 J	0.33 J	0.46 J
NITROGEN, NITRITE (AS N)	*MG/L*	1	0.15 U	0.1 U	0.15 U	0.1 U	0.15 U
PHOSPHORUS, TOTAL ORTHOPHOSPHATE (AS PO4)	*MG/L*	-	0.12 U	0.17 U	0.12 U	0.17 U	0.12 U
SULFATE	*MG/L*	250	750	690	570	560	520

Concentration Exceeds Criteria

(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

U - Not detected above the reported quantitation limit.; R - The data is rejected.; J - The reported concentration is an estimated value.

NOTE: The detection limits shown are MDL.

TABLE 14
GROUNDWATER ANALYTICAL RESULTS - WATER QUALITY PARAMETERS
NIAGARA FALLS STORAGE SITE

Location Identifier :			OW11B	OW12A	OW12A	OW12B	OW12B
Field Sample Identifier :			OW11B	OW12A	OW12A	OW12B	OW12B
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			10/17/13	04/26/13	10/18/13	04/26/13	10/18/13
Parameter	**Units**	**Criteria[1]**					
MISCELLANEOUS							
ALKALINITY, BICARBONATE (As CaCO3)	*MG/L*	-	350	190	230	340	370
ALKALINITY, CARBONATE (As CaCO3)	*MG/L*	-	20 U	0 U	20 U	0 U	20 U
ALKALINITY, HYDROXIDE (AS CACO3)	*MG/L*	-	20 U	0 U	20 U	0 U	20 U
ALKALINITY, TOTAL	*MG/L*	500	350	190	230	340	370
BROMIDE	*MG/L*	2	0.06 U	0.62 J	0.42 J	0.29 U	0.06 U
CHLORIDE (AS CL)	*MG/L*	250	20	22	22	1.8	1.8
DISSOLVED SOLIDS, TOTAL	*MG/L*	-	1,200	1,500	1,400	570	690
FLUORIDE	*MG/L*	1.5	0.5 J	0.4 J	0.55 J	0.71 J	0.67 J
NITROGEN, NITRATE (AS N)	*MG/L*	10	0.08 U	0.17 U	0.08 U	0.17 U	0.48 J
NITROGEN, NITRITE (AS N)	*MG/L*	1	0.1 U	0.15 U	0.31 J	0.15 U	0.1 U
PHOSPHORUS, TOTAL ORTHOPHOSPHATE (AS PO4)	*MG/L*	-	0.17 U	0.12 U	0.17 U	0.12 U	0.17 U
SULFATE	*MG/L*	250	520	740	720	140	210

Concentration Exceeds Criteria

(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

U - Not detected above the reported quantitation limit.; R - The data is rejected.; J - The reported concentration is an estimated value.

NOTE: The detection limits shown are MDL.

TABLE 14
GROUNDWATER ANALYTICAL RESULTS - WATER QUALITY PARAMETERS
NIAGARA FALLS STORAGE SITE

Location Identifier :			OW13A	OW13A	OW13B	OW13B	OW15A
Field Sample Identifier :			OW13A	OW13A	OW13B	OW13B	OW15A
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			04/26/13	10/17/13	04/29/13	10/17/13	04/29/13
Parameter	**Units**	**Criteria[1]**					
MISCELLANEOUS							
ALKALINITY, BICARBONATE (As CaCO3)	*MG/L*	-	180	200	0 U	480	0 U
ALKALINITY, CARBONATE (As CaCO3)	*MG/L*	-	0 U	20 U	0 U	20 U	0 U
ALKALINITY, HYDROXIDE (AS CACO3)	*MG/L*	-	0 U	20 U	0 U	20 U	0 U
ALKALINITY, TOTAL	*MG/L*	500	180	200	490	480	92
BROMIDE	*MG/L*	2	0.69 J	0.41 J	0.3 J	0.06 U	0.8
CHLORIDE (AS CL)	*MG/L*	250	38	38	41	41	67
DISSOLVED SOLIDS, TOTAL	*MG/L*	-	1,800	1,600	2,300	2,200	1,900
FLUORIDE	*MG/L*	1.5	0.35 J	0.44 J	0.28 J	0.33 J	0.55 J
NITROGEN, NITRATE (AS N)	*MG/L*	10	0.37 J	0.08 U	0.17 U	0.36 J	0.17 U
NITROGEN, NITRITE (AS N)	*MG/L*	1	0.15 U	0.1 U	0.15 U	0.1 U	0.15 U
PHOSPHORUS, TOTAL ORTHOPHOSPHATE (AS PO4)	*MG/L*	-	0.12 U	0.17 U	0.12 U	0.17 U	0.12 U
SULFATE	*MG/L*	250	920	930	1,100	1,100	1,100

Concentration Exceeds Criteria

(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

U - Not detected above the reported quantitation limit.; R - The data is rejected.; J - The reported concentration is an estimated value.

NOTE: The detection limits shown are MDL.

TABLE 14
GROUNDWATER ANALYTICAL RESULTS - WATER QUALITY PARAMETERS
NIAGARA FALLS STORAGE SITE

Location Identifier :			OW15A	OW15B	OW15B	OW17A	OW17A
Field Sample Identifier :			OW15A	OW15B	OW15B	OW17A	OW17A
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			10/17/13	04/26/13	10/17/13	04/26/13	10/16/13
Parameter	**Units**	**Criteria[1]**					
MISCELLANEOUS							
ALKALINITY, BICARBONATE (As CaCO3)	*MG/L*	-	94	0 U	300	170	110
ALKALINITY, CARBONATE (As CaCO3)	*MG/L*	-	20 U	0 U	20 U	0 U	20 U
ALKALINITY, HYDROXIDE (AS CACO3)	*MG/L*	-	20 U	0 U	20 U	0 U	20 U
ALKALINITY, TOTAL	*MG/L*	500	94	310	300	170	110
BROMIDE	*MG/L*	2	0.8	0.29 U	0.06 U	0.58 J	0.43 J
CHLORIDE (AS CL)	*MG/L*	250	71	1.8	2.3	34	35
DISSOLVED SOLIDS, TOTAL	*MG/L*	-	1,800	540	530	2,100	2,100
FLUORIDE	*MG/L*	1.5	0.49 J	0.45 J	0.71 J	0.22 J	0.45 J
NITROGEN, NITRATE (AS N)	*MG/L*	10	0.08 U	1	0.71	0.42 J	0.08 U
NITROGEN, NITRITE (AS N)	*MG/L*	1	0.1 U	0.15 U	0.1 U	0.15 U	0.1 U
PHOSPHORUS, TOTAL ORTHOPHOSPHATE (AS PO4)	*MG/L*	-	0.17 U	0.12 U	0.17 U	0.12 U	0.17 U
SULFATE	*MG/L*	250	1,000	150	150	1,200	1,300

Concentration Exceeds Criteria

(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

U - Not detected above the reported quantitation limit.; R - The data is rejected.; J - The reported concentration is an estimated value.

NOTE: The detection limits shown are MDL.

TABLE 14
GROUNDWATER ANALYTICAL RESULTS - WATER QUALITY PARAMETERS
NIAGARA FALLS STORAGE SITE

Location Identifier :			OW17B	OW17B	OW18B	OW18B
Field Sample Identifier :			OW17B	OW17B	OW18B	OW18B
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-
Date of Sample :			04/26/13	10/16/13	04/26/13	10/17/13
Parameter	**Units**	**Criteria[1]**				
MISCELLANEOUS						
ALKALINITY, BICARBONATE (As CaCO3)	*MG/L*	-	430	430	0 U	570
ALKALINITY, CARBONATE (As CaCO3)	*MG/L*	-	0 U	20 U	0 U	20 U
ALKALINITY, HYDROXIDE (AS CACO3)	*MG/L*	-	0 U	20 U	0 U	20 U
ALKALINITY, TOTAL	*MG/L*	500	430	430	540	570
BROMIDE	*MG/L*	2	0.29 U	0.06 U	0.47 J	0.06 U
CHLORIDE (AS CL)	*MG/L*	250	8.8	7.9	18	12
DISSOLVED SOLIDS, TOTAL	*MG/L*	-	1,000	950	1,600	1,400
FLUORIDE	*MG/L*	1.5	0.28 J	0.4 J	0.34 J	0.71 J
NITROGEN, NITRATE (AS N)	*MG/L*	10	0.4 J	0.08 U	0.38 J	0.47 J
NITROGEN, NITRITE (AS N)	*MG/L*	1	0.15 U	0.1 U	0.15 U	0.1 U
PHOSPHORUS, TOTAL ORTHOPHOSPHATE (AS PO4)	*MG/L*	-	0.12 U	0.17 U	0.12 U	0.17 U
SULFATE	*MG/L*	250	390	380	670	580

Concentration Exceeds Criteria

(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

U - Not detected above the reported quantitation limit.; R - The data is rejected.; J - The reported concentration is an estimated value.

NOTE: The detection limits shown are MDL.

TABLE 15
GROUNDWATER ANALYTICAL RESULTS - RADIONUCLIDES
NIAGARA FALLS STORAGE SITE

Location Identifier :			302A	302A	411A	411A	505
Field Sample Identifier :			302A	302A	411A	411A	505
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			04/25/13	10/16/13	04/25/13	10/16/13	04/25/13
Parameter	**Units**	**Criteria[1]**					
RADIONUCLIDES							
RADIUM-226	*PCI/L*	3	0.206 U	0.26	-0.14 U	0.0813 U	0.0723 U
TOTAL URANIUM	*UG/L*	30	84.5	82.2	11.4	18.1	42.4
RADIONUCLIDES (FILTERED)							
RADIUM-226	*PCI/L*	3	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed
TOTAL URANIUM	*UG/L*	30	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed

Concentration Exceeds Criteria

(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

U - Not detected above the reported quantitation limit.; R - The data is rejected.; J - The reported concentration is an estimated value.

NOTE: The detection limits shown are MDL.

TABLE 15
GROUNDWATER ANALYTICAL RESULTS - RADIONUCLIDES
NIAGARA FALLS STORAGE SITE

Location Identifier :			505	808A	A42	A42	A43
Field Sample Identifier :			505	808A	A42	A42	A43
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			10/17/13	10/18/13	04/23/13	10/16/13	04/25/13
Parameter	**Units**	**Criteria[1]**					
RADIONUCLIDES							
RADIUM-226	*PCI/L*	3	0.32 J	0.0573 U	0 U	0.0767 U	0.0708 U
TOTAL URANIUM	*UG/L*	30	34.7	34.4	45.6	67.8	36.3
RADIONUCLIDES (FILTERED)							
RADIUM-226	*PCI/L*	3	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed
TOTAL URANIUM	*UG/L*	30	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed

Concentration Exceeds Criteria

(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

U - Not detected above the reported quantitation limit.; R - The data is rejected.; J - The reported concentration is an estimated value.

NOTE: The detection limits shown are MDL.

TABLE 15
GROUNDWATER ANALYTICAL RESULTS - RADIONUCLIDES
NIAGARA FALLS STORAGE SITE

Location Identifier :			A43	A45	A45	A50	A50
Field Sample Identifier :			A43	A45	A45	A50	A50
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			10/16/13	04/23/13	10/15/13	04/23/13	10/15/13
Parameter	**Units**	**Criteria[1]**					
RADIONUCLIDES							
RADIUM-226	*PCI/L*	3	-0.056 U	0.868	0.068 U	-0.071 U	0.152 U
TOTAL URANIUM	*UG/L*	30	32.9	33.6	26.4	16.3	16.7
RADIONUCLIDES (FILTERED)							
RADIUM-226	*PCI/L*	3	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed
TOTAL URANIUM	*UG/L*	30	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed

Concentration Exceeds Criteria

(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

U - Not detected above the reported quantitation limit.; R - The data is rejected.; J - The reported concentration is an estimated value.

NOTE: The detection limits shown are MDL.

TABLE 15
GROUNDWATER ANALYTICAL RESULTS - RADIONUCLIDES
NIAGARA FALLS STORAGE SITE

Location Identifier :			A55	A55	BH49	BH49	BH49A
Field Sample Identifier :			A55	A55	BH49	BH49	BH49A
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			04/23/13	10/15/13	04/29/13	10/17/13	04/29/13
Parameter	**Units**	**Criteria[1]**					
RADIONUCLIDES							
RADIUM-226	*PCI/L*	3	0.276 U	0.395 J	0.326 U	0.221 J	0.197 U
TOTAL URANIUM	*UG/L*	30	0.111 J	0.107 J	1.47	0.701	19
RADIONUCLIDES (FILTERED)							
RADIUM-226	*PCI/L*	3	Not Anaylzed	0.0732 U	Not Anaylzed	Not Anaylzed	Not Anaylzed
TOTAL URANIUM	*UG/L*	30	Not Anaylzed	0.093 J	Not Anaylzed	Not Anaylzed	Not Anaylzed

Concentration Exceeds Criteria

(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

U - Not detected above the reported quantitation limit.; R - The data is rejected.; J - The reported concentration is an estimated value.

NOTE: The detection limits shown are MDL.

TABLE 15
GROUNDWATER ANALYTICAL RESULTS - RADIONUCLIDES
NIAGARA FALLS STORAGE SITE

Location Identifier :			BH49A	MW423	MW862	MW862	MW863
Field Sample Identifier :			BH49A	MW423	MW862	MW862	MW863
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			10/17/13	10/18/13	04/26/13	10/15/13	04/26/13
Parameter	**Units**	**Criteria[1]**					
RADIONUCLIDES							
RADIUM-226	*PCI/L*	3	0.312 J	0.365 J	0 U	0.766 J	-0.202 U
TOTAL URANIUM	*UG/L*	30	11	12	23.2	22.4	4.16
RADIONUCLIDES (FILTERED)							
RADIUM-226	*PCI/L*	3	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed
TOTAL URANIUM	*UG/L*	30	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed

Concentration Exceeds Criteria

(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

U - Not detected above the reported quantitation limit.; R - The data is rejected.; J - The reported concentration is an estimated value.

NOTE: The detection limits shown are MDL.

TABLE 15
GROUNDWATER ANALYTICAL RESULTS - RADIONUCLIDES
NIAGARA FALLS STORAGE SITE

Location Identifier :			MW863	MW921	MW921	MW934	MW934
Field Sample Identifier :			MW863	MW921	MW921	MW934	MW934
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			10/15/13	04/24/13	10/17/13	04/25/13	10/16/13
Parameter	**Units**	**Criteria[1]**					
RADIONUCLIDES							
RADIUM-226	*PCI/L*	3	0.298 U	0.212 J	0 U	0.0848 U	0.164 U
TOTAL URANIUM	*UG/L*	30	2.44	31.2	38.6	31	30.6
RADIONUCLIDES (FILTERED)							
RADIUM-226	*PCI/L*	3	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed
TOTAL URANIUM	*UG/L*	30	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed

Concentration Exceeds Criteria

(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

U - Not detected above the reported quantitation limit.; R - The data is rejected.; J - The reported concentration is an estimated value.

NOTE: The detection limits shown are MDL.

TABLE 15
GROUNDWATER ANALYTICAL RESULTS - RADIONUCLIDES
NIAGARA FALLS STORAGE SITE

Location Identifier :			MW935	MW935	MW938	MW938	MW944
Field Sample Identifier :			MW935	MW935	MW938	MW938	MW944
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			04/23/13	10/15/13	04/25/13	10/16/13	04/24/13
Parameter	**Units**	**Criteria[1]**					
RADIONUCLIDES							
RADIUM-226	*PCI/L*	3	0.0715 U	0.148 U	0.0929 U	0.0721 U	0.2 U
TOTAL URANIUM	*UG/L*	30	25.4	29.3	28.7	25.9	10.1
RADIONUCLIDES (FILTERED)							
RADIUM-226	*PCI/L*	3	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed
TOTAL URANIUM	*UG/L*	30	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed

Concentration Exceeds Criteria

(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

U - Not detected above the reported quantitation limit.; R - The data is rejected.; J - The reported concentration is an estimated value.

NOTE: The detection limits shown are MDL.

TABLE 15
GROUNDWATER ANALYTICAL RESULTS - RADIONUCLIDES
NIAGARA FALLS STORAGE SITE

Location Identifier :			MW944	MW945	MW945	MW946	MW948
Field Sample Identifier :			MW944	MW945	MW945	MW946	GW948
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			10/18/13	04/24/13	10/18/13	04/24/13	04/24/13
Parameter	**Units**	**Criteria[1]**					
RADIONUCLIDES							
RADIUM-226	*PCI/L*	3	0.285 J	0.361 U	0.232 U	-0.147 U	0 U
TOTAL URANIUM	*UG/L*	30	6.37	5.25	15.3	37.6	33.1
RADIONUCLIDES (FILTERED)							
RADIUM-226	*PCI/L*	3	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed
TOTAL URANIUM	*UG/L*	30	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed

Concentration Exceeds Criteria

(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

U - Not detected above the reported quantitation limit.; R - The data is rejected.; J - The reported concentration is an estimated value.

NOTE: The detection limits shown are MDL.

TABLE 15
GROUNDWATER ANALYTICAL RESULTS - RADIONUCLIDES
NIAGARA FALLS STORAGE SITE

Location Identifier :			MW948	MW949	MW949	MW950	MW950
Field Sample Identifier :			MW948	MW949	MW949	MW950	MW950
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			10/16/13	04/24/13	10/17/13	04/29/13	10/18/13
Parameter	**Units**	**Criteria[1]**					
RADIONUCLIDES							
RADIUM-226	*PCI/L*	3	0.0618 U	0.0855 U	0.49	0.307	0.127 U
TOTAL URANIUM	*UG/L*	30	24.6	0.803	0.469	31.8	26.3
RADIONUCLIDES (FILTERED)							
RADIUM-226	*PCI/L*	3	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed
TOTAL URANIUM	*UG/L*	30	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed

Concentration Exceeds Criteria

(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

U - Not detected above the reported quantitation limit.; R - The data is rejected.; J - The reported concentration is an estimated value.

NOTE: The detection limits shown are MDL.

TABLE 15
GROUNDWATER ANALYTICAL RESULTS - RADIONUCLIDES
NIAGARA FALLS STORAGE SITE

Location Identifier :			MW951	MW951	MW952	MW952	MW953
Field Sample Identifier :			MW951	MW951	MW952	MW952	MW953
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			04/29/13	10/18/13	04/24/13	10/17/13	04/25/13
Parameter	**Units**	**Criteria[1]**					
RADIONUCLIDES							
RADIUM-226	*PCI/L*	3	0.0698 U	0.408 J	0.152 U	0.0611 U	0.556
TOTAL URANIUM	*UG/L*	30	4,631	4,502	216	175	4,843
RADIONUCLIDES (FILTERED)							
RADIUM-226	*PCI/L*	3	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed
TOTAL URANIUM	*UG/L*	30	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed

Concentration Exceeds Criteria

(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

U - Not detected above the reported quantitation limit.; R - The data is rejected.; J - The reported concentration is an estimated value.

NOTE: The detection limits shown are MDL.

TABLE 15
GROUNDWATER ANALYTICAL RESULTS - RADIONUCLIDES
NIAGARA FALLS STORAGE SITE

Location Identifier :			MW953	MW954	MW954	MW955	MW955
Field Sample Identifier :			MW953	MW954	MW954	MW955	MW955
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			10/17/13	04/25/13	10/17/13	04/25/13	10/17/13
Parameter	**Units**	**Criteria[1]**					
RADIONUCLIDES							
RADIUM-226	*PCI/L*	3	0.557 J	0.459 U	0 U	0.141 U	-0.051 U
TOTAL URANIUM	*UG/L*	30	3,929	687	322	25.2	22
RADIONUCLIDES (FILTERED)							
RADIUM-226	*PCI/L*	3	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed
TOTAL URANIUM	*UG/L*	30	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed

Concentration Exceeds Criteria

(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

U - Not detected above the reported quantitation limit.; R - The data is rejected.; J - The reported concentration is an estimated value.

NOTE: The detection limits shown are MDL.

TABLE 15
GROUNDWATER ANALYTICAL RESULTS - RADIONUCLIDES
NIAGARA FALLS STORAGE SITE

Location Identifier :			MW956	MW956	MW957	MW957	MW958
Field Sample Identifier :			MW956	MW956	MW957	MW957	MW958
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			04/29/13	10/18/13	04/25/13	10/18/13	04/29/13
Parameter	**Units**	**Criteria[1]**					
RADIONUCLIDES							
RADIUM-226	*PCI/L*	3	0 U	0.0571 U	-0.139 U	0.956	0.065 J
TOTAL URANIUM	*UG/L*	30	70.8	46.8	2,846	1,944	235
RADIONUCLIDES (FILTERED)							
RADIUM-226	*PCI/L*	3	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed
TOTAL URANIUM	*UG/L*	30	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed

Concentration Exceeds Criteria

(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

U - Not detected above the reported quantitation limit.; R - The data is rejected.; J - The reported concentration is an estimated value.

NOTE: The detection limits shown are MDL.

TABLE 15
GROUNDWATER ANALYTICAL RESULTS - RADIONUCLIDES
NIAGARA FALLS STORAGE SITE

Location Identifier :			MW958	MW959	MW959	MW960	MW960
Field Sample Identifier :			MW958	MW959	MW959	MW960	MW960
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			10/18/13	04/29/13	10/18/13	04/29/13	10/15/13
Parameter	**Units**	**Criteria[1]**					
RADIONUCLIDES							
RADIUM-226	*PCI/L*	3	0.0639 U	0 U	0.28 U	0.19 U	0.226 U
TOTAL URANIUM	*UG/L*	30	113	137	50.3	1,097	1,049
RADIONUCLIDES (FILTERED)							
RADIUM-226	*PCI/L*	3	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed
TOTAL URANIUM	*UG/L*	30	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed

Concentration Exceeds Criteria

(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

U - Not detected above the reported quantitation limit.; R - The data is rejected.; J - The reported concentration is an estimated value.

NOTE: The detection limits shown are MDL.

TABLE 15
GROUNDWATER ANALYTICAL RESULTS - RADIONUCLIDES
NIAGARA FALLS STORAGE SITE

Location Identifier :			OW03A	OW03A	OW03B	OW03B	OW04A
Field Sample Identifier :			OW03A	OW03A	OW03B	OW03B	OW04A
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			04/25/13	10/15/13	04/25/13	10/15/13	02/07/13
Parameter	**Units**	**Criteria[1]**					
RADIONUCLIDES							
RADIUM-226	*PCI/L*	3	0.531	0.228 U	-0.138 U	-0.082 U	0.198 U
TOTAL URANIUM	*UG/L*	30	9.95	18.4	17.1	8.91	2.01
RADIONUCLIDES (FILTERED)							
RADIUM-226	*PCI/L*	3	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed
TOTAL URANIUM	*UG/L*	30	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed

Concentration Exceeds Criteria

(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

U - Not detected above the reported quantitation limit.; R - The data is rejected.; J - The reported concentration is an estimated value.

NOTE: The detection limits shown are MDL.

TABLE 15
GROUNDWATER ANALYTICAL RESULTS - RADIONUCLIDES
NIAGARA FALLS STORAGE SITE

Location Identifier :			OW04A	OW04A	OW04A	OW04B	OW04B
Field Sample Identifier :			OW04A	OW04A	OW04A	OW04B	OW04B
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			04/24/13	08/13/13	10/15/13	02/07/13	04/24/13
Parameter	**Units**	**Criteria[1]**					
RADIONUCLIDES							
RADIUM-226	*PCI/L*	3	0.399	0.0886 U	-0.064 U	0.39 J	0 U
TOTAL URANIUM	*UG/L*	30	2.38	2.6	2.44	46.7	55.8
RADIONUCLIDES (FILTERED)							
RADIUM-226	*PCI/L*	3	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed
TOTAL URANIUM	*UG/L*	30	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed

Concentration Exceeds Criteria

(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

U - Not detected above the reported quantitation limit.; R - The data is rejected.; J - The reported concentration is an estimated value.

NOTE: The detection limits shown are MDL.

TABLE 15
GROUNDWATER ANALYTICAL RESULTS - RADIONUCLIDES
NIAGARA FALLS STORAGE SITE

Location Identifier :			OW04B	OW04B	OW05A	OW05A	OW05B
Field Sample Identifier :			OW04B	OW04B	OW05A	OW05A	OW05B
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			08/13/13	10/15/13	04/29/13	10/17/13	04/29/13
Parameter	**Units**	**Criteria[1]**					
RADIONUCLIDES							
RADIUM-226	*PCI/L*	3	0 U	-0.069 U	0.24 U	0.434 J	0.315 J
TOTAL URANIUM	*UG/L*	30	49.3	45.5	2.3	2.08	14.9
RADIONUCLIDES (FILTERED)							
RADIUM-226	*PCI/L*	3	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed
TOTAL URANIUM	*UG/L*	30	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed

Concentration Exceeds Criteria

(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

U - Not detected above the reported quantitation limit.; R - The data is rejected.; J - The reported concentration is an estimated value.

NOTE: The detection limits shown are MDL.

TABLE 15
GROUNDWATER ANALYTICAL RESULTS - RADIONUCLIDES
NIAGARA FALLS STORAGE SITE

Location Identifier :			OW05B	OW06A	OW06A	OW06B	OW06B
Field Sample Identifier :			OW05B	OW06A	OW06A	OW06B	OW06B
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			10/17/13	04/26/13	10/18/13	04/26/13	10/18/13
Parameter	**Units**	**Criteria[1]**					
RADIONUCLIDES							
RADIUM-226	*PCI/L*	3	0.228	0.343 U	0 U	-0.148 U	0.278 J
TOTAL URANIUM	*UG/L*	30	12.1	2.07	2.07	18.9	15.2
RADIONUCLIDES (FILTERED)							
RADIUM-226	*PCI/L*	3	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed
TOTAL URANIUM	*UG/L*	30	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed

Concentration Exceeds Criteria

(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

U - Not detected above the reported quantitation limit.; R - The data is rejected.; J - The reported concentration is an estimated value.

NOTE: The detection limits shown are MDL.

TABLE 15
GROUNDWATER ANALYTICAL RESULTS - RADIONUCLIDES
NIAGARA FALLS STORAGE SITE

Location Identifier :			OW07A	OW07A	OW07B	OW07B	OW11A
Field Sample Identifier :			OW07A	OW07A	OW07B	OW07B	OW11A
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			04/26/13	10/18/13	04/29/13	10/18/13	04/24/13
Parameter	**Units**	**Criteria[1]**					
RADIONUCLIDES							
RADIUM-226	*PCI/L*	3	0.452 U	0.246	0.0695 U	0.116 U	0.0699 U
TOTAL URANIUM	*UG/L*	30	1.9	1.51	18.7	17.1	2.45
RADIONUCLIDES (FILTERED)							
RADIUM-226	*PCI/L*	3	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed
TOTAL URANIUM	*UG/L*	30	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed

Concentration Exceeds Criteria

(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

U - Not detected above the reported quantitation limit.; R - The data is rejected.; J - The reported concentration is an estimated value.

NOTE: The detection limits shown are MDL.

TABLE 15
GROUNDWATER ANALYTICAL RESULTS - RADIONUCLIDES
NIAGARA FALLS STORAGE SITE

Location Identifier :			OW11A	OW11B	OW11B	OW12A	OW12A
Field Sample Identifier :			OW11A	OW11B	OW11B	OW12A	OW12A
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			10/17/13	04/24/13	10/17/13	04/26/13	10/18/13
Parameter	**Units**	**Criteria[1]**					
RADIONUCLIDES							
RADIUM-226	*PCI/L*	3	-0.179 U	0.634 J	0.297 J	0.821 J	0.263 J
TOTAL URANIUM	*UG/L*	30	1.73	355	175	4.83	4.95
RADIONUCLIDES (FILTERED)							
RADIUM-226	*PCI/L*	3	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed
TOTAL URANIUM	*UG/L*	30	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed

Concentration Exceeds Criteria

(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

U - Not detected above the reported quantitation limit.; R - The data is rejected.; J - The reported concentration is an estimated value.

NOTE: The detection limits shown are MDL.

TABLE 15
GROUNDWATER ANALYTICAL RESULTS - RADIONUCLIDES
NIAGARA FALLS STORAGE SITE

Location Identifier :			OW12B	OW12B	OW13A	OW13A	OW13B
Field Sample Identifier :			OW12B	OW12B	OW13A	OW13A	OW13B
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			04/26/13	10/18/13	04/26/13	10/17/13	04/29/13
Parameter	**Units**	**Criteria[1]**					
RADIONUCLIDES							
RADIUM-226	*PCI/L*	3	-0.271 U	-0.049 U	-0.206 U	0.17 J	0.118 U
TOTAL URANIUM	*UG/L*	30	42.8	30.8	2.47	2.4	22.9
RADIONUCLIDES (FILTERED)							
RADIUM-226	*PCI/L*	3	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed
TOTAL URANIUM	*UG/L*	30	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed

Concentration Exceeds Criteria

(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

U - Not detected above the reported quantitation limit.; R - The data is rejected.; J - The reported concentration is an estimated value.

NOTE: The detection limits shown are MDL.

TABLE 15
GROUNDWATER ANALYTICAL RESULTS - RADIONUCLIDES
NIAGARA FALLS STORAGE SITE

Location Identifier :			OW13B	OW15A	OW15A	OW15B	OW15B
Field Sample Identifier :			OW13B	OW15A	OW15A	OW15B	OW15B
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			10/17/13	04/29/13	10/17/13	04/26/13	10/17/13
Parameter	**Units**	**Criteria[1]**					
RADIONUCLIDES							
RADIUM-226	*PCI/L*	3	0.128 U	0.202 U	0.601	0 U	0.0659 U
TOTAL URANIUM	*UG/L*	30	25.3	0.481	0.372	9.59	8.84
RADIONUCLIDES (FILTERED)							
RADIUM-226	*PCI/L*	3	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed
TOTAL URANIUM	*UG/L*	30	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed

Concentration Exceeds Criteria

(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

U - Not detected above the reported quantitation limit.; R - The data is rejected.; J - The reported concentration is an estimated value.

NOTE: The detection limits shown are MDL.

TABLE 15
GROUNDWATER ANALYTICAL RESULTS - RADIONUCLIDES
NIAGARA FALLS STORAGE SITE

Location Identifier :			OW17A	OW17A	OW17B	OW17B	OW18B
Field Sample Identifier :			OW17A	OW17A	OW17B	OW17B	OW18B
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			04/26/13	10/16/13	04/26/13	10/16/13	04/26/13
Parameter	**Units**	**Criteria[1]**					
RADIONUCLIDES							
RADIUM-226	*PCI/L*	3	0.0827 U	-0.163 U	0.271 U	0 U	0 U
TOTAL URANIUM	*UG/L*	30	1.45	1.1	5.25	6.4	11.6
RADIONUCLIDES (FILTERED)							
RADIUM-226	*PCI/L*	3	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed
TOTAL URANIUM	*UG/L*	30	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed

Concentration Exceeds Criteria

(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

U - Not detected above the reported quantitation limit.; R - The data is rejected.; J - The reported concentration is an estimated value.

NOTE: The detection limits shown are MDL.

TABLE 15
GROUNDWATER ANALYTICAL RESULTS - RADIONUCLIDES
NIAGARA FALLS STORAGE SITE

Location Identifier :			OW18B
Field Sample Identifier :			OW18B
Sample Type :			Groundwater
Sample Depth Interval (ft) :			-
Date of Sample :			10/17/13
Parameter	**Units**	**Criteria[1]**	
RADIONUCLIDES			
RADIUM-226	*PCI/L*	3	0.296 J
TOTAL URANIUM	*UG/L*	30	13.9
RADIONUCLIDES (FILTERED)			
RADIUM-226	*PCI/L*	3	Not Anaylzed
TOTAL URANIUM	*UG/L*	30	Not Anaylzed

Concentration Exceeds Criteria

(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

U - Not detected above the reported quantitation limit.; R - The data is rejected.; J - The reported concentration is an estimated value.

NOTE: The detection limits shown are MDL.

TABLE 16
GROUNDWATER ANALYTICAL RESULTS - VOLATILES
NIAGARA FALLS STORAGE SITE

Location Identifier :			411A	411A	MW423	MW934	MW934
Field Sample Identifier :			411A	411A	MW423	MW934	MW934
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			04/25/13	10/16/13	10/18/13	04/25/13	10/16/13
Parameter	**Units**	**Criteria[1]**					
VOLATILE ORGANIC ANALYSES							
1,1,1,2-TETRACHLOROETHANE	UG/L	5	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U
1,1,2,2-TETRACHLOROETHANE	UG/L	5	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	UG/L	5	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U
1,1,2-TRICHLOROETHANE	UG/L	1	0.27 U	0.27 U	0.27 U	0.27 U	0.27 U
1,1-DICHLOROETHANE	UG/L	5	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
1,1-DICHLOROETHENE	UG/L	5	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U
1,1-DICHLOROPROPENE	UG/L	5	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U
1,2,3-TRICHLOROBENZENE	UG/L	5	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U
1,2,3-TRICHLOROPROPANE	UG/L	0.04	0.79 U	0.79 U	0.79 U	0.79 U	0.79 U
1,2,3-TRIMETHYLBENZENE	UG/L	-	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U
1,2,4-TRICHLOROBENZENE	UG/L	5	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U
1,2,4-TRIMETHYLBENZENE	UG/L	5	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U
1,2-DIBROMO-3-CHLOROPROPANE	UG/L	0.04	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	UG/L	0.006	0.18 U	0.18 U	0.18 U	0.18 U	0.18 U
1,2-DICHLOROBENZENE	UG/L	3	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
1,2-DICHLOROETHANE	UG/L	0.6	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U
1,2-DICHLOROPROPANE	UG/L	1	0.35 U	0.35 U	0.35 U	0.35 U	0.35 U
1,3,5-TRIMETHYLBENZENE (MESITYLENE)	UG/L	5	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U
1,3-DICHLOROBENZENE	UG/L	3	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U

Concentration Exceeds Criteria

(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

U - Not detected above the reported quantitation limit.; R - The data is rejected.; J - The reported concentration is an estimated value.

NOTE: The detection limits shown are MDL.

TABLE 16
GROUNDWATER ANALYTICAL RESULTS - VOLATILES
NIAGARA FALLS STORAGE SITE

Location Identifier :			411A	411A	MW423	MW934	MW934
Field Sample Identifier :			411A	411A	MW423	MW934	MW934
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			04/25/13	10/16/13	10/18/13	04/25/13	10/16/13
Parameter	**Units**	**Criteria[1]**					
VOLATILE ORGANIC ANALYSES							
1,3-DICHLOROPROPANE	UG/L	5	0.23 U	0.23 U	0.23 U	0.23 U	0.23 U
1,4-DICHLOROBENZENE	UG/L	3	0.18 U	0.18 U	0.18 U	0.18 U	0.18 U
2,2-DICHLOROPROPANE	UG/L	5	0.44 U	0.44 U	0.44 U	0.44 U	0.44 U
2-CHLOROETHYL VINYL ETHER	UG/L	-	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U
2-CHLOROTOLUENE	UG/L	-	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U
2-HEXANONE	UG/L	50	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U
2-METHYLNAPHTHALENE	UG/L	-	0.74 U	0.74 U	0.74 U	0.74 U	0.74 U
4-CHLOROTOLUENE	UG/L	-	0.72 U	0.72 U	0.72 U	0.72 U	0.72 U
ACETONE	UG/L	50	2.6 J	0.44 U	0.44 U	2.1 J	0.44 U
ACRYLONITRILE	UG/L	5	0.65 U	0.65 U	0.65 U	0.65 U	0.65 U
BENZENE	UG/L	1	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
BROMOBENZENE	UG/L	-	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U
BROMOCHLOROMETHANE	UG/L	5	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
BROMODICHLOROMETHANE	UG/L	50	0.18 U	0.18 U	0.18 U	0.18 U	0.18 U
BROMOFORM	UG/L	50	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U
BROMOMETHANE	UG/L	5	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U
CARBON DISULFIDE	UG/L	60	0.15 U	0.15 U	0.15 U	0.15 U	0.15 U
CARBON TETRACHLORIDE	UG/L	5	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U
CHLOROBENZENE	UG/L	5	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U

Concentration Exceeds Criteria

(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

U - Not detected above the reported quantitation limit.; R - The data is rejected.; J - The reported concentration is an estimated value.

NOTE: The detection limits shown are MDL.

TABLE 16
GROUNDWATER ANALYTICAL RESULTS - VOLATILES
NIAGARA FALLS STORAGE SITE

Location Identifier :			411A	411A	MW423	MW934	MW934
Field Sample Identifier :			411A	411A	MW423	MW934	MW934
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			04/25/13	10/16/13	10/18/13	04/25/13	10/16/13
Parameter	**Units**	**Criteria[1]**					
VOLATILE ORGANIC ANALYSES							
CHLOROETHANE	UG/L	5	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U
CHLOROFORM	UG/L	7	0.19 J	0.19 U	0.19 U	35	5.6
CHLOROMETHANE	UG/L	5	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U
CIS-1,2-DICHLOROETHYLENE	UG/L	5	0.17 U	0.2 J	0.17 U	0.17 U	0.17 U
CIS-1,3-DICHLOROPROPENE	UG/L	0.4	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U
CYCLOHEXANE	UG/L	-	1 U	1 U	1 U	1 U	1 U
DIBROMOCHLOROMETHANE	UG/L	50	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U
DIBROMOMETHANE	UG/L	5	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U
DICHLORODIFLUOROMETHANE	UG/L	5	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U
DIETHYL ETHER (ETHYL ETHER)	UG/L	-	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U
ETHYL METHACRYLATE	UG/L	-	0.18 U	0.18 U	0.18 U	0.18 U	0.18 U
ETHYLBENZENE	UG/L	5	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
HEXACHLOROBUTADIENE	UG/L	0.5	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U
HEXACHLOROETHANE	UG/L	5	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
IODOMETHANE (METHYL IODIDE)	UG/L	5	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U
ISOPROPYL ETHER	UG/L	-	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U
ISOPROPYLBENZENE (CUMENE)	UG/L	5	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U
M+P-XYLENE	UG/L	5	0.46 U	0.46 U	0.46 U	0.46 U	0.46 U
METHYL ACETATE	UG/L	-	1 U	1 U	1 U	1 U	1 U

Concentration Exceeds Criteria

(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

U - Not detected above the reported quantitation limit.; R - The data is rejected.; J - The reported concentration is an estimated value.

NOTE: The detection limits shown are MDL.

TABLE 16
GROUNDWATER ANALYTICAL RESULTS - VOLATILES
NIAGARA FALLS STORAGE SITE

Location Identifier :			411A	411A	MW423	MW934	MW934
Field Sample Identifier :			411A	411A	MW423	MW934	MW934
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			04/25/13	10/16/13	10/18/13	04/25/13	10/16/13
Parameter	**Units**	**Criteria[1]**					
VOLATILE ORGANIC ANALYSES							
METHYL ETHYL KETONE (2-BUTANONE)	UG/L	50	0.28 U	0.28 U	0.28 U	0.28 U	0.28 U
METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	UG/L	-	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
METHYLCYCLOHEXANE	UG/L	-	1 U	1 U	1 U	1 U	1 U
METHYLENE CHLORIDE	UG/L	5	0.2 U	0.2 U	0.2 U	0.68 J	0.2 U
NAPHTHALENE	UG/L	10	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U
N-BUTYLBENZENE	UG/L	5	0.18 U	0.18 U	0.18 U	0.18 U	0.18 U
N-PROPYLBENZENE	UG/L	5	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U
O-XYLENE (1,2-DIMETHYLBENZENE)	UG/L	5	0.23 U	0.23 U	0.23 U	0.23 U	0.23 U
P-CYMENE (P-ISOPROPYLTOLUENE)	UG/L	5	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U
SEC-BUTYLBENZENE	UG/L	5	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U
STYRENE	UG/L	5	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
T-BUTYLBENZENE	UG/L	5	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U
TERT-AMYL METHYL ETHER	UG/L	-	0.23 U	0.23 U	0.23 U	0.23 U	0.23 U
TERT-BUTYL ALCOHOL	UG/L	-	7.5 U	7.5 U	7.5 U	7.5 U	7.5 U
TERT-BUTYL ETHYL ETHER	UG/L	-	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
TERT-BUTYL METHYL ETHER	UG/L	10	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U
TETRACHLOROETHYLENE(PCE)	UG/L	5	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U
TETRAHYDROFURAN	UG/L	-	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
TOLUENE	UG/L	5	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U

Concentration Exceeds Criteria

(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

U - Not detected above the reported quantitation limit.; R - The data is rejected.; J - The reported concentration is an estimated value.

NOTE: The detection limits shown are MDL.

TABLE 16
GROUNDWATER ANALYTICAL RESULTS - VOLATILES
NIAGARA FALLS STORAGE SITE

Location Identifier :			411A	411A	MW423	MW934	MW934
Field Sample Identifier :			411A	411A	MW423	MW934	MW934
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			04/25/13	10/16/13	10/18/13	04/25/13	10/16/13
Parameter	**Units**	**Criteria[1]**					
VOLATILE ORGANIC ANALYSES							
TRANS-1,2-DICHLOROETHENE	UG/L	5	0.18 U	0.18 U	0.18 U	0.18 U	0.18 U
TRANS-1,3-DICHLOROPROPENE	UG/L	0.4	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
TRANS-1,4-DICHLORO-2-BUTENE	UG/L	5	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
TRICHLOROETHANE	UG/L	5	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U
TRICHLOROETHYLENE (TCE)	UG/L	5	0.27 U	0.31 J	0.27 U	0.27 U	0.27 U
TRICHLOROFLUOROMETHANE	UG/L	5	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U
VINYL CHLORIDE	UG/L	2	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U
XYLENES, TOTAL	UG/L	-	0.66 U	0.66 U	0.66 U	0.66 U	0.66 U

Concentration Exceeds Criteria

(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

U - Not detected above the reported quantitation limit.; R - The data is rejected.; J - The reported concentration is an estimated value.

NOTE: The detection limits shown are MDL.

TABLE 16
GROUNDWATER ANALYTICAL RESULTS - VOLATILES
NIAGARA FALLS STORAGE SITE

Location Identifier :			MW948	MW948	MW949	MW949
Field Sample Identifier :			GW948	MW948	MW949	MW949
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-
Date of Sample :			04/24/13	10/16/13	04/24/13	10/17/13
Parameter	**Units**	**Criteria[1]**				
VOLATILE ORGANIC ANALYSES						
1,1,1,2-TETRACHLOROETHANE	UG/L	5	0.26 U	0.26 U	0.26 U	0.26 U
1,1,2,2-TETRACHLOROETHANE	UG/L	5	0.29 U	0.29 U	0.29 U	0.29 U
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	UG/L	5	0.26 U	0.26 U	0.26 U	0.26 U
1,1,2-TRICHLOROETHANE	UG/L	1	0.27 U	0.27 U	0.27 U	0.27 U
1,1-DICHLOROETHANE	UG/L	5	0.25 U	0.25 U	0.25 U	0.25 U
1,1-DICHLOROETHENE	UG/L	5	0.19 U	0.19 U	0.19 U	0.19 U
1,1-DICHLOROPROPENE	UG/L	5	0.26 U	0.26 U	0.26 U	0.26 U
1,2,3-TRICHLOROBENZENE	UG/L	5	0.38 U	0.38 U	0.38 U	0.38 U
1,2,3-TRICHLOROPROPANE	UG/L	0.04	0.79 U	0.79 U	0.79 U	0.79 U
1,2,3-TRIMETHYLBENZENE	UG/L	-	0.19 U	0.19 U	0.19 U	0.19 U
1,2,4-TRICHLOROBENZENE	UG/L	5	0.17 U	0.17 U	0.17 U	0.17 U
1,2,4-TRIMETHYLBENZENE	UG/L	5	0.21 U	0.21 U	0.21 U	0.21 U
1,2-DIBROMO-3-CHLOROPROPANE	UG/L	0.04	0.25 U	0.25 U	0.25 U	0.25 U
1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	UG/L	0.006	0.18 U	0.18 U	0.18 U	0.18 U
1,2-DICHLOROBENZENE	UG/L	3	0.25 U	0.25 U	0.25 U	0.25 U
1,2-DICHLOROETHANE	UG/L	0.6	0.19 U	0.19 U	0.19 U	0.19 U
1,2-DICHLOROPROPANE	UG/L	1	0.35 U	0.35 U	0.35 U	0.35 U
1,3,5-TRIMETHYLBENZENE (MESITYLENE)	UG/L	5	0.21 U	0.21 U	0.21 U	0.21 U
1,3-DICHLOROBENZENE	UG/L	3	0.21 U	0.21 U	0.65 J	0.5 J

Concentration Exceeds Criteria

(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

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NOTE: The detection limits shown are MDL.

TABLE 16
GROUNDWATER ANALYTICAL RESULTS - VOLATILES
NIAGARA FALLS STORAGE SITE

Location Identifier :			MW948	MW948	MW949	MW949
Field Sample Identifier :			GW948	MW948	MW949	MW949
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-
Date of Sample :			04/24/13	10/16/13	04/24/13	10/17/13
Parameter	**Units**	**Criteria[1]**				
VOLATILE ORGANIC ANALYSES						
1,3-DICHLOROPROPANE	UG/L	5	0.23 U	0.23 U	0.23 U	0.23 U
1,4-DICHLOROBENZENE	UG/L	3	0.18 U	0.18 U	0.18 U	0.18 U
2,2-DICHLOROPROPANE	UG/L	5	0.44 U	0.44 U	0.44 U	0.44 U
2-CHLOROETHYL VINYL ETHER	UG/L	-	0.24 U	0.24 U	0.24 U	0.24 U
2-CHLOROTOLUENE	UG/L	-	0.21 U	0.21 U	0.21 U	0.21 U
2-HEXANONE	UG/L	50	0.21 U	0.21 U	0.21 U	0.21 U
2-METHYLNAPHTHALENE	UG/L	-	0.74 U	0.74 U	0.74 U	0.74 U
4-CHLOROTOLUENE	UG/L	-	0.72 U	0.72 U	0.72 U	0.72 U
ACETONE	UG/L	50	0.44 U	0.44 U	15	9.6 J
ACRYLONITRILE	UG/L	5	0.65 U	0.65 U	0.65 U	0.65 U
BENZENE	UG/L	1	0.2 U	0.2 U	0.2 U	0.2 U
BROMOBENZENE	UG/L	-	0.24 U	0.24 U	0.24 U	0.24 U
BROMOCHLOROMETHANE	UG/L	5	0.2 U	0.2 U	0.2 U	0.2 U
BROMODICHLOROMETHANE	UG/L	50	0.18 U	0.18 U	0.18 U	0.18 U
BROMOFORM	UG/L	50	0.33 U	0.33 U	0.33 U	0.33 U
BROMOMETHANE	UG/L	5	1.2 U	1.2 U	1.2 U	1.2 U
CARBON DISULFIDE	UG/L	60	0.15 U	0.15 U	0.84 J	1.7
CARBON TETRACHLORIDE	UG/L	5	0.36 U	0.36 U	0.36 U	0.36 U
CHLOROBENZENE	UG/L	5	0.22 U	0.22 U	0.22 U	0.22 U

Concentration Exceeds Criteria

(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

U - Not detected above the reported quantitation limit.; R - The data is rejected.; J - The reported concentration is an estimated value.

NOTE: The detection limits shown are MDL.

TABLE 16
GROUNDWATER ANALYTICAL RESULTS - VOLATILES
NIAGARA FALLS STORAGE SITE

Location Identifier :			MW948	MW948	MW949	MW949
Field Sample Identifier :			GW948	MW948	MW949	MW949
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-
Date of Sample :			04/24/13	10/16/13	04/24/13	10/17/13
Parameter	**Units**	**Criteria[1]**				
VOLATILE ORGANIC ANALYSES						
CHLOROETHANE	UG/L	5	0.42 U	0.42 U	0.42 U	0.42 U
CHLOROFORM	UG/L	7	0.19 U	0.19 U	0.19 U	0.19 U
CHLOROMETHANE	UG/L	5	0.22 U	0.22 U	0.22 U	0.22 U
CIS-1,2-DICHLOROETHYLENE	UG/L	5	0.17 U	0.17 U	0.17 U	0.17 U
CIS-1,3-DICHLOROPROPENE	UG/L	0.4	0.17 U	0.17 U	0.17 U	0.17 U
CYCLOHEXANE	UG/L	-	1 U	1 U	1 U	1 U
DIBROMOCHLOROMETHANE	UG/L	50	0.21 U	0.21 U	0.21 U	0.21 U
DIBROMOMETHANE	UG/L	5	0.29 U	0.29 U	0.29 U	0.29 U
DICHLORODIFLUOROMETHANE	UG/L	5	0.24 U	0.24 U	0.24 U	0.24 U
DIETHYL ETHER (ETHYL ETHER)	UG/L	-	0.24 U	0.24 U	0.24 U	0.24 U
ETHYL METHACRYLATE	UG/L	-	0.18 U	0.18 U	0.18 U	0.18 U
ETHYLBENZENE	UG/L	5	0.2 U	0.2 U	0.2 U	0.2 U
HEXACHLOROBUTADIENE	UG/L	0.5	0.7 U	0.7 U	0.7 U	0.7 U
HEXACHLOROETHANE	UG/L	5	0.2 U	0.2 U	0.2 U	0.2 U
IODOMETHANE (METHYL IODIDE)	UG/L	5	0.9 U	0.9 U	0.9 U	0.9 U
ISOPROPYL ETHER	UG/L	-	0.29 U	0.29 U	0.29 U	0.29 U
ISOPROPYLBENZENE (CUMENE)	UG/L	5	0.21 U	0.21 U	0.21 U	0.21 U
M+P-XYLENE	UG/L	5	0.46 U	0.46 U	0.46 U	0.46 U
METHYL ACETATE	UG/L	-	1 U	1 U	1 U	1 U

Concentration Exceeds Criteria

(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

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TABLE 16
GROUNDWATER ANALYTICAL RESULTS - VOLATILES
NIAGARA FALLS STORAGE SITE

Location Identifier :			MW948	MW948	MW949	MW949
Field Sample Identifier :			GW948	MW948	MW949	MW949
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-
Date of Sample :			04/24/13	10/16/13	04/24/13	10/17/13
Parameter	**Units**	**Criteria[1]**				
VOLATILE ORGANIC ANALYSES						
METHYL ETHYL KETONE (2-BUTANONE)	UG/L	50	0.28 U	0.28 U	0.28 U	0.28 U
METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	UG/L	-	0.4 U	0.4 U	0.4 U	0.4 U
METHYLCYCLOHEXANE	UG/L	-	1 U	1 U	1 U	1 U
METHYLENE CHLORIDE	UG/L	5	0.2 U	0.2 U	0.2 U	0.2 U
NAPHTHALENE	UG/L	10	0.24 U	0.24 U	0.24 U	0.24 U
N-BUTYLBENZENE	UG/L	5	0.18 U	0.18 U	0.18 U	0.18 U
N-PROPYLBENZENE	UG/L	5	0.16 U	0.16 U	0.16 U	0.16 U
O-XYLENE (1,2-DIMETHYLBENZENE)	UG/L	5	0.23 U	0.23 U	0.23 U	0.23 U
P-CYMENE (P-ISOPROPYLTOLUENE)	UG/L	5	0.19 U	0.19 U	0.19 U	0.19 U
SEC-BUTYLBENZENE	UG/L	5	0.16 U	0.16 U	0.16 U	0.16 U
STYRENE	UG/L	5	0.2 U	0.2 U	0.2 U	0.2 U
T-BUTYLBENZENE	UG/L	5	0.17 U	0.17 U	0.17 U	0.17 U
TERT-AMYL METHYL ETHER	UG/L	-	0.23 U	0.23 U	0.23 U	0.23 U
TERT-BUTYL ALCOHOL	UG/L	-	7.5 U	7.5 U	7.5 U	7.5 U
TERT-BUTYL ETHYL ETHER	UG/L	-	0.2 U	0.2 U	0.2 U	0.2 U
TERT-BUTYL METHYL ETHER	UG/L	10	0.17 U	0.17 U	0.17 U	0.17 U
TETRACHLOROETHYLENE(PCE)	UG/L	5	0.26 U	0.26 U	0.26 U	0.26 U
TETRAHYDROFURAN	UG/L	-	0.4 U	0.4 U	0.4 U	0.4 U
TOLUENE	UG/L	5	0.2 U	0.2 U	0.2 U	0.2 U

Concentration Exceeds Criteria

(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

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NOTE: The detection limits shown are MDL.

TABLE 16
GROUNDWATER ANALYTICAL RESULTS - VOLATILES
NIAGARA FALLS STORAGE SITE

Location Identifier :			MW948	MW948	MW949	MW949
Field Sample Identifier :			GW948	MW948	MW949	MW949
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-
Date of Sample :			04/24/13	10/16/13	04/24/13	10/17/13
Parameter	**Units**	**Criteria[1]**				
VOLATILE ORGANIC ANALYSES						
TRANS-1,2-DICHLOROETHENE	*UG/L*	5	0.18 U	0.18 U	0.18 U	0.18 U
TRANS-1,3-DICHLOROPROPENE	*UG/L*	0.4	0.2 U	0.2 U	0.2 U	0.2 U
TRANS-1,4-DICHLORO-2-BUTENE	*UG/L*	5	0.25 U	0.25 U	0.25 U	0.25 U
TRICHLOROETHANE	*UG/L*	5	0.16 U	0.16 U	0.16 U	0.16 U
TRICHLOROETHYLENE (TCE)	*UG/L*	5	0.27 U	0.27 U	0.27 U	0.27 U
TRICHLOROFLUOROMETHANE	*UG/L*	5	0.26 U	0.26 U	0.26 U	0.26 U
VINYL CHLORIDE	*UG/L*	2	0.24 U	0.24 U	0.24 U	0.24 U
XYLENES, TOTAL	*UG/L*	-	0.66 U	0.66 U	0.66 U	0.66 U

Concentration Exceeds Criteria

(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

U - Not detected above the reported quantitation limit.; R - The data is rejected.; J - The reported concentration is an estimated value.

NOTE: The detection limits shown are MDL.

FIGURES

Acronyms and Abbreviations

amsl	above mean sea level
AV	average
BKGD	background
EU	exposure unit
ft	feet
IWCS	Interim Waste Containment Structure
MCL	maximum contaminant level
mrem/y	millirem per year
NFSS	Niagara Falls Storage Site
NGVD 88	national geodetic vertical datum 1988
OSL	optically stimulated luminescence
pCi/g	picocuries per gram
RD	road
RI	remedial investigation
ST	street
SDWA	Safe Drinking Water Act
TLD	thermo luminescent dosimeter
µg/L	micrograms per liter

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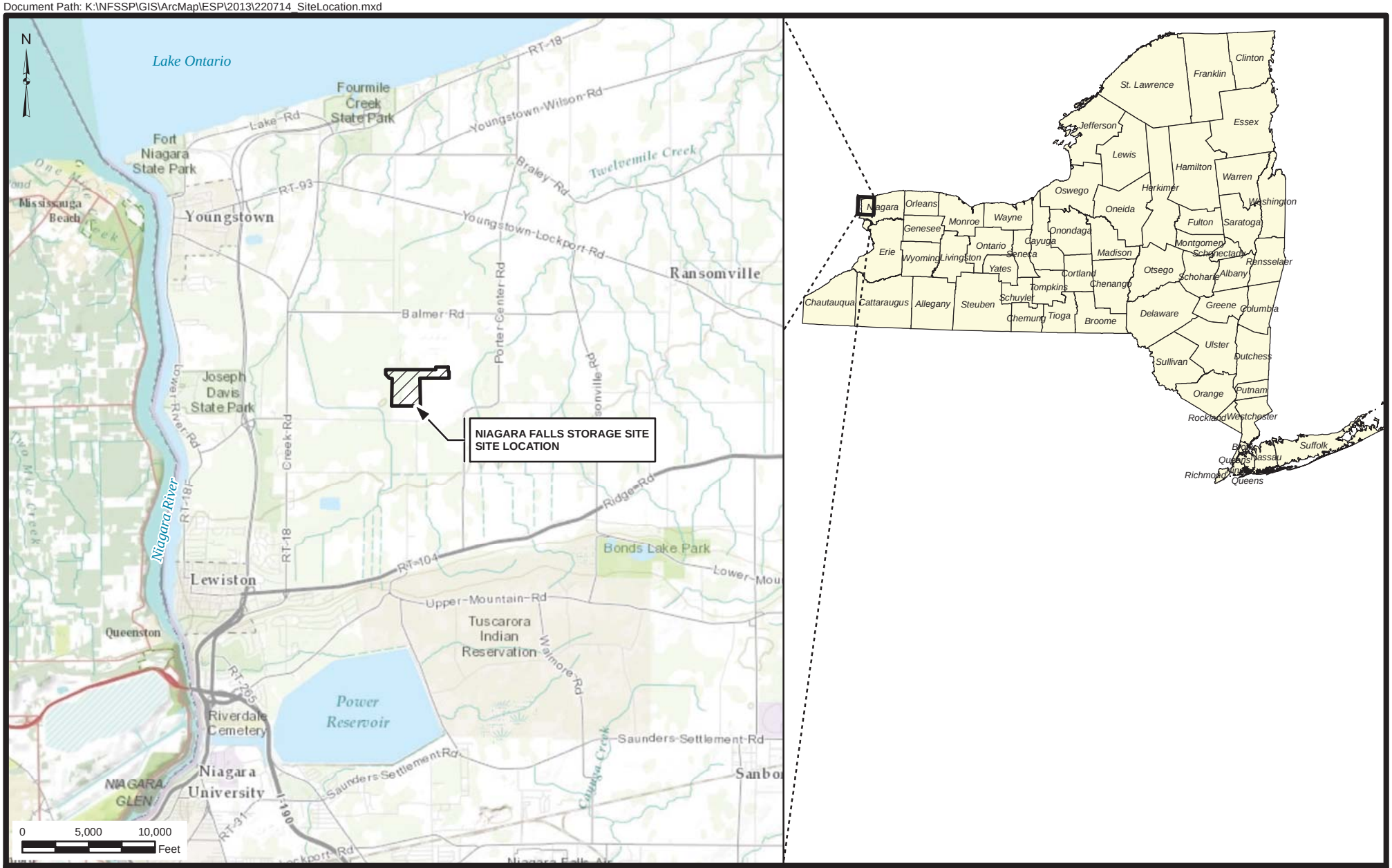

U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS BUFFALO, NY	SITE LOCATION MAP	
Document Name: 220714_SiteLocation.mxd Drawn By: H5TDESPM Date Saved: 23 Jul 2014 Time Saved: 11:04:05 AM	NIAGARA FALLS STORAGE SITE LEWISTON, NEW YORK	FIGURE 1

N

1 2 3 4 5 6 7 8 9 10 11 12 13 14

445 443 444 431/432 434 428 430 458 425 421 423 422 427 420 403 429 401 411 414 413 410 412 409

WEST PATROL RD.
LUTTS RD.
CAMPBELL ST.
"N" ST.
"N" ST. SOUTH POND
MACARTHUR ST.
434 POND
STOCKPILE
"O" ST.
"O" ST. NORTH POND
"O" ST. SOUTH DITCH
"W" ST.
EIGHTH ST.
"X" ST.
SEVENTH ST.
SIXTH ST.
"Z" ST.
POND 5
POND 4
POND 3
POND 2
POND 1
CENTRAL DITCH
WEST DITCH
IWCS
NORTH POND
SOUTH POND
SOUTH 16 DITCH
SOUTH 31 DITCH
CASTLEGARDEN RD.
CAMPBELL ST.
STOCKPILE AREA
"R" ST.
MODERN DITCH

Legend

- Ephemeral Ditchs
- IWCS Cutoff Wall
- Former Remedial Structures
- Surface Water Features
- NFSS Site Roads
- Railroads
- EU Boundaries
- Structure (Active)
- Structure (Abandoned Above Grade)
- Former Structure
- Acid Sewer
- Water Line
- Culvert
- Fuel Line
- Sanitary Sewer
- Storm Sewer

0 175 350 700 Feet

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BUFFALO, NY

SITE PLAN

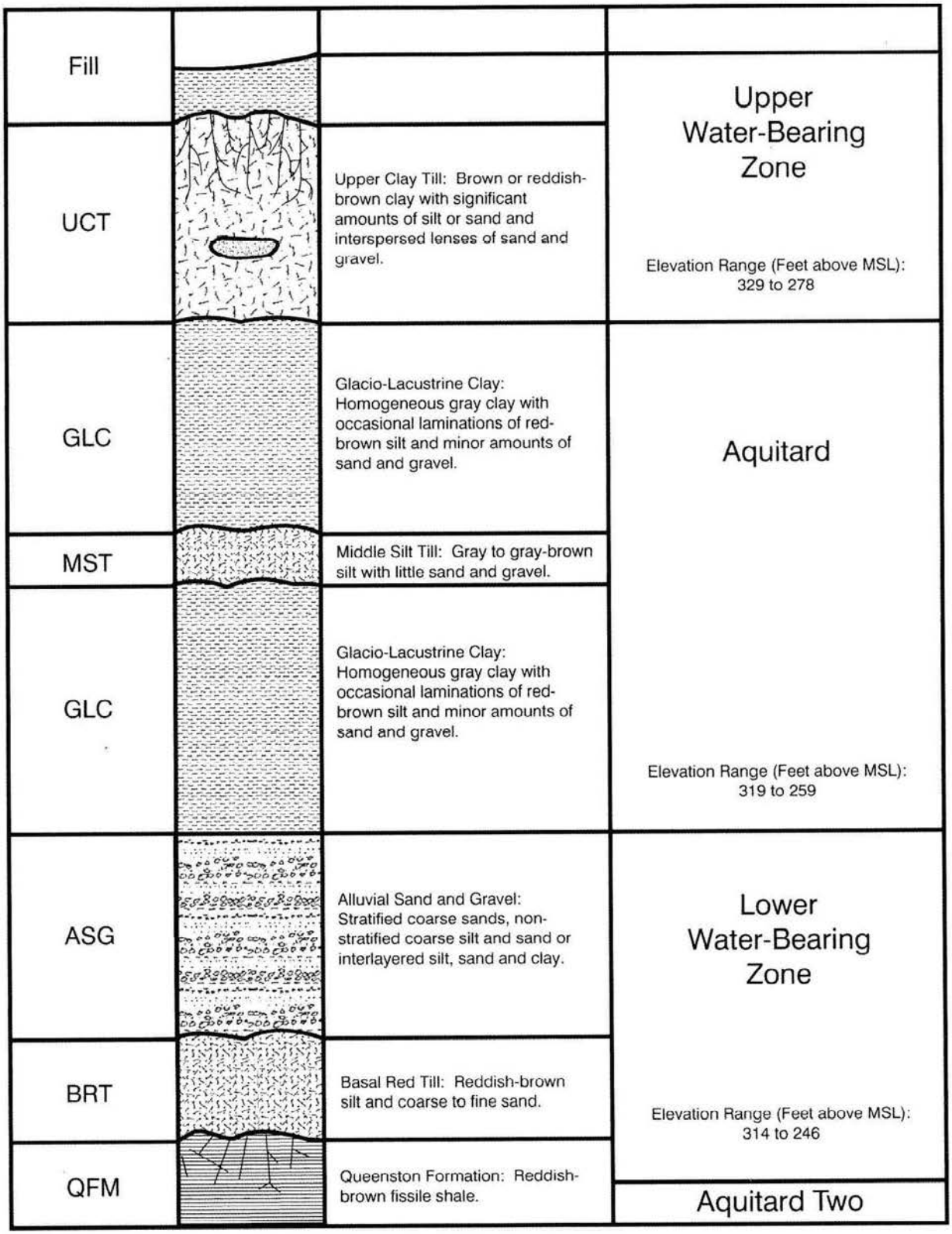
Document Name: 220714_SitePlan.mxd
Drawn By: H5TDESPM
Date Saved: 25 Jul 2014
Time Saved: 1:14:51 PM

NIAGARA FALLS STORAGE SITE
LEWISTON, NEW YORK

FIGURE 2

Document Path: K:\NFSSPG\S\ArcMap\ESP\2013\220714_SitePlan.mxd

N



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Buffalo District

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BUFFALO, NY

SCHEMATIC OF CONCEPTUALIZED HYDROSTRATIGRAPHY

Name: Figure03_Hydrostratigraphy.mxd
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Date Saved: 07 Sep 2012
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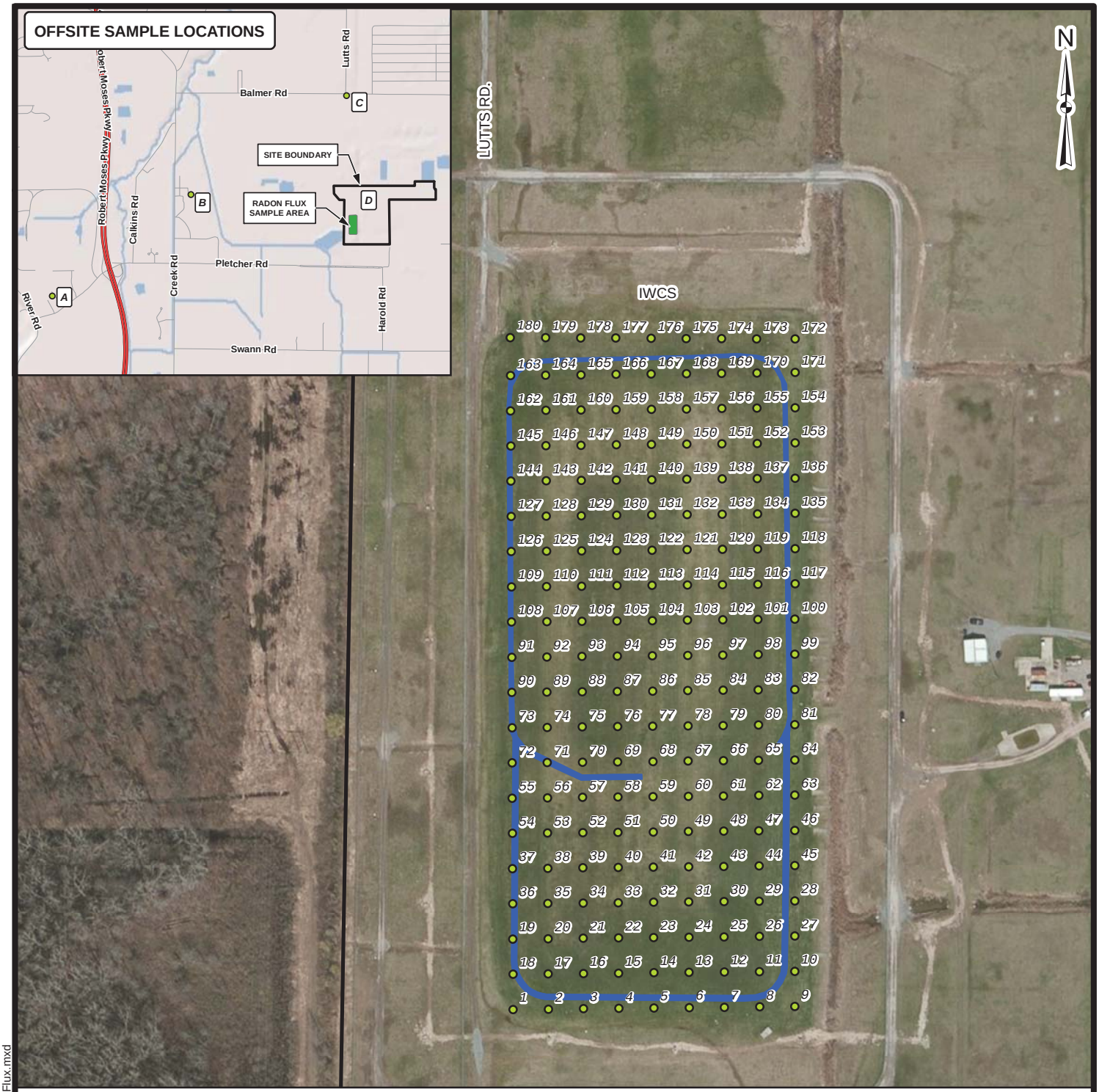
NIAGARA FALLS STORAGE SITE
LEWISTON, NEW YORK

FIGURE 3

Document Path: K:\NFSSP\GIS\ArcMap\ESP\2011\Figure03_Hydrostratigraphy.mxd



Legend

- Radon Flux Location
- IWCS Cutoff Wall
- NFSS Site Boundary

A - Lewiston Water Pollution Control Center
B - Lewiston Porter School Campus
C - Balmer Road Location
D - Niagara Falls Storage Site

Locations A, B, and C are background locations for Radon Flux Sampling.

0 100 200 400 Feet

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BUFFALO, NY

LOCATIONS OF RADON FLUX MEASUREMENTS ON THE IWCS

Name: 220714_ESPRadonFlux.mxd
Drawn By: H5TDESPM
Date Saved: 23 Jul 2014
Time Saved: 9:52:36 AM

NIAGARA FALLS STORAGE SITE
LEWISTON, NEW YORK

FIGURE 4

Document Path: K:\NFSSP\GIS\ArcMap\ESP\2013\220714_ESPRadonFlux.mxd

Legend

- Monitoring Well (Sampled Quarterly)
- Monitoring Well (Sampled Bi-Annually)
- NFSS Site Boundary

0 175 350 700 Feet

Document Path: K:\NFSSP\GIS\ArcMap\ESP\2013\220714_ESPSampleWells.mxd

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MONITORING WELL LOCATION MAP

Name: 220714_ESPSampleWells.mxd
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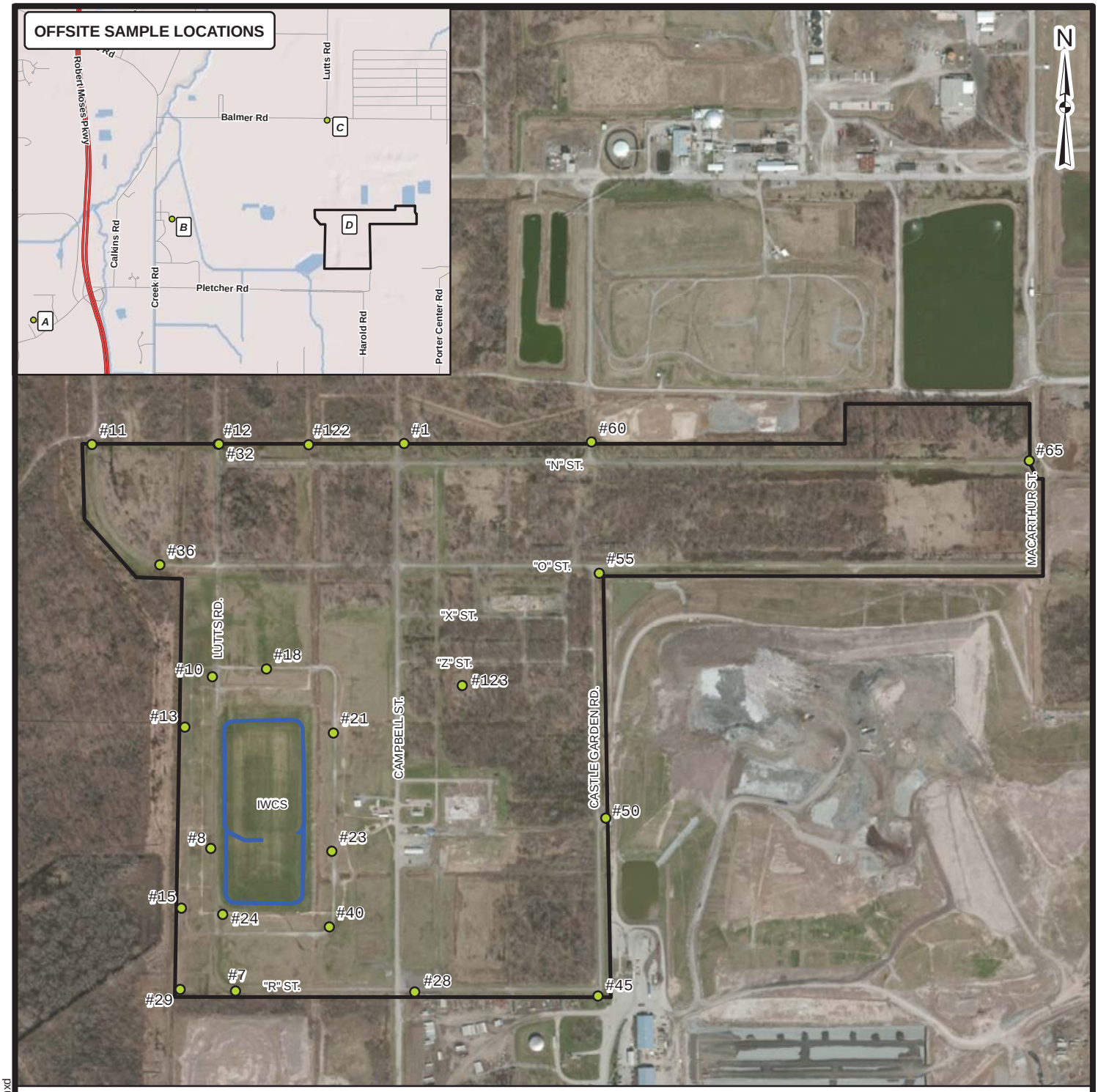
Date Saved: 23 Jul 2014
Time Saved: 11:14:10 AM

NIAGARA FALLS STORAGE SITE
LEWISTON, NEW YORK

FIGURE 5



Legend

- OSL's / RadTrack Detectors
- IWCS Cutoff Wall
- NFSS Site Boundary

A - Lewiston Water Pollution Control Center
B - Lewiston Porter School Campus
C - Balmer Road Location
D - Niagara Falls Storage Site

Locations A, B, and C are background locations for OSL and RadTrack Sampling.

0 350 700 1,400 Feet

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BUFFALO, NY

LOCATION OF RADTRACK DETECTORS AND OSL'S

Name: 220714_ESPTLD.mxd
Drawn By: H5TDESPM
Date Saved: 23 Jul 2014
Time Saved: 10:47:50 AM

NIAGARA FALLS STORAGE SITE
LEWISTON, NEW YORK

FIGURE 6

Document Path: K:\NFSSP\GIS\ArcMap\ESP\2013\220714_ESPTLD.mxd

Legend

- Surface Water/Sediment Sample Location
- NFSS Site Boundary

0 175 350 700 Feet

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BUFFALO, NY

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Buffalo District

SURFACE WATER/SEDIMENT SAMPLING LOCATION MAP

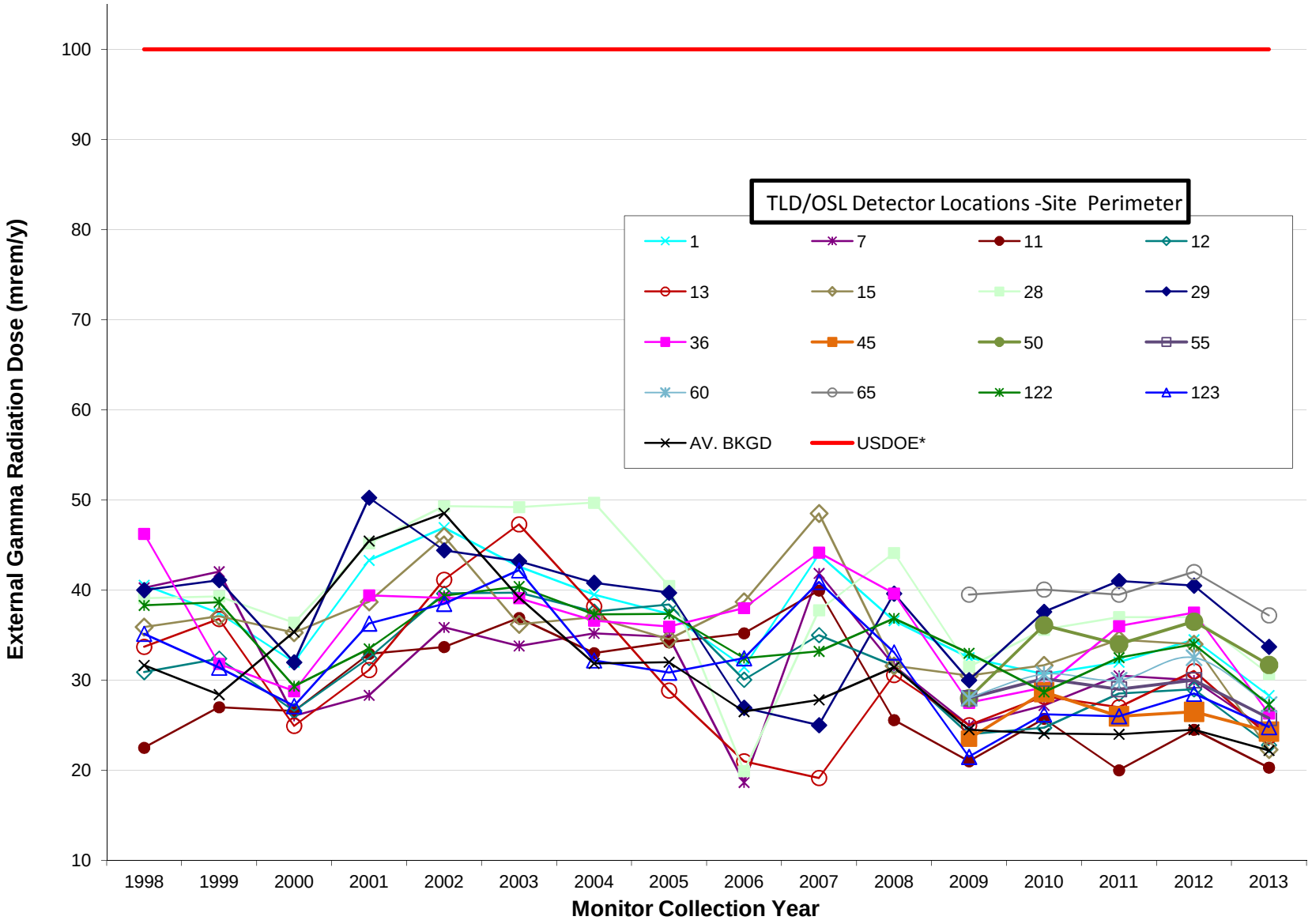
Name: 130321_SWaterSed_Aerial.mxd
Drawn By: H5TDESPM
Date Saved: 30 Apr 2013
Time Saved: 12:26:07 PM

NIAGARA FALLS STORAGE SITE
LEWISTON, NEW YORK

FIGURE 7

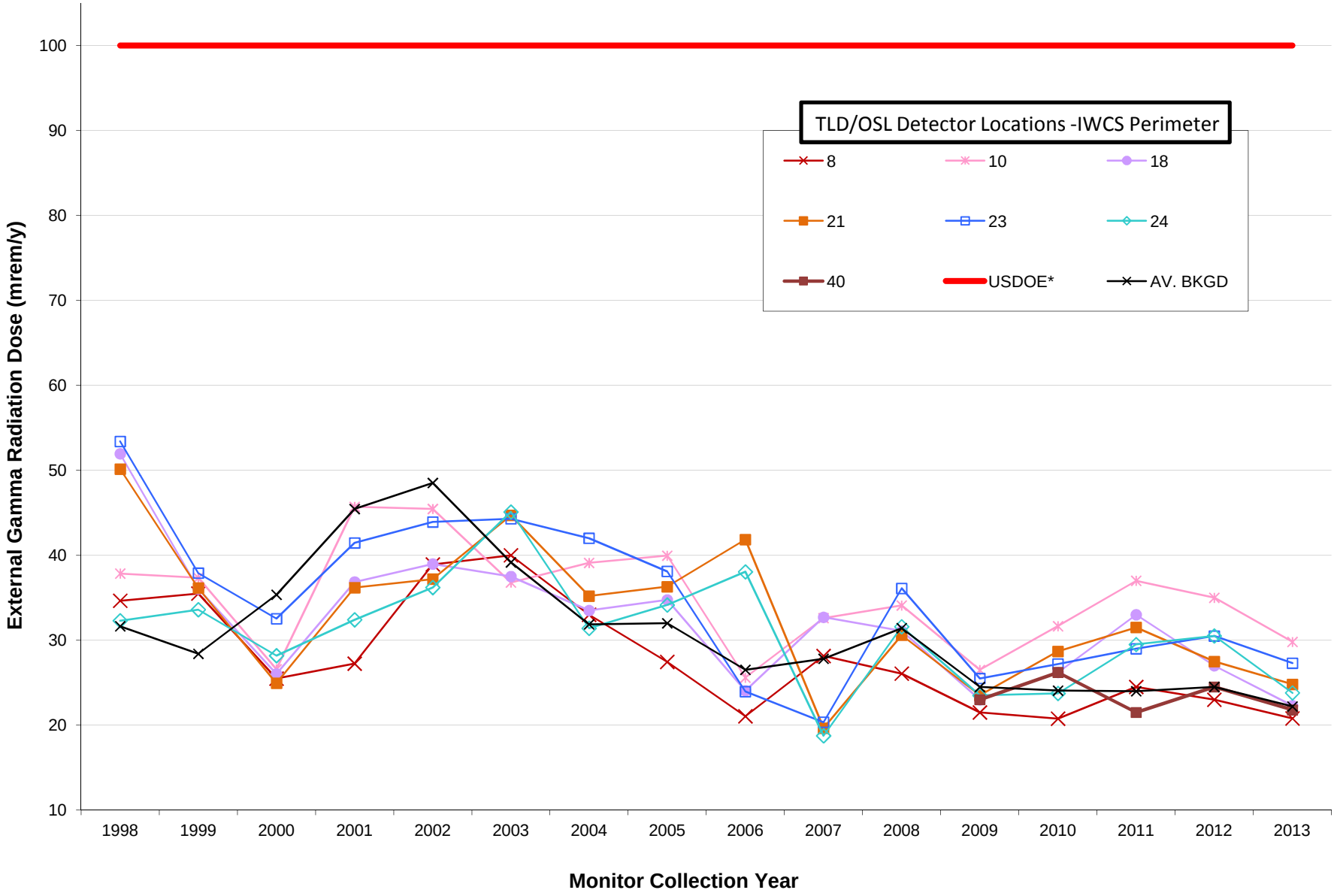
Document Path: K:\NFSSP\GIS\ArcMap\Sampling_Locations\130321_SWaterSed_Aerial.mxd

FIGURE 8
EXTERNAL GAMMA RADIATION DOSE RATES AT NFSS PERIMETER



*The United States Department of Energy (USDOE) limit for external gamma radiation is 100 mrem/year above background but the value for each detector location includes background.

FIGURE 9
EXTERNAL GAMMA RADIATION DOSE RATES AT IWCS PERIMETER



*The United States Department of Energy (USDOE) limit for external gamma radiation is 100 mrem/year above background but the value shown for each detector location includes background.

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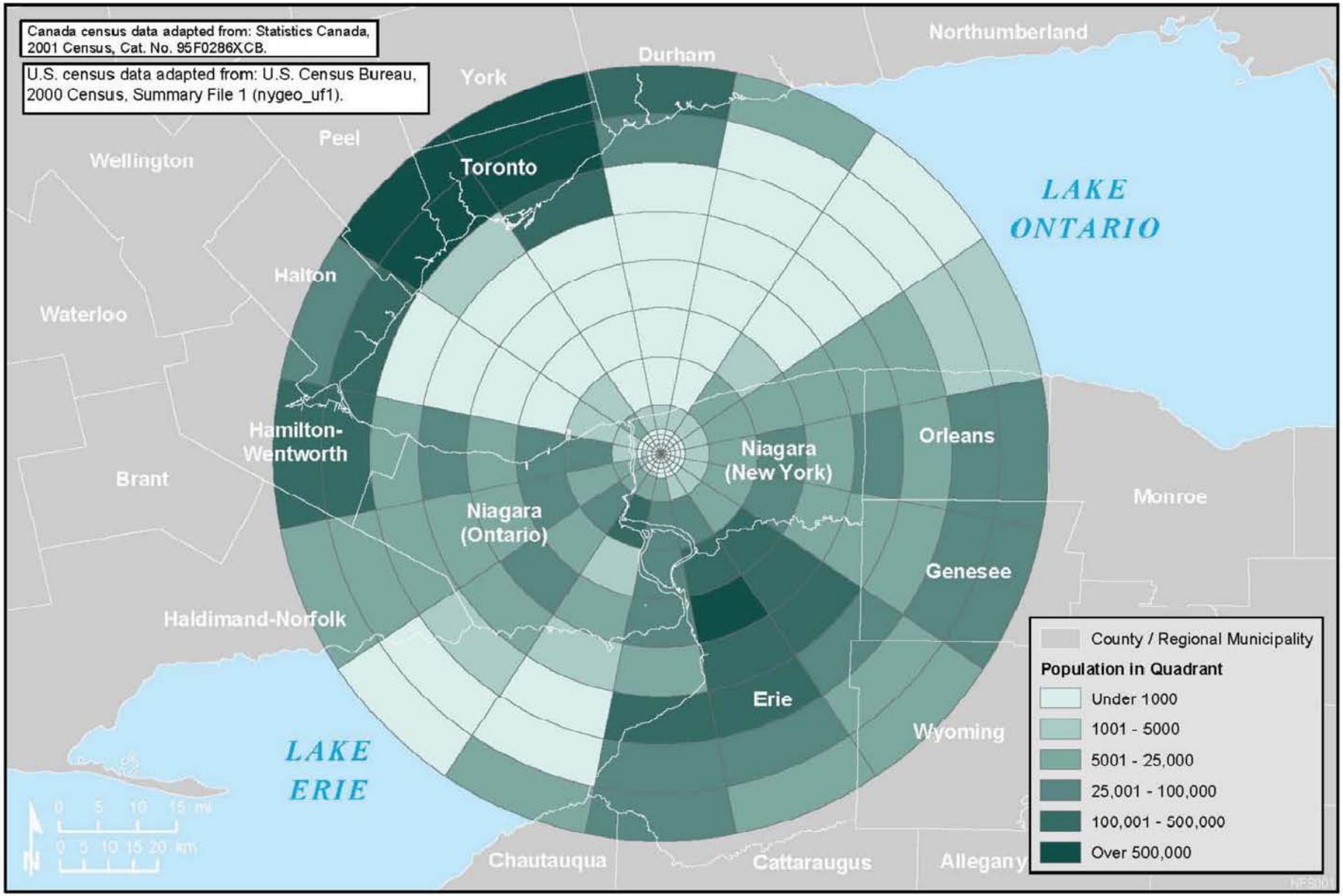

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CENSUS DATA

Document Name: Figure10_CensusData.mxd
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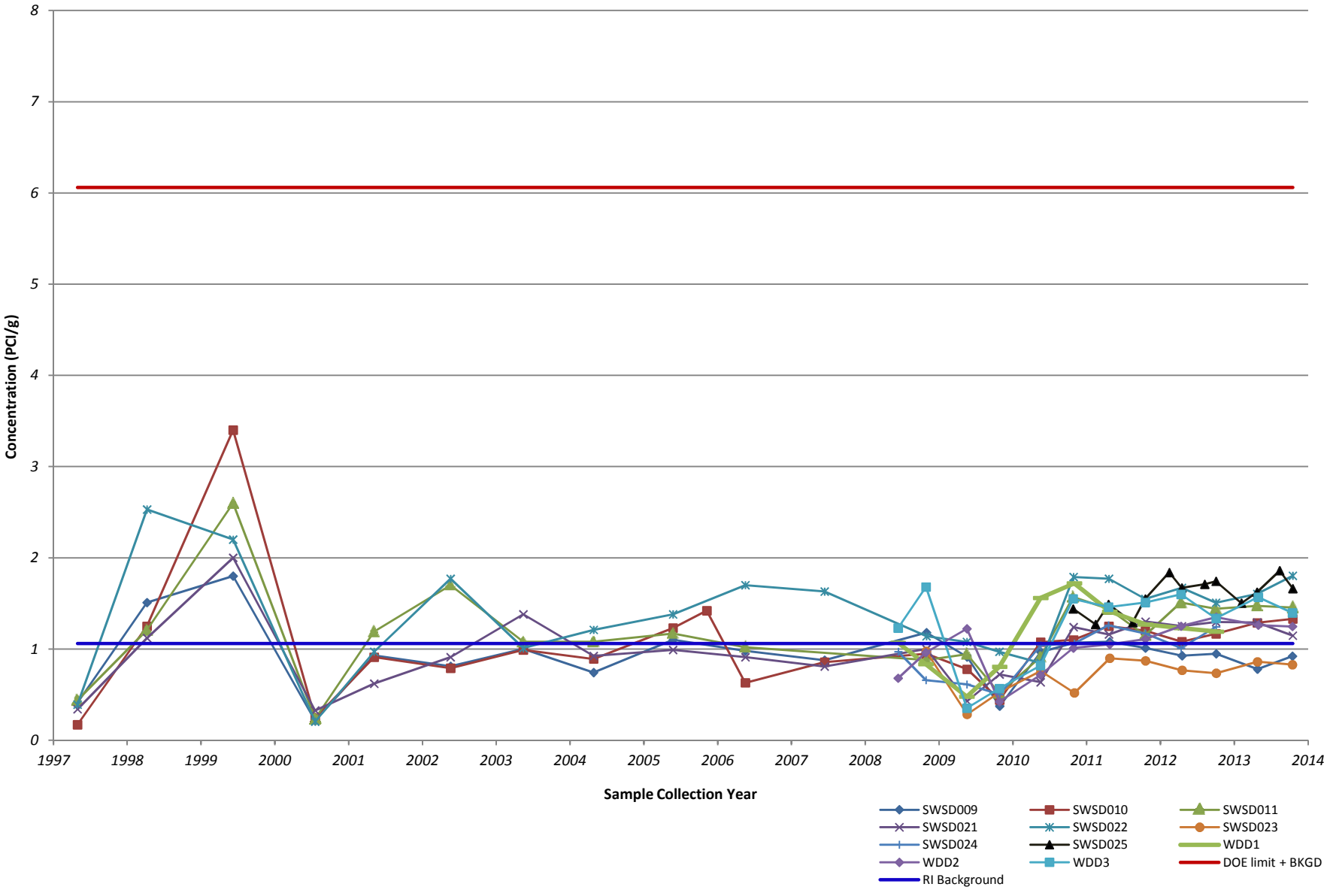
Date Saved: 10 Sep 2012
Time Saved: 7:53:42 AM

NIAGARA FALLS STORAGE SITE
LEWISTON, NEW YORK

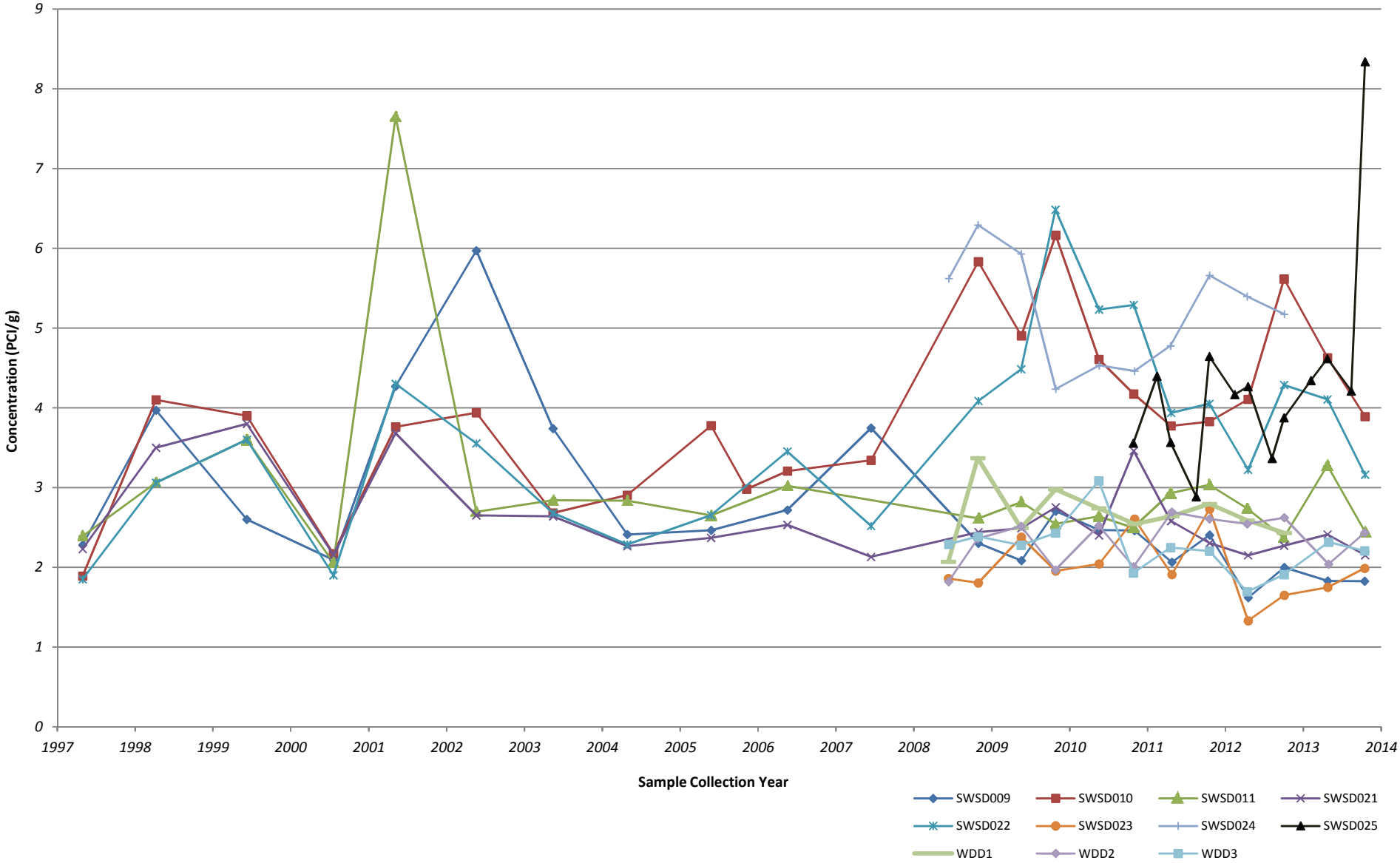
FIGURE 10

FIGURE 11
RADIUM-226 CONCENTRATIONS IN SEDIMENT
1997 - 2013



K:\EDMS\Program\NFSS\Printing\EDMS.mdb
Copy of Fig_11_and_12_ESP_Graphs_sed_only.xlsx, Radium-226 (Sediment), 6/26/2014

FIGURE 12
TOTAL URANIUM CONCENTRATIONS IN SEDIMENT
1997 - 2013



K:\EDMS\Program\NFSS\Printing\EDMS.mdb
Copy of Fig_11_and_12_ESP_Graphs_sed_only.xlsx, Total Uranium (Sediment), 6/26/2014

Legend

- Monitoring Well (Lower Water Bearing Zone)
- Groundwater Potentiometric Surface (ft amsl)
- Groundwater Flow Direction
- NFSS Site Boundary

NOTES:
1) All elevations are represented in NGVD 88.

0 175 350 700 Feet

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U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
BUFFALO, NY

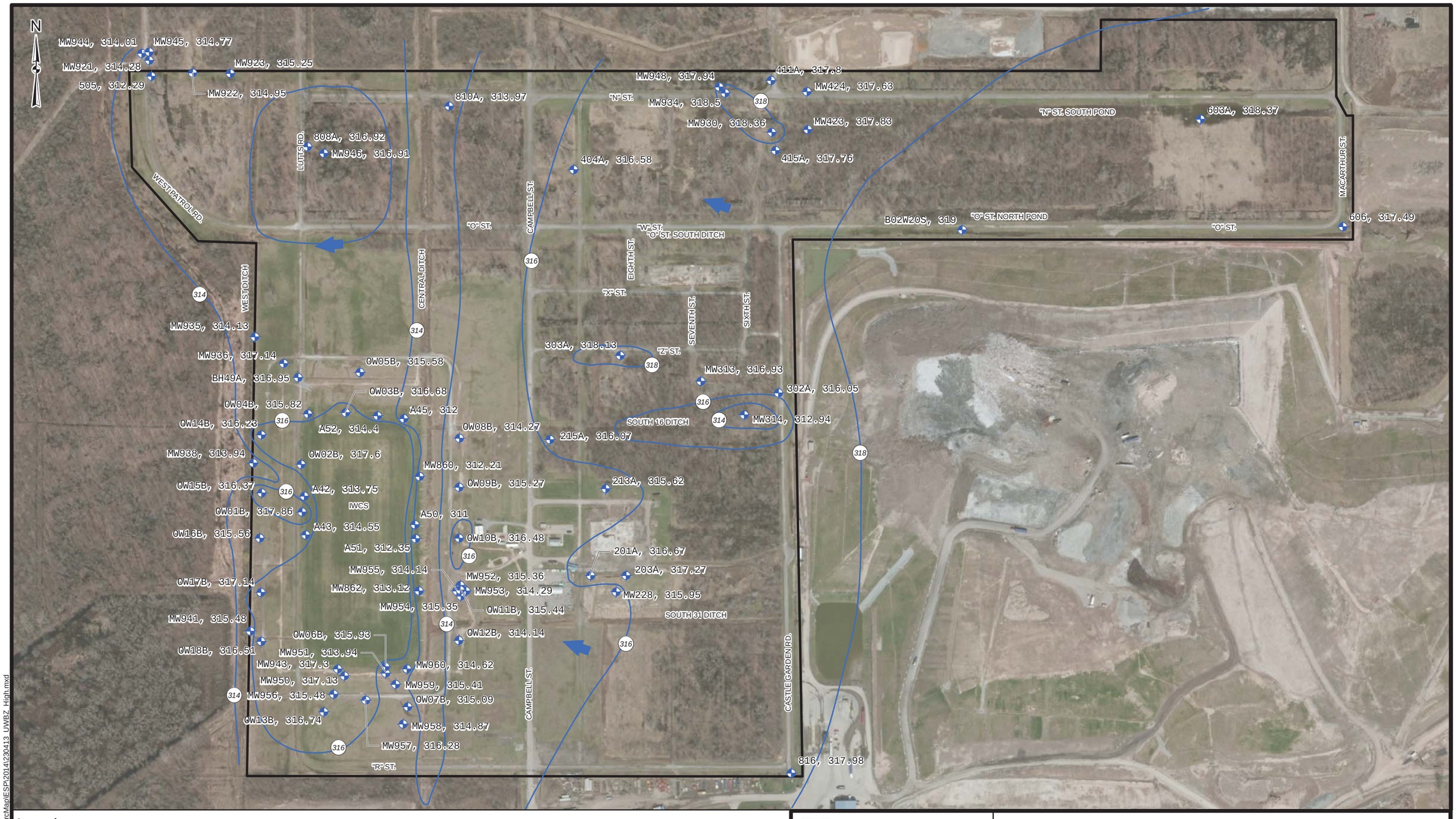
GROUNDWATER POTENTIOMETRIC SURFACE MAP FOR THE LOWER WATER BEARING ZONE (AUGUST 13, 2013 - SEASONAL HIGH)

Name: 130813_LWBZ_High.mxd
Drawn By: H5TDESPM
Date Saved: 12 Jun 2014
Time Saved: 9:38:16 AM

NIAGARA FALLS STORAGE SITE
LEWISTON, NEW YORK

FIGURE 13

Document Path: K:\NFSSP\GIS\ArcMap\ESP\20141130813_LWBZ_High.mxd



Legend

- Monitoring Well (Upper Water Bearing Zone)
- Groundwater Potentiometric Surface (ft amsl)
- Groundwater Flow Direction
- NFSS Site Boundary

NOTES:
1) All elevations are represented in NGVD 88.

0 175 350 700 Feet

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BUFFALO, NY

US Army Corps of Engineers
Buffalo District

GROUNDWATER POTENTIOMETRIC SURFACE MAP FOR THE UPPER WATER BEARING ZONE (APRIL 23, 2013 - SEASONAL HIGH)

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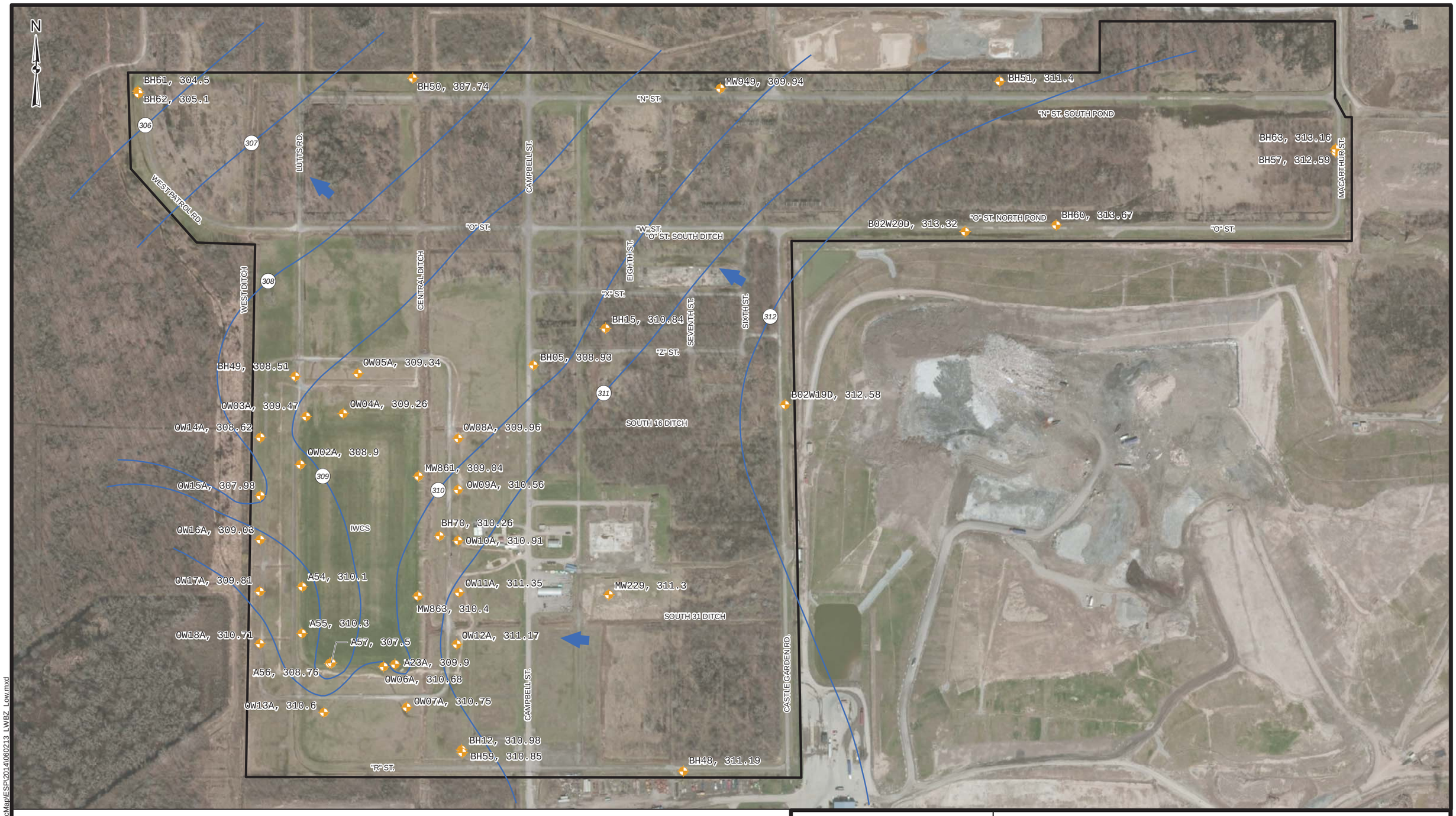
Date Saved: 12 Jun 2014
Time Saved: 9:38:12 AM

NIAGARA FALLS STORAGE SITE
LEWISTON, NEW YORK

FIGURE 14

Document Path: K:\NFSSP\GIS\ArcMap\ESP\20141230413_UWBZ_High.mxd



Legend

- Monitoring Well (Lower Water Bearing Zone)
- Groundwater Potentiometric Surface (ft amsl)
- Groundwater Flow Direction
- NFSS Site Boundary

NOTES:
1) All elevations are represented in NGVD 88.

0 175 350 700 Feet

US Army Corps of Engineers Buffalo District

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BUFFALO, NY

GROUNDWATER POTENTIOMETRIC SURFACE MAP FOR THE LOWER WATER BEARING ZONE (FEBRUARY 6, 2013 - SEASONAL LOW)

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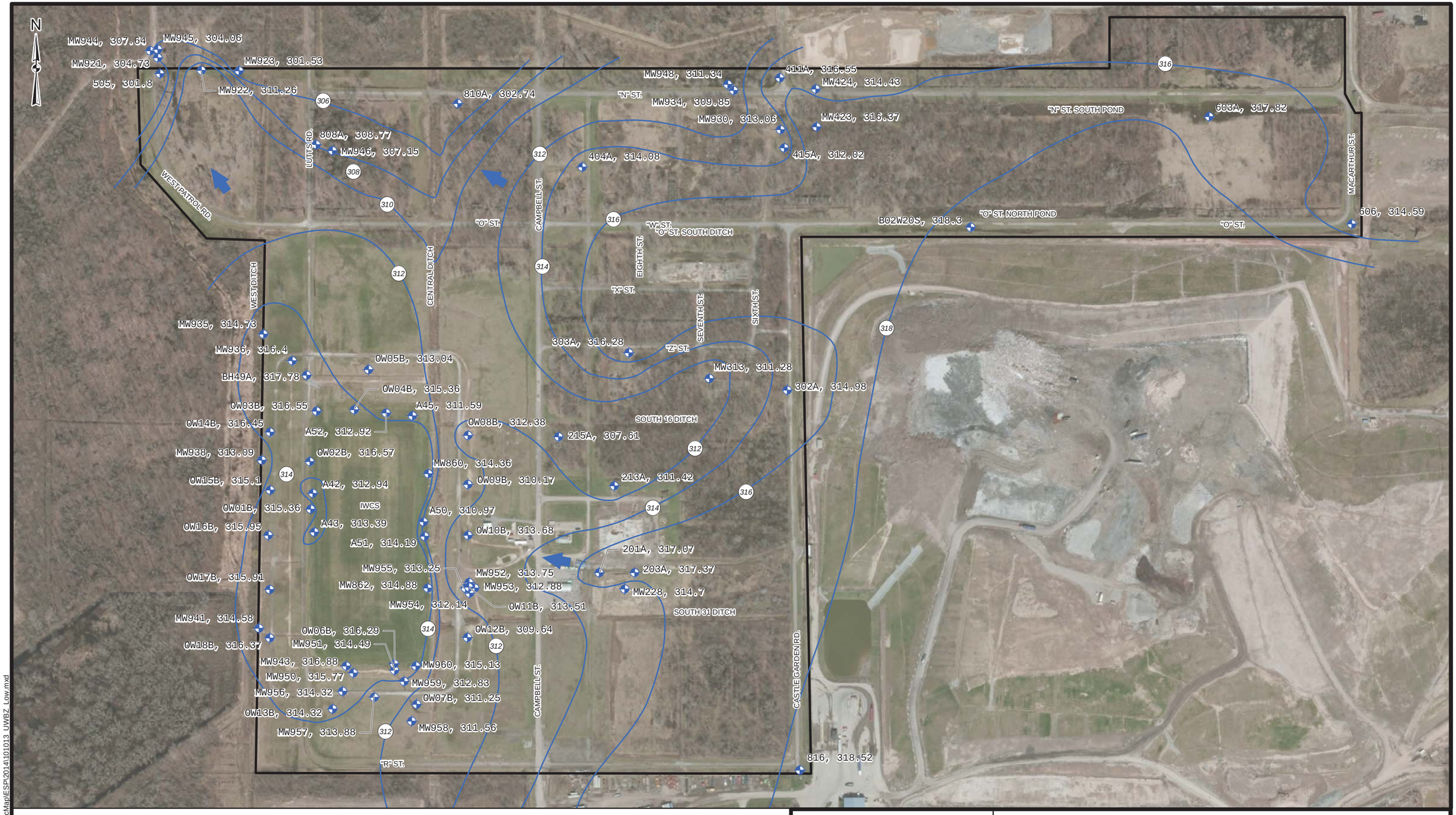
Drawn By: H5TDESPM
Date Saved: 12 Jun 2014
Time Saved: 9:24:21 AM

NIAGARA FALLS STORAGE SITE
LEWISTON, NEW YORK

FIGURE 15

Document Path: K:\NFSSPGIS\ArcMap\ESP\20140602\13 LWBZ_Low.mxd



Legend

- Monitoring Well (Upper Water Bearing Zone)
- Groundwater Potentiometric Surface (ft amsl)
- Groundwater Flow Direction
- NFSS Site Boundary

NOTES:
1) All elevations are represented in NGVD 88.

0 175 350 700 Feet

US Army Corps of Engineers Buffalo District

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
BUFFALO, NY

GROUNDWATER POTENTIOMETRIC SURFACE MAP FOR THE UPPER WATER BEARING ZONE (OCTOBER 10, 2013 - SEASONAL LOW)

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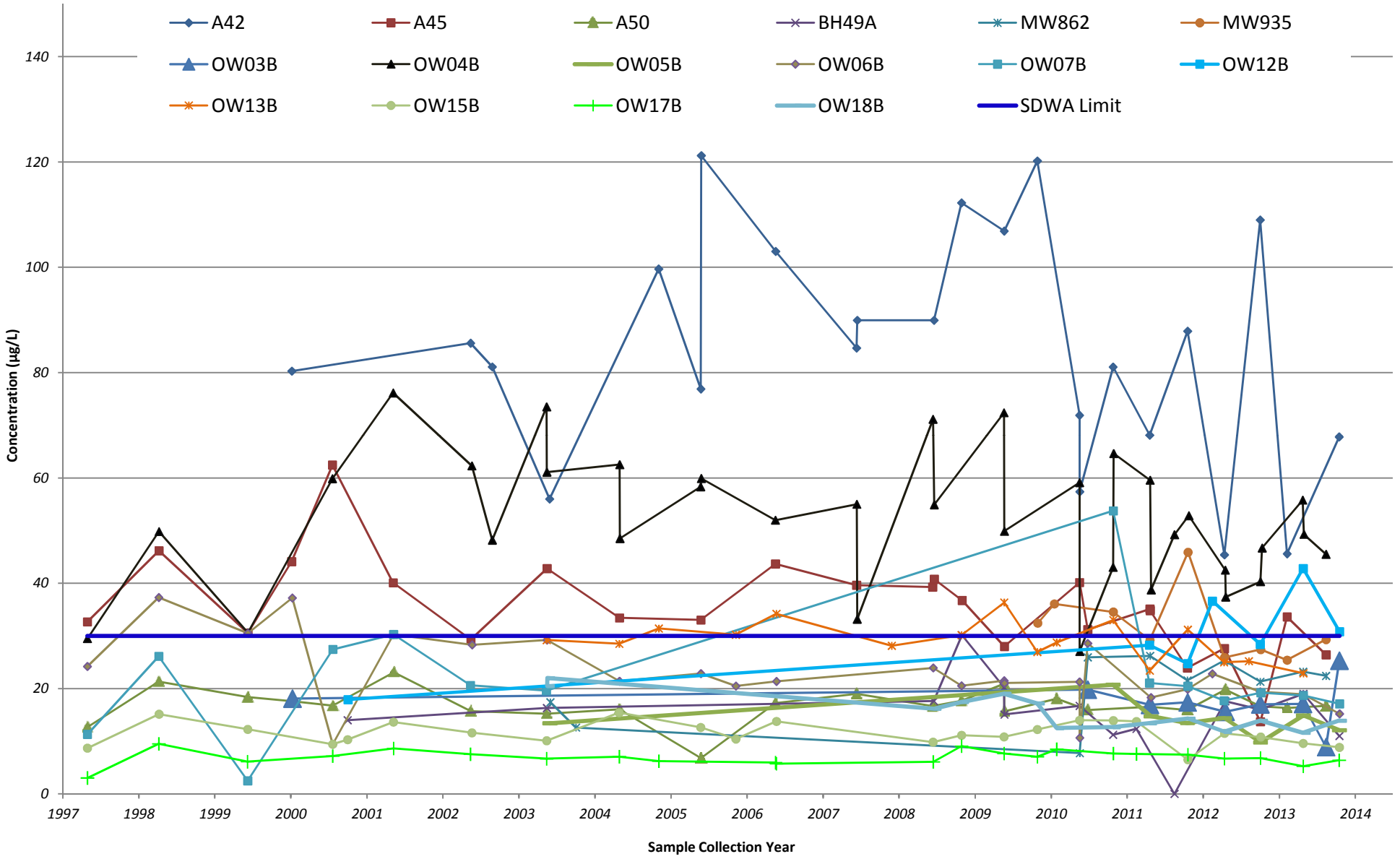
Date Saved: 12 Jun 2014
Time Saved: 8:51:45 AM

NIAGARA FALLS STORAGE SITE
LEWISTON, NEW YORK

FIGURE 16

Document Path: K:\NFSSPGIS\ArcMap\ESP\20141\01013_UWBZ_Low.mxd

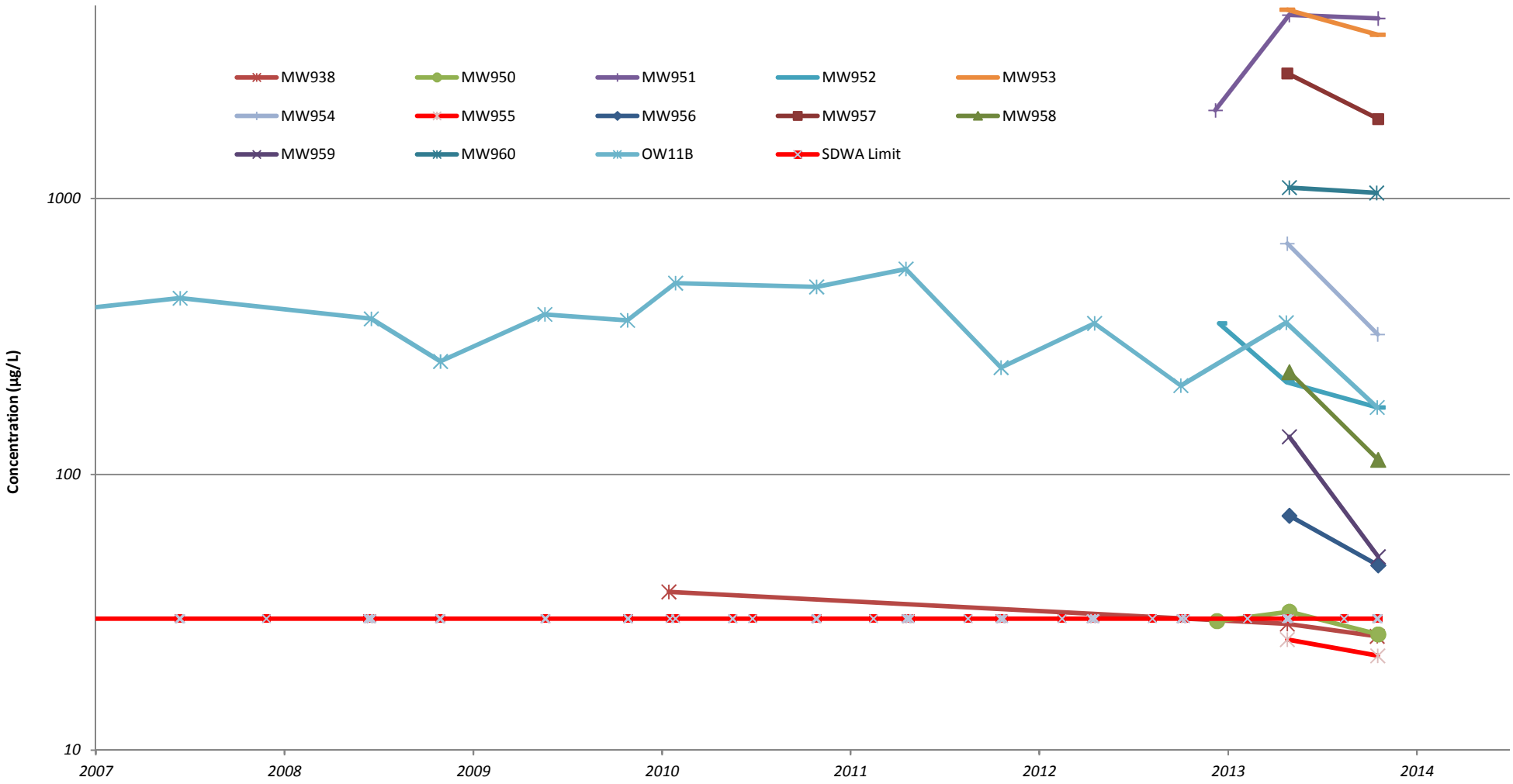
FIGURE 17
TOTAL URANIUM CONCENTRATIONS IN UPPER WATER BEARING ZONE WELLS IN THE VICINITY OF THE IWCS
(1997 - 2013)



*The Safe Drinking Water Act Maximum Containment Level (SDWA MCL) for Total Uranium is 27 pCi/L (30 µg/L). Groundwater at NFSS is not a drinking water source so use of the MCL is for comparative purposes only. Total Uranium trend for OW11B is presented on Figure 18.

K:\NFSSP\GIS\ArcMap\ESP\2011
ESP_Figures_17_18_19.xlsx, Total Uranium (UWBZ Wells), 6/26/2014

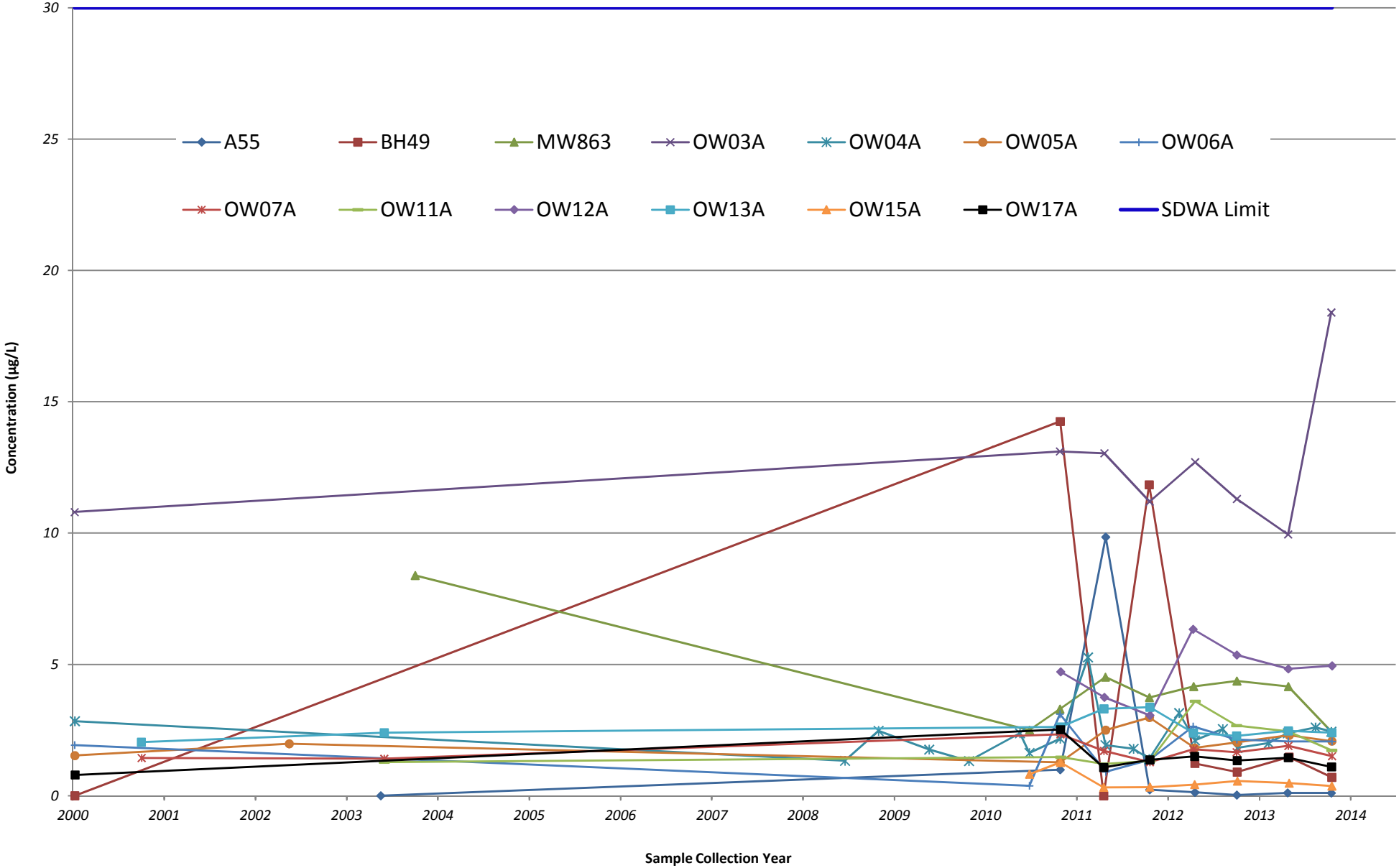
FIGURE 18
TOTAL URANIUM CONCENTRATIONS IN UPPER WATER BEARING ZONE WELL OW11B AND NEWLY INSTALLED BALANCE OF PLANT WELLS (2007 - 2013)



*The Safe DrinkingWater Act Maximum Containment Level (SDWA MCL) for Total Uranium is 27 pCi/L (30 µg/L). Groundwater at NFSS is not a drinking water source so use of the MCL is for comparative purposes only.

K:\NFSSP\GIS\ArcMap\ESP\2011
ESP_Figures_17_18_19.xlsx, Total Uranium (OW11B & others), 6/26/2014

FIGURE 19
TOTAL URANIUM CONCENTRATIONS IN LOWER WATER BEARING ZONE MONITORING WELLS (1997 - 2013)



The Safe Drinking Water Act Maximum Containment Level (SDWA MCL) for Total Uranium is 27 pCi/L (30 µg/L). Groundwater at NFSS is not a drinking water source so use of the MCL is for comparative purposes only.

K:\EDMS\Program\NFSS\Printing\EDMS.mdb
ESP_Figures_17_18_19.xlsx, Total Uranium (LWBZ Wells), 6/26/2014

APPENDIX A

APPENDIX A: NFSS CY2013 ENVIRONMENTAL SURVEILLANCE TECHNICAL MEMORANDUM

CY2013 CALCULATION OF EXTERNAL GAMMA RADIATION DOSE RATES FOR NIAGARA FALLS STORAGE SITE (NFSS)

LEWISTON, NEW YORK

June 2014

US Army Corps of Engineers®
Buffalo District
BUILDING STRONG®

TABLE OF CONTENTS

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2.0 ASSUMPTIONS 1

3.0 OSL DATA 1

4.0 ASSESSMENT METHODOLOGY AND RESULTS 2
4.1 NEAREST RESIDENT 2
4.2 NEAREST OFF-SITE WORKER 3

5.0 REFERENCES 3

1.0 PURPOSE

This calculation estimates the external gamma radiation dose from the Niagara Falls Storage Site (NFSS), Lewiston, New York during calendar year 2013 (CY2013). Hypothetical doses from external gamma radiation to members of the public are calculated from dose measurements using Landauer "Luxel" Optically Stimulated Luminescence dosimeters (OSLs) located at the perimeters of the NFSS and the Interim Waste Containment Structure (IWCS). Figure 6 in the main text shows the locations of the dosimeters. OSLs replaced thermoluminescent dosimeters (TLDs) in the environmental program beginning in 2008.

2.0 ASSUMPTIONS

Doses were calculated for off-site receptors based on these locations for off-site receptors based on the canvas of receptors in CY2006. The hypothetical doses for the nearest resident and off-site worker are reported. The modeling approach described below is considered to be protective of human health (conservative) in calculating hypothetical dose to receptors. The shielding effect of the air has not been included in the calculations. Calculations for the hypothetical annual external gamma radiation doses to the nearest resident and nearest off-site worker used the following assumptions:

Distance from each OSL above the source (the ground) is 3 feet (ft),
Distance from the OSLs to the nearest resident is 500 ft (perpendicular to the western OSL line),
Distance from the OSLs to the nearest off-site worker is 1,020 ft (perpendicular to the eastern OSL line),
Length of the western OSL monitoring line (western perimeter fence) is 2,766 ft,
Length of the eastern OSL monitoring line (east of Campbell Street) is 2,700 ft.

3.0 OSL DATA

At NFSS, OSLs are used to measure gamma radiation from the site and from sources of background radiation. Natural sources of background radiation include cosmic radiation and terrestrial radiation sources. In the United States, the annual average (per capita) cosmic and terrestrial radiation doses are 34 millirem per year (mrem/yr) and 22 mrem/yr, respectively (NCRP Report 160). Annual doses due to background at NFSS are measured at background locations using OSLs. Background dose for the same period of exposure is subtracted from site dose values to estimate the net dose from NFSS. OSLs are located at the facility perimeter and at the perimeter of the IWCS. The OSLs are placed at approximately 3 ft [1.6 meters (m)] above the ground surface. The OSLs measure approximately six-month intervals and are analyzed at an off-site vendor.

Seventeen locations around the perimeter of the site and seven locations around the IWCS were monitored in CY2013. In addition to these locations, there were three background locations. Two environmental OSLs were placed at each monitoring location. The environmental program utilizes two OSLs at each monitoring location for each monitoring period as a quality control check. In addition, if a measurement result is rejected or a OSL is lost, the duplicate reading is assumed for that monitoring period. For CY2013 two OSL co-located badge results were used for each location.

OSL monitoring data for CY2013 are presented in Table 2 in the Tables section. A time-weighted or normalized annual dose is calculated that accounts for exposure periods having different integration times (a different number of measurement days). Negative net values, when they occur, are retained for calculational purposes.

4.0 ASSESSMENT METHODOLOGY AND RESULTS

Gamma radiation measured at the perimeter fence line represents the dose for full-time occupancy i.e. 24 hours/day and 365 days/year (366 days for a leap year). Dose to an off-site receptor is significantly affected by proximity to the source and the amount of time spent at the receptor location. The estimate of dose to an off-site worker therefore uses a correction factor for occupancy assuming 2000 hours worked per year. The estimate of dose to an off-site resident assumes a full-time occupancy at home. The average net dose rate for CY 2013 at the site perimeter by direction is calculated to be:

Direction	OSL Locations	Calculated Average Net Dose Rate (mrem/year)
North Perimeter	1, 11, 12, 60, 65, 122	4.79
East Perimeter	1,28,123	6.61
South Perimeter	7, 28, 29, 45	6.61
West Perimeter	8, 10, 11,13,15,29,36	4.35

4.1 NEAREST RESIDENT

The dose calculation for the nearest resident uses the line of OSLs along the western perimeter fence. The OSLs along this side of the facility include NFSS perimeter fence monitoring locations 11, 13, 15, 29, and 36, and WCS perimeter fence monitoring locations 8 and 10. The two WCS locations are located close to the western NFSS perimeter fence. Net dose rates (corrected for background) for these OSLs are summed and divided by the total number of observations (14 for CY2013). This average value represents the annual dose at the site perimeter (D1 = 4.35 mrem for CY2013). The dose contribution to this resident from the southern exposure is insignificant compared to the exposure from the western line source. The western site perimeter dose is then used in the following equation for a line source:

$$D_2 = D_1 * h_1/h_2 * (\text{Arc Tan } (L/h_2) / \text{Arc Tan } (L/h_1))$$

Where:
D_2 = dose calculated at the receptor location from the line source
D_1 = dose at the site perimeter as described above
h_1 = the distance of the OSLs from the source (3 ft)
h_2 = the distance of the resident from the fence line (500 ft)
L = half the length of line of OSLs measuring the line source (1,383 ft)

Nearest Resident Dose Calculation (Resident southwest of NFSS)

NFSS Perimeter Monitoring Locations 11, 13, 15, 29, and 36 and IWCS Perimeter Monitoring Locations 8 and 10

Where:
h_1 = 3 feet distance of OSL from the source
h_2 = 500 feet distance of resident from the eastern fence line.
L = 1,383 feet half the length of the western line source
D_1 = 4.35 mrem average annual dose at the OSL monitoring locations
D_2 = 0.020 mrem resident annual dose at 500 feet from the eastern fence-line.

The hypothetical dose to the nearest resident is 2.0 E-02 (or 0.020) mrem for calendar year 2013.

4.2 NEAREST OFF-SITE WORKER

The dose to the nearest off-site worker uses, the line of OSLs, closest to the eastern perimeter fence (Castle Garden Road). The OSLs used include monitoring locations 1, 28, and 123. These OSLs are located along an interior fence east of Campbell Street. There are no WCS perimeter fence monitoring locations close to those along the line east of Campbell Street; therefore, none are included in the dose calculations. Net dose rates (corrected for background) for OSL monitoring locations 1, 28, and 123 are summed and divided by the total number observations (6 for CY2013). This average represents the annual dose at the site perimeter (D1 = 6.61 mrem for CY2013).

Nearest Off-Site Worker Dose Calculations (Worker east of NFSS)

NFSS Perimeter Monitoring Locations 1, 28, 123
h_1 = 3 feet distance of OSL from the source
h_2 = 1,020 feet distance of off-site worker from the OSLs
L = 1,350 feet half the length of the eastern line source
D_1 = 6.61 mrem average annual dose at the OSL monitoring locations
D_2 = 0.002 mrem off-site worker annual dose at 1,020 feet from the western fence line.

The hypothetical dose to the nearest off-site worker is 2.6 E-03 (or 0.00261) mrem for calendar year 2013. This was calculated using the equation above and a correction factor for off-site worker occupancy of 2000/8760 hours.

5.0 REFERENCES

Bechtel National, Inc. (BNI), 1997. "1996 Public External Gamma Dose," 14501-158-CV-031, Rev. 0, Oak Ridge, TN.

National Council on Radiation Protection and Measurements (NCRP), 2009. "NCRP Report No. 160, Ionizing Radiation Exposure of the Population of the United States," ISBN-13: 978-0-929600-98-7, Bethesda, MD.

APPENDIX B

FUSRAP 2013 NESHAP Annual Report for NFSS

DEPARTMENT OF THE ARMY
BUFFALO DISTRICT, CORPS OF ENGINEERS
1776 NIAGARA STREET
BUFFALO NY 14207-3199

REPLY TO ATTENTION OF:

Special Projects Branch June 04, 2014

SUBJECT: Niagara Falls Storage Site (NFSS) 2013 NESHAP Report

[redacted]
Radiation and Indoor Air Branch
Environmental Protection Agency, Region II
290 Broadway
New York, New York 10007

Dear [redacted]

Enclosed please find the 2013 National Emission Standards for Hazardous Air Pollutants (NESHAPs) report for the Niagara Falls Storage Site (NFSS). This report, as it has in the past, will be included in the Corps *FUSRAP Niagara Falls Storage Site 2013 Environmental Surveillance Technical Memorandum*, which is currently under development. In summary the Corps finds that the NFSS is in compliance with 40 CFR 61, Subpart H and Subpart Q.

Compliance with 40 CFR 61, Subpart H is determined by use of USEPA approved code CAP88-PC Version 3.0. The CAP88-PC hypothetical annual maximum dose to an off-site:

Resident:	1.6 E-03 mrem
Resident Farmer:	1.3 E-03 mrem

The hypothetical annual doses to the nearest off-site worker and school corrected for 2,000 hr of exposure per year are:

Off-site worker:	1.6 E-03 mrem
School:	1.4 E-04 mrem

The hypothetical annual doses to the maximally exposed off-site individual (MEOSI) is therefore 1.6 E-03 mrem to a resident or worker.

The CAP88-PC hypothetical annual effective dose for the population within 80 km of the facility is:

Population:	4.41 E-02 person-rem

Compliance with 40 CFR 61, Subpart Q is demonstrated by the measurement of radon-222 (radon flux). Radon-222 flux at the NFSS site was measured using 180 10-inch diameter activated carbon canisters placed at 15-meter intervals across the Interim Waste Containment

SUBJECT:Niagara Falls Storage Site (NFSS) 2012 NESHAP Report

Structure (IWCS) and sealed to the surface for a 24-hour exposure period (August 22-23, 2013). Individual and average (0.056 pCi/m^2/sec) measurements were well below the NESHAPs standard for radon flux of 20 pCi/m^2/sec, with results ranging from non-detect to 0.141 pCi/m^2/s. These results are consistent with radon flux measured in previous years. The results do not exceed the established standard specified in 40 CFR 61, Subpart Q.

[redacted] is the technical point of contact for these results. He can be reached at (716) 879-4274 if you have any questions.

Sincerely,

[redacted]

Environmental Project Management Team Leader

Enclosure: FUSRAP CY2013 NESHAP ANNUAL REPORT FOR NIAGARA FALLS STORAGE SITE (NFSS)

FUSRAP CY2013 NESHAP ANNUAL REPORT FOR NIAGARA FALLS STORAGE SITE (NFSS)

LEWISTON, NEW YORK

JUNE 2014

U.S. Army Corps of Engineers
Buffalo District Office
Formerly Utilized Sites Remedial Action Program

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ACRONYMS AND ABBREVIATIONS

BNI	Bechtel National, Inc.
CAP88-PC Ver 3	Clean Air Act Assessment Package-1988, Version 3.0 (Revised in 2013)
CFR	Code of Federal Regulations
E_w	annual wind erosion emission
FUSRAP	Formerly Utilized Sites Remedial Action Program
ICRP	International Commission on Radiological Protection
IWCS	Interim Waste Containment Structure
m^2	square meter(s)
MEI	maximally exposed individual
ML	Modern Landfill
mph	miles per hour
NOAA	National Oceanic and Atmospheric Administration
NESHAP	National Emission Standards for Hazardous Air Pollutants
NFIA	Niagara Falls International Airport
NFSS	Niagara Falls Storage Site
USAEC	United States Atomic Energy Commission
USACE	United States Army Corps of Engineers
UCL	upper confidence limit
USDOE	United States Department of Energy
USEPA	United States Environmental Protection Agency

1.0 INTRODUCTION

In 1974, the United States Atomic Energy Commission (USAEC), a predecessor to the United States Department of Energy (USDOE), instituted the Formerly Utilized Sites Remedial Action Program (FUSRAP). This program is now managed by United States Army Corps of Engineers (USACE) to identify and clean up, or otherwise control sites where residual radioactivity remains from the early years of the nation's atomic energy program or from commercial operations causing conditions that Congress has authorized USACE to remedy under FUSRAP. The Niagara Falls Storage Site (NFSS) is a federally-owned storage site managed under FUSRAP. In October 1997, Congress transferred the responsibility for FUSRAP to USACE.

1.1 SITE DESCRIPTION

The Niagara Falls Storage Site (NFSS) is located in the Town of Lewiston in northwestern New York State, northeast of Niagara Falls and south of Lake Ontario (page F-1, Attachment F). NFSS is approximately 77 hectare (~191 acre) site which includes: one metal storage building, one office building (Building 429), an equipment shed, and a 4 hectare (9.9 acre) interim waste containment structure (IWCS). The property is fenced, and public access is restricted.

Land use in the region is primarily rural; however, the site is bordered by a chemical waste disposal facility on the north, a solid waste disposal facility on the east and south, and a Niagara Mohawk Power Corporation right-of-way on the west. The nearest residential areas are approximately 1.1-km southwest of the site; the residences are primarily single-family dwellings.

1.2 SOURCE DESCRIPTION

Beginning in 1944, NFSS was used as a storage facility for radioactive residues and wastes. The residues and wastes are the process by-products of uranium extraction from pitchblende (uranium ore). Waste was also generated from remediation of buildings and process equipment used in the uranium extraction process. The residues originated at other sites and were transferred to NFSS for storage in buildings, on-site pits, and surface piles. Table 1 includes a brief history and description of the major radioactive residues and wastes transferred to NFSS. From 1953 to 1959 and 1965 to 1971, the former Building 401 was used as a boron-10 isotope separation plant.

Table 1. History and Description of Wastes Transferred to NFSS

Material	Description	Transferred to NFSS
L-50	Low-activity radioactive residues from the processing of low-grade uranium ores at Linde Air Products, Tonawanda, New York.	1944
R-10	Low-activity radioactive residues from the processing of low-grade uranium ores at Linde Air Products, Tonawanda, New York.	1944
F-32	Low-activity radioactive residues from the processing of high-grade uranium ores at Middlesex, New Jersey.	1944 to early 1950
L-30	Low-activity radioactive residues from the processing of low-grade uranium ores at Linde Air Products, Tonawanda, New York.	1945
K-65	High-activity radioactive residues from the processing of high-grade uranium ores at Mallinckrodt Chemical Works, St. Louis, Missouri.	1949
Middlesex Sands	Sand and abraded material from the sandblasting of buildings and process equipment where the F-32 residue was generated at Middlesex Metal Refinement Plant, Middlesex, New Jersey.	1950

Since 1971, activities at NFSS have been confined to residue and waste storage and remediation. On-site and off-site areas with residual radioactivity exceeding USDOE guidelines were remediated between 1981 and 1992. The materials generated during remedial actions (approximately 195,000 m^3) are encapsulated in the IWCS, which is specifically designed to provide interim storage of the materials. Remedial investigation began at the end of 1999 to determine if any areas of the site contained radioactive or chemical contaminants at levels that could pose an unacceptable risk to human health and the environment. The CERCLA remedial investigation of the NFSS was completed in 2007. NFSS is currently in the feasibility study phase of the CERCLA process for the IWCS Operable Unit.

2.0 REGULATORY STANDARDS

The United States Environmental Protection Agency's (USEPA) National Emission Standards for Hazardous Air Pollutants (NESHAP) are compliance standards that require annual reporting of emissions of radionuclides and radon gas from operations at nuclear facilities.

2.1 40 CFR 61, SUBPART H

40 CFR 61, Subpart H provides standards for reporting emissions of radionuclides (excluding radon-222 and radon-220) into the air from USDOE facilities. Although control and maintenance of the site currently rests with USACE, responsibility for NFSS will return to USDOE following completion of remedial actions. This regulation therefore provides an appropriate standard for NFSS. Compliance with Subpart H is verified by applying the USEPA approved code, CAP88-PC. CAP88-PC Version 3.0 (USEPA 2006, revised 2013) was used for this year's calculation. The applicable regulation, 40 CFR 61.92 limits exposure of the public to an annual effective dose equivalent of 10 mrem from radioactive emissions.

2.2 40 CFR 61, SUBPART Q

40 CFR 61, Subpart Q applies to storage and disposal facilities for radium-containing material that emits radon-222 into air. NFSS is specifically identified as one such facility in this subpart (in 40 CFR 61.190). Compliance with Subpart Q is verified by annual monitoring of the IWCS for radon-222 flux. The Subpart Q radon-222 emission limit is 20 $pCi/m^2/s$.

3.0 AIR EMISSION DATA

Table 2 summarizes the sources of air emissions. Attachment A contains the annual wind erosion emission (E_w) calculation. Attachment B contains the radioactive source term calculations and annual air releases.

These calculations use the USEPA air pollution emission factor methodology (AP-42) to estimate the radioactive release from wind erosion, which is then used as the source term in the Clean Air Act Assessment Package (CAP88-PC) model to estimate airborne doses to hypothetically exposed individuals. The annual wind erosion emission estimate uses the most current soil data from the NFSS RI sampling Phases I, II, and III. A 95% upper confidence limit (UCL) without the subtraction of background radioactivity was calculated for each soil nuclide of concern and was used as the soil concentration for the source term estimate. The area of the entire NFSS was assumed to be uniformly contaminated and to contribute to the source term.

Table 2. Air Emission Data - NFSS

Point Sources	Type Control	Efficiency	Distance to Hypothetical Exposed Individual
none	not applicable	not applicable	not applicable
Area (Non-Point) Sources	**Type Control**	**Efficiency**	**Distance and Direction from Center of Site to Hypothetical Exposed Individual**
in situ soil –area source	vegetative cover	90 percent[a]	533 m SE Modern Scale-house Worker 783 m S Greenhouse Worker 914 m SSW Resident 1105 m S Resident (farm) 1250 m WSW Resident 1486 m ESE Resident 2499 m W School 2629 m WNW School
Group Sources	**Type Control**	**Efficiency**	**Distance to Hypothetical Exposed Individual**
none	not applicable	not applicable	not applicable

[a] This is the fraction of vegetative cover used to correct emissions (Attachments A,B).

4.0 DOSE ASSESSMENTS

4.1 MODEL SOURCE DESCRIPTION

To determine the dose from airborne particulates potentially released from NFSS during CY2013, the annual wind erosion emission, E_w (Attachment A) is calculated using local climatological data (Attachment F) from the National Oceanic and Atmospheric Administration (NOAA) National Climatic Data Center for the Niagara Falls International Airport (NFIA) in Niagara Falls, NY. E_w is calculated using the USEPA AP-42 methodology for "fugitive emissions" from an "area source" that uses the "fastest mile" wind speed data from local climatological data reports. E_w, in grams emitted, is then applied to the soil nuclide concentration to estimate the source term or annual emissions for each radionuclide. The soil concentration was developed from sample data compiled during Phases I, II, and III of the Remedial Investigation for soil contamination (Attachment B). Contributions from radon gas, in accordance with regulatory guidance, are not considered in this calculation. Annual estimated emissions for each radionuclide were input into the USEPA's CAP88-PC, Version 3.0 (revised 2013) code to calculate hypothetical receptor doses. The model estimates resultant doses from airborne particulates to hypothetical individuals at the distances to the nearest residence, commercial/industrial facility, school, and farm as measured from a central location on-site. Hypothetical doses are then corrected for occupancy. Commercial/industrial facility and school occupancy is assumed to be 40 hr/week for 50 weeks/yr. Residential and farm occupancy is assumed to be full-time/continuous for 24 hr/day for 365 days/yr. The hypothetical individual receiving the higher of these calculated doses is then identified as the maximally exposed individual (MEI) for airborne particulate dose.

4.2 DESCRIPTION OF DOSE MODEL

4.2.1 CAP88-PC Computer Program

The CAP88-PC model is a set of computer programs, databases, and associated utility programs that estimate the dose and risk from airborne radioactivity emissions. The USEPA NESHAP compliance procedures for airborne radioactivity emissions at USDOE facilities (40 CFR 61.93(a)) require the use of the CAP88-PC model, or other approved procedures to calculate effective dose equivalents to members of the public.

CAP88-PC uses a modified Gaussian plume equation to estimate the average dispersion of radionuclides released from a site. Assessments are performed for a circular grid of distances and directions for a radius of 80 km (50 miles) around the facility. Agricultural arrays for EPA food source scenarios for vegetation, milk and meat, and for milk cattle and beef cattle density and land fraction cultivated are generated automatically. Dose and risk factors for CAP88-PC, Version 3.0 are from Federal Guidance Report 13 and are based on the methods detailed in International Commission on Radiological Protection (ICRP) 72 (ICRP72). The dose calculations presented in this document used the default values for nuclide lung clearance type. These defaults correspond to the recommended values from FGR 13. Deposition velocity and scavenging coefficient are calculated by the code in accordance with USEPA policy. In the CAP88 model nuclides are depleted from the plume by precipitation scavenging, dry deposition and radioactive decay. The default scavenging coefficient is calculated as a function of annual precipitation. The program calculates the effective dose equivalents received by receptors by combining the inhalation and ingestion intake rates and the air and ground surface concentrations using the appropriate dose conversion factors.

4.2.2 CAP88-PC Input

Input parameters for CAP88 include:

Radionuclide emissions (Attachment B),
Weather data (average annual temperature, total annual precipitation) (Attachment E),
Emission source height and area (Section 4.3), and
Distance to nearest resident, off-site worker, school, and farm (Section 4.3).

4.2.3 CAP88-PC Output

The "Dose and Risk Equivalent Summaries" from CAP88-PC contains the resulting effective dose equivalents for each modeled scenario. The effective dose equivalent summary contains results for 16 compass directions around the facility for the nearest resident, off-site worker, school, and farm. CAP88-PC individual receptor and population output summaries are located in Attachment C and D, respectively.

4.3 COMPLIANCE ASSESSMENT

The released activity data from Attachment B is entered into the CAP88-PC modeling program to derive the hypothetical dose to the defined receptors. To derive the dose to the MEI, the CAP88-PC model must have weather data for the appropriate year, information on the emission source, and the distances and directions to the nearest residence, off-site worker, school, and farm. The following CY2013 meteorological data were entered into CAP88-PC (see Attachment E):

Average temperature	7.56 °C (45.6 °F) NFIA
Precipitation,	99.87 cm (39.32 inches) ML
Mixing height	1,000 m

The following emission source and nearest receptor distances and direction information were also entered into the program:

Source height	0 m
Source area	780,000 m^2
Resident	914 m SSW
Resident (farm)	1105 m S
Resident	1250 m WSW
Resident	1486 m ESE
Off-site worker	533 m SE
Off-site worker	783 m S
School (building)	2499 m W
School (building)	2629 m WNW

The CAP88-PC annual hypothetical dose to the nearest resident, off-site worker, school, and farm at the corresponding directions and distances taken from page six of the "Dose and Risk Equivalent Summaries" document for individual modeling (Attachment C) are:

Resident	1.6 E-03 mrem, SSW @ 914 m
Off-site worker	6.9 E-03 mrem, SE @ 533 m
School	6.3 E-04 mrem, W @ 2499 m
Farm	1.3 E-03 mrem, S @ 1105 m

The hypothetical doses to the nearest off-site worker and school corrected for an assumed 2,000 hr of exposure per year are:

Off-site worker	1.6 E-03 mrem
School	1.4 E-04 mrem

5.0 SUPPLEMENTAL INFORMATION

5.1 POPULATION DOSE

The CAP88-PC model was also used to estimate the hypothetical airborne particulate dose to the population within 80 km of the site. Population data taken from year 2000 census data for New York State and 2001 census data for Ontario, Canada was used to create a population file for CAP88-PC. The effective dose equivalent for the collective population in person-rem/yr is from the CAP88-PC "Dose and Risk Equivalent Summaries" report.

The CAP88-PC annual effective dose for the population within 80 km of the facility (Attachment D) is:

Population:	4.41 E-02 person-rem

5.2 RADON-222 FLUX

Measurement of radon-222 flux provides an indication of the rate of radon-222 emission from a surface. Radon-222 flux is measured with activated charcoal canisters placed at 15-m intervals across the surface of the IWCS for a 24-hr exposure period. Measurements for CY2013 are presented in the radon flux results with measurement locations (site map) in Attachment F.

Measured results for 2013 ranged from non-detect to 0.141 $pCi/m^2/s$, with an average result including detects and non-detects of 0.056 $pCi/m^2/s$. As in previous years, these results are well below the 20 $pCi/m^2/s$ standard specified in 40 CFR Part 61, Subpart Q, and demonstrate the effectiveness of the containment cell design and construction in mitigating radon-222 migration.

5.3 NON-APPLICABILITY

Requirements from section 61.93(b) of 40 CFR for continuous monitoring from point sources (stacks or vents) are not applicable to NFSS.

6.0 REFERENCES

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Bechtel National, Inc. (BNI), 1997. "1996 Public Inhalation Dose" 14501-158-CV-030, Rev. 0, Oak Ridge, TN.

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Environmental Protection Agency (EPA), 1999. *Federal Guidance Report 13, Cancer Risk Coefficients for Environmental Exposure to Radionuclides,* EPA99 EPA 402-R-99_001, USEPA Office of Radiation and Indoor Air, Washington, DC.

International Commission on Radiological Protection (ICRP72), 1996. *Age Dependent Doses to Members of the Public from Intake of Radionuclides, Part 5, Compilation of Ingestion and Inhalation Dose Coefficients*," ICRP 72, Pergamon Press, Oxford.

40 CFR 61, Subpart H. *National Emission Standards for Emissions of Radionuclides Other Than Radon From Department of Energy Facilities.*

40 CFR 61, Subpart Q. *National Emission Standards for Radon Emissions from Department of Energy Facilities.*

ATTACHMENT A

ANNUAL WIND EROSION EMISSION CALCULATION

A.1 ANNUAL WIND EROSION

In 2013, the potential source of airborne emissions from NFSS is assumed to be from wind erosion of in-situ soil from the entire NFSS. The AP-42 model for industrial wind erosion for limited flat sources is used. In this model the potential airborne emissions are a function of the number of disturbances of contaminated soil. The following assumptions and calculations are made:

The air release source is wind erosion of in-situ soil from an area (A) of 780,000 m^2 of vegetation covered soil.

$A = 780{,}000\ m^2$

The calculation assumes that 90% of this area is covered by grass or vegetation (V).

$V = 0.90$

Weekly grass cutting is assumed for half the year, occurring May through October and in an April spring thaw. The number of estimated disturbances (N) is therefore:

$N = 27$

The threshold velocity (U_t) for overburden (USEPA 1995 Table 13.2.5-2) is:

$U_t = 1.02$ m/s

Anemometer height adjustment is not necessary.

Z_r = reference anemometer height = 10 m

Z_a = actual anemometer height = 10 m

The roughness height for overburden is 0.3 cm (USEPA 1995 Table 13.2.5-2).

$Z_o = 0.3$ cm

The corrected wind speed (U_{rN}) for each period (N) between disturbances (USEPA 1995 Equation 5) is:

$U_{rN} = U_{aN}\ [\ln(Z_r / Z_o) / \ln(Z_a / Z_o)]$, therefore $U_{rN} = U_{aN}$

The equivalent friction velocity (U_N) for each period between disturbances (USEPA 1995 Equation 4) is:

$U_N = 0.053\ U_{rN}$

The fastest mile speeds (maximum 2-minute wind speeds[a]) from Local Climatological Data reports from NOAA for Niagara Falls International Airport (NFIA) in mph for the period between each disturbance are:

$U_{a1} = 38$	$U_{a2} = 20$	$U_{a3} = 37$	$U_{a4} = 35$	$U_{a5} = 26$	$U_{a6} = 32$
$U_{a7} = 20$	$U_{a8} = 24$	$U_{a9} = 26$	$U_{a10} = 20$	$U_{a11} = 23$	$U_{a12} = 24$
$U_{a13} = 52$	$U_{a14} = 22$	$U_{a15} = 25$	$U_{a16} = 23$	$U_{a17} = 23$	$U_{a18} = 21$
$U_{a19} = 23$	$U_{a20} = 25$	$U_{a21} = 25$	$U_{a22} = 30$	$U_{a23} = 22$	$U_{a24} = 32$
$U_{a25} = 18$	$U_{a26} = 29$	$U_{a27} = 35$			

[a]Maximum 2-minute wind speeds can be used to approximate fastest mile wind speeds (USEPA 2004 Table 7-4), however, this calculation applies an uncertainty correction factor, protective of human health, of 1.3 in order to approximate the fastest mile wind speeds.

The equivalent friction velocity in m/s for each period is:

U_1	1.17E+00	U_{11}	7.08E-01	U_{21}	7.70E-01
U_2	6.16E-01	U_{12}	7.39E-01	U_{22}	9.24E-01
U_3	1.14E+00	U_{13}	1.60E+00	U_{23}	6.78E-01
U_4	1.08E+00	U_{14}	6.78E-01	U_{24}	9.86E-01
U_5	8.01E-01	U_{15}	7.70E-01	U_{25}	5.54E-01
U_6	9.86E-01	U_{16}	7.08E-01	U_{26}	8.93E-01
U_7	6.16E-01	U_{17}	7.08E-01	U_{27}	1.08E+00
U_8	7.39E-01	U_{18}	6.47E-01		
U_9	8.01E-01	U_{19}	7.08E-01		
U_{10}	6.16E-01	U_{20}	7.70E-01		

The erosion potential (P_N) for a dry exposed surface (USEPA 1985 Figure 4-2) is:

$$P_N = 58 (U^*-U_t)^2 + 25(U^*-U_t) = 46.35 \text{ g/m}^2$$

The erosion potentials (P_N) for each period between disturbances are all less than or equal to the threshold friction velocity except for U_1, U_3, $U_{6,}$, and U_{23}.

The particle size multiplier (k) for 10 μ particles (USEPA 1995 Equation 2) is:

$$k = 0.5$$

The emission factor (P) for dry bare soil for 10 μ particles (USEPA 1995 Equation 2) is:

$$P = k \sum P_N = 23.18 \text{ g/m}^2$$

Thornthwaite's Precipitation Evaporation Index (PE), used as a measure of average soil moisture, is:

$$PE = 110$$

The corrected emission factor (PM_{10}) for 10 μ particles (USEPA 1985 Equation 4-1) is:

$$PM_{10} = P(1-V) / (PE/50)^2 = 0.48 \text{ g/m}^2\text{/yr}$$

The annual wind erosion emission (E) is calculated to be:

$$E = A (PM_{10}) = 373{,}493 \text{ g soil}$$

A.2 REFERENCES

EPA 2004. *Methods for Estimating Fugitive Air Emissions of Radionuclides from Diffuse Sources at USDOE Facilities*, Final Report, September 3, 2004.

EPA 1995. *AP 42 Compilation of Air Pollutant Emission Factors, Volume 1: Stationary Point and Area Sources,* Fifth Edition, 1995.

M. J. Changery, *National Wind Data Index Final Report*, HCO/T1041-01 UC-60, National Climatic Center, Asheville, NC, December 1978.

EPA 1985. *Rapid Assessment of Exposure to Particulate Emissions from Surface Contaminated Sites*, EPA/600/8-85/002, Office of Health and Environmental Assessment, Washington, DC (February).

EPA 1985. *AP 42 Compilation of Air Pollution Emission Factors,* Third Edition (including supplements 1-7), August 1977.

ATTACHMENT B

SOURCE TERM DEVELOPMENTAND ANNUAL AIR EMISSIONS

B.1 SOURCE TERM DEVELOPMENT

The source term for NFSS NESHAPS calculations was developed considering the radionuclides in the uranium, thorium, and actinium decay series as shown in Table B-1. Concentration data for these radioisotopes were taken from Phases I, II, and III of the Remedial Investigation and are listed in Table B-2. The Phase I sampling was performed from November 1999 through January 2000. The Phase II was performed from August 2000 through October 2000. The Phase III sampling was performed from May 2001 through October 2003. The dataset has been verified to ensure data quality and includes the analysis of soils from biased high locations (i.e., locations that had elevated gamma survey readings).

The IWCS, completed in 1986 and added to in 1991, is surrounded by sufficient topsoil and compacted clay to consider radionuclide emissions negligible. In 1986, the entire IWCS was covered with 0.9 meters (3 feet) of low-permeability, compacted clay, a 0.3 meter (12 inch)-thick layer of loosely compacted soil, 0.15 meter (6 inches) of topsoil and covered with shallow-rooted grass. A clay cutoff wall and dike measuring 3.35 to 8.84 meters (11 to 29 feet) in thickness formed the perimeter. In 1991 additional soil with residual radioactivity from a vicinity property, along with 60 drums containing radioactive material, were placed over the existing IWCS. Six inches of clay was placed over the waste material and two feet of compacted clay was added on top along with 0.46 meter (1.5 feet) of topsoil material. However, the area of the cap was included in the site area estimate.

Radium-226 was detected at an elevated concentration of 1,140 pCi/g in one area during the Phase I remedial investigation. This was analyzed and determined to come from a stone in the sample. Although release rates are based on dust erosion and not buried stones, this detection was used in the source term calculation.

Soil concentration data, listed in Table B-3, are not available for all the radionuclides in Table B-1. If explicit results for a radionuclide were not available, it was assumed that the radionuclide was present in equilibrium with (i.e., at the same concentration as) the nearest long-lived parent. Branching ratios were used to estimate source term concentrations. Table B-3 lists the source term values used in the CAP-88 modeled scenarios.

Table B-1. Radionuclides Considered in NESHAPS Evaluation

Uranium Series	Thorium Series	Actinium Series
U-238	Th-232	U-235
Th-234	Ra-228	Th-231
Pa-234m	Ac-228	Pa-231
Pa-234 (0.13%)	Th-228	Ac-227
U-234	Ra-224	Th-227 (98.62%)
Th-230	*Rn-220 (thoron)	Fr-223 (1.38%)
Ra-226	Po-216	Ra-223
*Rn-222 (radon)	Pb-212	*Rn-219 (actinon)
Po-218	Bi-212	Po-215
Pb-214 (99.98%)	Po-212 (64.07%)	Pb-211 (≈ 100%)
At-218 (0.02%)	Tl-208 (35.93%)	At-215 (0.00023%)
Bi-214	*Pb-208 (stable)	Bi-211
Po-214 (99.979%)		Po-211 (0.273%)
Tl-210 (0.021%)		Tl-207 (99.73%)
Pb-210		*Pb-207 (stable)
Bi-210		
Po-210 (≈ 100%)		
Tl-206 (0.00013%)		
*Pb-206 (stable)		

Nuclides with asterisks (*) were excluded from dose calculations because radon isotopes, including thoron and action, are specifically excluded per the regulation or they are stable nuclides and do not contribute to radiological dose. Nuclides are presented from top to bottom in order of decay starting from the parent radionuclides. Branching fractions are shown, as appropriate, for consideration in source term development. Fractions taken from Shleien, 1992. Because in the year 2013 EPA revised CAP88 Ver 3 the input into the source term was changed to the inclusion of 10 subchains for the three series listed above. The subchains used are indicated in alternating highlight. Subchains were input based upon the decay half-lives significant to a 100-year build-up. Chain length was limited to 10 daughters, the highest number of subchain daughters for the Ac-227 subchain.

Table B-2. Summary of Phases I, II, and III Characterization Data Used in NESHAP Dose Calculations

Analyte	Units	Results	Minimum Detect	Maximum Detect	Average Result	95% UCL of the Mean	Input Exposure Concentration
Radium-226 [a]	(pCi/g)	552	0.0607	1140	10.23	26.09	26.09
Thorium-228	(pCi/g)	552	0.0481	2.38	1.06	1.08	1.08
Thorium-230	(pCi/g)	552	0.0906	978	8.68	22.74	22.74
Thorium-232	(pCi/g)	551	0.0149	2.07	0.88	0.89	0.89
Uranium-234	(pCi/g)	552	0.0416	8340	20.57	87.4	87.4
Uranium-235	(pCi/g)	553	-0.16	886	1.94	8.97	8.97
Uranium-238	(pCi/g)	551	0.049	8830	21.59	92.38	92.38

[a] Includes previous outlier 1,140 pCi/g (NiagAir1 on 25JUL00 at 15:36 using dataset allradnq)

Table B-3. Soil Concentration and Estimated Emission of Radionuclides from NFSS for CY 2013

Soil Concentration and CAPP88 Input Source Term								
Uranium Series			**Thorium Series**			**Actinium Series**		
Nuclide	**pCi/g**	**Ci/y**	**Nuclide**	**pCi/g**	**Ci/y**	**Nuclide**	**pCi/g**	**Ci/y**
U-238	92.38	1.07E-05	Th-232	0.89	1.03E-07	U-235	8.97	1.04E-06
Th-234	92.38		Ra-228	0.89	1.03E-07	Th-231	8.97	
Pa-234m	92.38		Ac-228	0.89		Pa-231	8.97	1.04E-06
Pa-234	92.38		Th-228	1.08		Ac-227	8.97	2.93E-06
U-234	87.4	1.01E-05	Ra-224	1.08		Th-227	8.97	
Th-230	22.74	2.64E-06	Rn-220	1.08		Fr-223	8.97	
Ra-226	26.09	3.03E-06	Po-216	1.08		Ra-223	8.97	
Rn-222	26.09		Pb-212	1.08		Rn-219	8.97	
Po-218	26.09		Bi-212	1.08		Po-215	8.97	
Pb-214	26.09		Po-212	1.08		Pb-211	8.97	
At-218	26.09		Tl-208	1.08		At-215	8.97	
Bi-214	26.09		Pb-208 (stable)	1.08	0.00E-00	Bi-211	8.97	
Po-214	26.09					Po-211	8.97	
Tl-210	26.09					Tl-207	8.97	
Pb-210	26.09	3.03E-06				Pb-207 (stable)	8.97	0.00E-00
Bi-210	26.09							
Po-210	26.09							
Tl-206	26.09							
Pb-206 (stable)	26.09	0.00E-00						

B.2 REFERENCES

Shleien, 1992. *The Health Physics and Radiological Health Handbook*, Scinta, Inc., Silver Spring, MD.

ATTACHMENT C

CAPP88-PC REPORTS – INDIVIDUAL

C A P 8 8 - P C

Version 3.0

Clean Air Act Assessment Package - 1988

D O S E A N D R I S K E Q U I V A L E N T S U M M A R I E S

Non-Radon Individual Assessment
Jun 2, 2014 04:11 pmm

Facility: Niagara Falls Storage Site
Address: 1397 Pletcher Road
City: Lewiston
State: NY Zip: 14174

Source Category: Area
Source Type: Area
Emission Year: 2013

Comments: NFSS Technical Memo 2013 Year
Individual Dose

Dataset Name: NFSS 2013 Ind
Dataset Date: 6/2/2014 2:33:00 PM
Wind File:
C:\CAP88 V3\program files\CAP88PC30\WindLib\IAG0905.WND

ORGAN DOSE EQUIVALENT SUMMARY

Organ	Selected Individual (mrem/y)
Adrenals	5.09E-05
B Surfac	1.24E-02
Breasts	5.23E-05
St Wall	5.18E-05
ULI Wall	6.09E-05
Kidneys	3.58E-04
Lungs	1.35E-03
Ovaries	1.40E-04
R Marrow	6.02E-04
Spleen	1.40E-04
Thymus	5.14E-05
Uterus	5.12E-05
Bld Wall	5.17E-05
Brain	5.13E-05
Esophagu	4.16E-04
SI Wall	5.21E-05
LLI Wall	8.09E-05
Liver	8.45E-04
Muscle	5.25E-05
Pancreas	5.10E-05
Skin	2.34E-04
Testes	1.42E-04
Thyroid	5.17E-05
EFFEC	9.01E-03

PATHWAY EFFECTIVE DOSE EQUIVALENT SUMMARY

Pathway	Selected Individual (mrem/y)
INGESTION	1.28E-03
INHALATION	7.73E-03
AIR IMMERSION	9.83E-10
GROUND SURFACE	9.83E-06
INTERNAL	9.00E-03
EXTERNAL	9.84E-06
TOTAL	9.01E-03

NUCLIDE EFFECTIVE DOSE EQUIVALENT SUMMARY

Nuclide	Selected Individual (mrem/y)
U-238	8.95E-04
Th-234	9.77E-08
Pa-234m	1.39E-06
Pa-234	0.00E+00
U-234	1.02E-03
Th-230	1.06E-03
Ra-226	6.70E-04
Rn-222	6.18E-15
Po-218	3.78E-11
Pb-214	1.05E-06
Bi-214	6.30E-06
Po-214	3.46E-10
Pb-210	4.93E-04
Bi-210	1.58E-07
Po-210	1.28E-11
At-218	0.00E+00
Th-232	6.68E-05
Ra-228	7.11E-06
Ac-228	5.07E-10
Th-228	0.00E+00
Ra-224	0.00E+00
Rn-220	0.00E+00
Po-216	0.00E+00
Pb-212	0.00E+00
Bi-212	0.00E+00
Po-212	0.00E+00
Tl-208	0.00E+00
U-235	9.38E-05
Th-231	2.41E-08
Pa-231	2.66E-03
Ac-227	2.04E-03
Th-227	1.27E-07
Ra-223	1.40E-07
Rn-219	0.00E+00
Po-215	1.94E-10
Pb-211	1.09E-07
Bi-211	5.07E-08
Tl-207	6.39E-08
Po-211	0.00E+00
Fr-223	9.10E-10
TOTAL	9.01E-03

CANCER RISK SUMMARY

Cancer	Selected Individual Total Lifetime Fatal Cancer Risk
Esophagu	7.26E-12
Stomach	2.07E-11
Colon	9.69E-11
Liver	2.15E-10
LUNG	2.70E-09
Bone	1.71E-10
Skin	7.28E-13
Breast	1.19E-11
Ovary	2.46E-11
Bladder	1.70E-11
Kidneys	4.27E-11
Thyroid	1.63E-12
Leukemia	3.67E-11
Residual	1.08E-10
Total	3.46E-09
TOTAL	6.91E-09

PATHWAY RISK SUMMARY

Pathway	Selected Individual Total Lifetime Fatal Cancer Risk
INGESTION	3.69E-10
INHALATION	3.08E-09
AIR IMMERSION	5.22E-16
GROUND SURFACE	4.60E-12
INTERNAL	3.45E-09
EXTERNAL	4.60E-12
TOTAL	3.46E-09

NUCLIDE RISK SUMMARY

Nuclide	Selected Individual Total Lifetime Fatal Cancer Risk
U-238	6.99E-10
Th-234	5.09E-14
Pa-234m	2.23E-13
Pa-234	0.00E+00
U-234	8.01E-10
Th-230	5.08E-10
Ra-226	3.67E-10
Rn-222	3.36E-21
Po-218	2.07E-17
Pb-214	5.60E-13
Bi-214	3.35E-12
Po-214	1.90E-16
Pb-210	1.89E-10
Bi-210	2.20E-14
Po-210	7.00E-18
At-218	0.00E+00
Th-232	2.96E-11
Ra-228	3.40E-12
Ac-228	3.23E-16
Th-228	0.00E+00
Ra-224	0.00E+00
Rn-220	0.00E+00
Po-216	0.00E+00
Pb-212	0.00E+00
Bi-212	0.00E+00
Po-212	0.00E+00
Tl-208	0.00E+00
U-235	7.33E-11
Th-231	1.09E-14
Pa-231	2.50E-10
Ac-227	5.32E-10
Th-227	6.87E-14
Ra-223	7.57E-14
Rn-219	0.00E+00
Po-215	1.06E-16
Pb-211	3.63E-14
Bi-211	2.78E-14
Tl-207	8.17E-15
Po-211	0.00E+00
Fr-223	7.70E-16
TOTAL	3.46E-09

INDIVIDUAL EFFECTIVE DOSE EQUIVALENT RATE (mrem/y)
(All Radionuclides and Pathways)

	Distance (m)						
Direction	533	783	914	1105	1250	1486	2499
N	6.5E-03	2.7E-03	2.0E-03	1.5E-03	1.3E-03	1.0E-03	5.3E-04
NNW	5.1E-03	2.1E-03	1.5E-03	1.0E-03	8.1E-04	5.9E-04	2.5E-04
NW	5.1E-03	1.8E-03	1.4E-03	1.0E-03	8.4E-04	6.6E-04	3.5E-04
WNW	5.5E-03	2.8E-03	2.0E-03	1.5E-03	1.2E-03	8.9E-04	4.2E-04
W	6.0E-03	3.0E-03	2.3E-03	1.7E-03	1.5E-03	1.2E-03	6.3E-04
WSW	6.0E-03	3.0E-03	2.2E-03	1.5E-03	1.2E-03	9.3E-04	4.2E-04
SW	5.5E-03	2.2E-03	1.7E-03	1.2E-03	1.0E-03	8.1E-04	4.3E-04
SSW	5.0E-03	2.2E-03	1.6E-03	1.1E-03	9.3E-04	6.9E-04	3.2E-04
S	5.3E-03	2.2E-03	1.7E-03	1.3E-03	1.1E-03	8.4E-04	4.5E-04
SSE	6.0E-03	2.8E-03	2.1E-03	1.5E-03	1.2E-03	9.0E-04	4.1E-04
SE	6.9E-03	3.1E-03	2.3E-03	1.7E-03	1.4E-03	1.1E-03	5.8E-04
ESE	7.6E-03	3.6E-03	2.7E-03	1.9E-03	1.5E-03	1.2E-03	5.4E-04
E	8.6E-03	3.6E-03	2.7E-03	2.0E-03	1.6E-03	1.3E-03	6.2E-04
ENE	9.0E-03	4.3E-03	3.2E-03	2.2E-03	1.8E-03	1.3E-03	5.9E-04
NE	8.9E-03	4.2E-03	3.2E-03	2.4E-03	2.0E-03	1.6E-03	8.1E-04
NNE	7.9E-03	4.1E-03	3.0E-03	2.1E-03	1.7E-03	1.3E-03	5.8E-04

	Distance (m)
Direction	2629
N	5.0E-04
NNW	2.4E-04
NW	3.3E-04
WNW	3.9E-04
W	5.9E-04
WSW	4.0E-04
SW	4.0E-04
SSW	3.1E-04
S	4.2E-04
SSE	3.9E-04
SE	5.4E-04
ESE	5.0E-04
E	5.8E-04
ENE	5.5E-04
NE	7.6E-04
NNE	5.4E-04

INDIVIDUAL LIFETIME RISK (deaths)
(All Radionuclides and Pathways)

Distance (m)

Direction	533	783	914	1105	1250	1486	2499
N	2.5E-09	1.0E-09	7.7E-10	5.7E-10	4.8E-10	3.7E-10	1.9E-10
NNW	2.0E-09	7.8E-10	5.6E-10	3.8E-10	3.0E-10	2.1E-10	8.5E-11
NW	2.0E-09	6.8E-10	5.1E-10	3.7E-10	3.1E-10	2.4E-10	1.2E-10
WNW	2.1E-09	1.1E-09	7.7E-10	5.5E-10	4.4E-10	3.3E-10	1.5E-10
W	2.3E-09	1.1E-09	8.7E-10	6.5E-10	5.5E-10	4.4E-10	2.3E-10
WSW	2.3E-09	1.1E-09	8.3E-10	5.8E-10	4.7E-10	3.5E-10	1.5E-10
SW	2.1E-09	8.2E-10	6.2E-10	4.6E-10	3.8E-10	3.0E-10	1.5E-10
SSW	1.9E-09	8.4E-10	6.1E-10	4.3E-10	3.4E-10	2.5E-10	1.1E-10
S	2.0E-09	8.3E-10	6.3E-10	4.7E-10	3.9E-10	3.1E-10	1.6E-10
SSE	2.3E-09	1.1E-09	7.9E-10	5.6E-10	4.5E-10	3.3E-10	1.5E-10
SE	2.6E-09	1.2E-09	8.9E-10	6.5E-10	5.4E-10	4.2E-10	2.1E-10
ESE	2.9E-09	1.4E-09	1.0E-09	7.2E-10	5.8E-10	4.4E-10	1.9E-10
E	3.3E-09	1.4E-09	1.0E-09	7.5E-10	6.2E-10	4.8E-10	2.3E-10
ENE	3.5E-09	1.6E-09	1.2E-09	8.5E-10	6.8E-10	5.1E-10	2.1E-10
NE	3.4E-09	1.6E-09	1.2E-09	9.1E-10	7.6E-10	6.0E-10	3.0E-10
NNE	3.0E-09	1.5E-09	1.1E-09	8.0E-10	6.5E-10	4.8E-10	2.1E-10

Distance (m)

Direction	2629
N	1.8E-10
NNW	8.1E-11
NW	1.2E-10
WNW	1.4E-10
W	2.2E-10
WSW	1.4E-10
SW	1.4E-10
SSW	1.1E-10
S	1.5E-10
SSE	1.4E-10
SE	2.0E-10
ESE	1.8E-10
E	2.1E-10
ENE	2.0E-10
NE	2.8E-10
NNE	1.9E-10

ATTACHMENT D

CAPP88-PC REPORTS – POPULATION

C A P 8 8 - P C

Version 3.0

Clean Air Act Assessment Package - 1988

D O S E A N D R I S K E Q U I V A L E N T S U M M A R I E S

Non-Radon Population Assessment
Jun 2, 2014 06:23 pmm

Facility: Niagara Falls Storage Site
Address: 1397 Pletcher Road
City: Lewiston
State: NY Zip: 14174

Source Category: Area
Source Type: Area
Emission Year: 2013

Comments: NFSS Technical Memo 2013 Year
Population Dose

Dataset Name: NFSS 2013 Pop
Dataset Date: 6/2/2014 4:51:00 PM
Wind File:
C:\CAP88 V3\program files\CAP88-PC30\WindLib\IAG0905.WND
Population File:
C:\CAP88 V3\program files\CAP88-PC30\Poplib\NFSS2003.POP

ORGAN DOSE EQUIVALENT SUMMARY

Organ	Selected Individual (mrem/y)	Collective Population (person-rem/y)
Adrenals	1.59E-04	2.61E-04
B Surfac	4.14E-02	5.88E-02
Breasts	1.64E-04	2.74E-04
St Wall	1.61E-04	2.68E-04
ULI Wall	1.79E-04	2.99E-04
Kidneys	8.12E-04	1.39E-03
Lungs	5.32E-03	7.15E-03
Ovaries	4.96E-04	7.19E-04
R Marrow	1.80E-03	2.71E-03
Spleen	2.40E-04	4.93E-04
Thymus	1.61E-04	2.66E-04
Uterus	1.60E-04	2.65E-04
Bld Wall	1.62E-04	2.69E-04
Brain	1.61E-04	2.66E-04
Esophagu	1.62E-03	2.20E-03
SI Wall	1.61E-04	2.67E-04
LLI Wall	2.14E-04	3.68E-04
Liver	2.96E-03	4.15E-03
Muscle	1.65E-04	2.76E-04
Pancreas	1.59E-04	2.62E-04
Skin	8.45E-04	1.96E-03
Testes	5.04E-04	7.35E-04
Thyroid	1.62E-04	2.69E-04
EFFEC	3.15E-02	4.41E-02

PATHWAY EFFECTIVE DOSE EQUIVALENT SUMMARY

Pathway	Selected Individual (mrem/y)	Collective Population (person-rem/y)
INGESTION	7.19E-04	2.93E-03
INHALATION	3.08E-02	4.11E-02
AIR IMMERSION	3.92E-09	5.22E-09
GROUND SURFACE	3.69E-05	9.14E-05
INTERNAL	3.15E-02	4.40E-02
EXTERNAL	3.69E-05	9.14E-05
TOTAL	3.15E-02	4.41E-02

NUCLIDE EFFECTIVE DOSE EQUIVALENT SUMMARY

Nuclides	Selected Individual (mrem/y)	Collective Population (person-rem/y)
U-238	3.24E-03	4.48E-03
Th-234	3.65E-07	9.02E-07
Pa-234m	5.22E-06	1.29E-05
Pa-234	0.00E+00	0.00E+00
U-234	3.72E-03	5.13E-03
Th-230	3.89E-03	5.32E-03
Ra-226	1.32E-03	2.44E-03
Rn-222	2.42E-14	5.31E-14
Po-218	1.42E-10	3.51E-10
Pb-214	3.94E-06	9.75E-06
Bi-214	2.36E-05	5.85E-05
Po-214	1.30E-09	3.21E-09
Pb-210	5.74E-04	1.38E-03
Bi-210	5.93E-07	1.44E-06
Po-210	4.79E-11	1.19E-10
At-218	0.00E+00	0.00E+00
Th-232	2.66E-04	3.55E-04
Ra-228	2.83E-05	3.78E-05
Ac-228	2.02E-09	2.69E-09
Th-228	0.00E+00	0.00E+00
Ra-224	0.00E+00	0.00E+00
Rn-220	0.00E+00	0.00E+00
Po-216	0.00E+00	0.00E+00
Pb-212	0.00E+00	0.00E+00
Bi-212	0.00E+00	0.00E+00
Po-212	0.00E+00	0.00E+00
Tl-208	0.00E+00	0.00E+00
U-235	3.41E-04	4.71E-04
Th-231	9.03E-08	2.24E-07
Pa-231	1.02E-02	1.37E-02
Ac-227	7.93E-03	1.06E-02
Th-227	4.77E-07	1.18E-06
Ra-223	5.24E-07	1.30E-06
Rn-219	0.00E+00	0.00E+00
Po-215	7.28E-10	1.80E-09
Pb-211	4.10E-07	1.02E-06
Bi-211	1.90E-07	4.71E-07
Tl-207	2.40E-07	5.94E-07
Po-211	0.00E+00	0.00E+00
Fr-223	3.63E-09	4.84E-09
TOTAL	3.15E-02	4.41E-02

CANCER RISK SUMMARY

Cancer	Selected Individual Total Lifetime Fatal Cancer Risk	Total Collective Population Fatal Cancer Risk (Deaths/y)
Esophagu	1.87E-11	3.88E-10
Stomach	4.38E-11	1.00E-09
Colon	1.34E-10	3.89E-09
Liver	6.80E-10	1.28E-08
LUNG	1.07E-08	1.85E-07
Bone	4.69E-10	9.38E-09
Skin	1.93E-12	4.95E-11
Breast	2.55E-11	5.92E-10
Ovary	8.26E-11	1.52E-09
Bladder	4.43E-11	9.15E-10
Kidneys	7.06E-11	1.80E-09
Thyroid	3.54E-12	8.01E-11
Leukemia	8.67E-11	1.88E-09
Residual	1.74E-10	4.65E-09
Total	1.25E-08	2.24E-07

PATHWAY RISK SUMMARY

Pathway	Selected Individual Total Lifetime Fatal Cancer Risk	Total Collective Population Fatal Cancer Risk (Deaths/y)
INGESTION	2.09E-10	1.12E-08
INHALATION	1.23E-08	2.12E-07
AIR IMMERSION	2.08E-15	3.59E-14
GROUND SURFACE	1.72E-11	5.53E-10
INTERNAL	1.25E-08	2.23E-07
EXTERNAL	1.72E-11	5.53E-10
TOTAL	1.25E-08	2.24E-07

NUCLIDE RISK SUMMARY

Nuclide	Selected Individual Total Lifetime Fatal Cancer Risk	Total Collective Population Fatal Cancer Risk (Deaths/y)
U-238	2.67E-09	4.69E-08
Th-234	1.89E-13	6.04E-12
Pa-234m	8.36E-13	2.68E-11
Pa-234	0.00E+00	0.00E+00
U-234	3.08E-09	5.39E-08
Th-230	1.99E-09	3.46E-08
Ra-226	1.00E-09	2.03E-08
Rn-222	1.32E-20	3.73E-19
Po-218	7.78E-17	2.50E-15
Pb-214	2.10E-12	6.74E-11
Bi-214	1.25E-11	4.03E-10
Po-214	7.12E-16	2.28E-14
Pb-210	2.91E-10	7.65E-09
Bi-210	8.36E-14	2.38E-12
Po-210	2.63E-17	8.43E-16
At-218	0.00E+00	0.00E+00
Th-232	1.18E-10	2.04E-09
Ra-228	1.35E-11	2.34E-10
Ac-228	1.29E-15	2.22E-14
Th-228	0.00E+00	0.00E+00
Ra-224	0.00E+00	0.00E+00
Rn-220	0.00E+00	0.00E+00
Po-216	0.00E+00	0.00E+00
Pb-212	0.00E+00	0.00E+00
Bi-212	0.00E+00	0.00E+00
Po-212	0.00E+00	0.00E+00
Tl-208	0.00E+00	0.00E+00
U-235	2.81E-10	4.93E-09
Th-231	4.09E-14	1.31E-12
Pa-231	9.63E-10	1.68E-08
Ac-227	2.09E-09	3.62E-08
Th-227	2.58E-13	8.26E-12
Ra-223	2.84E-13	9.11E-12
Rn-219	0.00E+00	0.00E+00
Po-215	3.99E-16	1.28E-14
Pb-211	1.36E-13	4.37E-12
Bi-211	1.04E-13	3.34E-12
Tl-207	3.06E-14	9.83E-13
Po-211	0.00E+00	0.00E+00
Fr-223	3.07E-15	5.30E-14
TOTAL	1.25E-08	2.24E-07

INDIVIDUAL EFFECTIVE DOSE EQUIVALENT RATE (mrem/y)
(All Radionuclides and Pathways)

	Distance (m)						
Direction	250	750	1500	2500	3500	4500	7500
N	3.1E-02	2.4E-03	7.6E-04	3.5E-04	2.0E-04	1.4E-04	6.2E-05
NNW	3.1E-02	1.9E-03	3.9E-04	1.1E-04	6.2E-05	4.2E-05	1.9E-05
NW	3.1E-02	1.6E-03	4.6E-04	1.9E-04	1.1E-04	7.5E-05	3.4E-05
WNW	3.1E-02	2.6E-03	6.6E-04	2.5E-04	1.4E-04	9.7E-05	4.3E-05
W	3.1E-02	2.7E-03	9.1E-04	4.4E-04	2.5E-04	1.7E-04	7.7E-05
WSW	3.1E-02	2.8E-03	6.9E-04	2.6E-04	1.5E-04	1.0E-04	4.6E-05
SW	3.1E-02	2.0E-03	5.9E-04	2.6E-04	1.5E-04	1.0E-04	4.6E-05
SSW	3.1E-02	2.0E-03	4.9E-04	1.7E-04	9.7E-05	6.6E-05	3.0E-05
S	3.1E-02	2.0E-03	6.1E-04	2.8E-04	1.6E-04	1.1E-04	4.8E-05
SSE	3.2E-02	2.6E-03	6.6E-04	2.4E-04	1.4E-04	9.5E-05	4.3E-05
SE	3.1E-02	2.9E-03	8.7E-04	3.9E-04	2.2E-04	1.5E-04	6.9E-05
ESE	3.1E-02	3.4E-03	9.0E-04	3.5E-04	2.0E-04	1.4E-04	6.3E-05
E	3.1E-02	3.4E-03	9.9E-04	4.3E-04	2.5E-04	1.7E-04	7.6E-05
ENE	3.1E-02	4.1E-03	1.1E-03	4.0E-04	2.3E-04	1.6E-04	7.2E-05
NE	3.1E-02	4.0E-03	1.3E-03	5.9E-04	3.4E-04	2.3E-04	1.1E-04
NNE	3.2E-02	3.8E-03	1.0E-03	3.9E-04	2.2E-04	1.5E-04	7.0E-05

	Distance (m)						
Direction	15000	25000	35000	45000	55000	65000	75000
N	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.0E-06	1.5E-06
NNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	9.4E-07	6.8E-07	5.5E-07
NW	1.2E-05	0.0E+00	0.0E+00	0.0E+00	1.5E-06	1.0E-06	8.0E-07
WNW	1.6E-05	0.0E+00	0.0E+00	0.0E+00	1.8E-06	1.2E-06	9.3E-07
W	2.8E-05	1.2E-05	7.4E-06	4.9E-06	3.3E-06	2.2E-06	1.7E-06
WSW	1.7E-05	7.4E-06	4.5E-06	3.0E-06	2.1E-06	1.4E-06	1.1E-06
SW	1.6E-05	7.4E-06	4.5E-06	3.0E-06	2.1E-06	1.4E-06	0.0E+00
SSW	1.1E-05	4.8E-06	2.9E-06	2.0E-06	0.0E+00	9.9E-07	7.9E-07
S	1.7E-05	7.8E-06	4.8E-06	3.2E-06	2.2E-06	1.5E-06	1.2E-06
SSE	1.6E-05	7.0E-06	4.3E-06	2.9E-06	2.0E-06	1.4E-06	1.1E-06
SE	2.5E-05	1.1E-05	6.8E-06	4.5E-06	3.1E-06	2.2E-06	1.7E-06
ESE	2.3E-05	1.0E-05	6.3E-06	4.2E-06	2.9E-06	2.1E-06	1.6E-06
E	2.8E-05	1.3E-05	7.7E-06	5.1E-06	3.6E-06	2.5E-06	2.0E-06
ENE	2.6E-05	1.2E-05	7.4E-06	5.0E-06	3.5E-06	2.5E-06	2.0E-06
NE	3.9E-05	1.8E-05	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NNE	2.5E-05	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.9E-06

COLLECTIVE EFFECTIVE DOSE EQUIVALENT (person rem/y)
(All Radionuclides and Pathways)

	Distance (m)						
Direction	250	750	1500	2500	3500	4500	7500
N	2.8E-04	6.8E-05	7.2E-05	4.7E-05	3.8E-05	3.2E-05	8.5E-05
NNW	2.8E-04	5.3E-05	4.0E-05	1.4E-05	1.2E-05	9.4E-06	2.9E-05
NW	2.8E-04	4.5E-05	5.1E-05	2.9E-05	2.1E-05	1.9E-05	2.8E-04
WNW	2.8E-04	7.2E-05	7.3E-05	4.6E-05	3.5E-05	5.6E-05	1.6E-04
W	2.8E-04	7.7E-05	1.0E-04	8.1E-05	4.1E-04	5.7E-05	8.7E-05
WSW	2.8E-04	7.7E-05	7.7E-05	4.8E-05	2.3E-04	2.0E-04	3.0E-04
SW	2.8E-04	5.5E-05	6.5E-05	4.8E-05	4.8E-05	2.1E-04	5.5E-04
SSW	2.8E-04	5.7E-05	5.4E-05	3.1E-05	2.8E-05	1.0E-04	3.3E-04
S	2.8E-04	5.6E-05	6.8E-05	5.1E-05	3.5E-05	3.2E-05	5.0E-04
SSE	2.8E-04	7.4E-05	7.3E-05	4.5E-05	3.1E-05	2.7E-05	2.0E-04
SE	2.8E-04	8.0E-05	9.6E-05	7.2E-05	5.4E-05	4.3E-05	2.1E-04
ESE	2.8E-04	9.4E-05	1.0E-04	6.6E-05	5.3E-05	4.6E-05	1.6E-04
E	2.8E-04	9.5E-05	1.1E-04	7.9E-05	6.4E-05	5.6E-05	1.8E-04
ENE	2.8E-04	1.1E-04	1.2E-04	7.2E-05	4.6E-05	3.3E-05	2.3E-04
NE	2.8E-04	1.1E-04	1.4E-04	7.3E-05	4.0E-05	3.4E-05	2.9E-04
NNE	2.8E-04	1.1E-04	9.8E-05	5.2E-05	4.1E-05	3.2E-05	1.0E-04

	Distance (m)						
Direction	15000	25000	35000	45000	55000	65000	75000
N	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.5E-04	4.4E-04
NNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.0E-04	7.2E-04	3.9E-04
NW	1.2E-05	0.0E+00	0.0E+00	0.0E+00	7.3E-06	8.3E-04	4.2E-04
WNW	5.4E-05	0.0E+00	0.0E+00	0.0E+00	1.8E-09	3.0E-04	8.2E-05
W	7.4E-04	7.9E-04	7.0E-05	1.4E-04	6.9E-05	3.6E-04	4.2E-04
WSW	2.4E-04	3.5E-04	3.6E-05	2.1E-05	1.1E-05	1.4E-05	6.4E-06
SW	1.2E-03	4.1E-05	2.6E-04	4.2E-05	4.0E-06	9.9E-07	0.0E+00
SSW	1.2E-03	1.1E-05	2.2E-05	8.6E-06	0.0E+00	1.4E-07	1.2E-05
S	1.6E-03	4.2E-04	4.5E-04	1.8E-05	2.3E-04	9.4E-05	4.4E-05
SSE	1.2E-03	3.3E-03	3.8E-03	1.4E-03	3.2E-04	6.1E-05	2.7E-05
SE	4.4E-04	1.3E-03	1.3E-03	4.9E-04	1.5E-04	5.2E-05	3.8E-05
ESE	2.5E-04	8.4E-04	9.8E-05	1.0E-04	6.6E-05	1.4E-04	5.2E-05
E	2.7E-04	6.6E-04	1.2E-04	1.9E-04	5.5E-05	9.6E-05	7.6E-05
ENE	1.5E-04	2.6E-04	7.1E-05	3.4E-05	2.1E-05	8.3E-06	3.8E-06
NE	3.2E-04	2.1E-05	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NNE	1.3E-05	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	4.0E-05

INDIVIDUAL LIFETIME RISK (deaths)
(All Radionuclides and Pathways)

	Distance (m)						
Direction	250	750	1500	2500	3500	4500	7500
N	1.2E-08	9.6E-10	3.0E-10	1.4E-10	8.0E-11	5.4E-11	2.5E-11
NNW	1.2E-08	7.5E-10	1.6E-10	4.3E-11	2.5E-11	1.7E-11	7.5E-12
NW	1.2E-08	6.4E-10	1.8E-10	7.7E-11	4.4E-11	3.0E-11	1.3E-11
WNW	1.2E-08	1.0E-09	2.6E-10	9.9E-11	5.7E-11	3.8E-11	1.7E-11
W	1.2E-08	1.1E-09	3.6E-10	1.7E-10	1.0E-10	6.8E-11	3.1E-11
WSW	1.2E-08	1.1E-09	2.8E-10	1.0E-10	5.9E-11	4.0E-11	1.8E-11
SW	1.2E-08	7.8E-10	2.3E-10	1.0E-10	5.9E-11	4.0E-11	1.8E-11
SSW	1.2E-08	8.1E-10	1.9E-10	6.7E-11	3.8E-11	2.6E-11	1.2E-11
S	1.2E-08	7.9E-10	2.4E-10	1.1E-10	6.3E-11	4.3E-11	1.9E-11
SSE	1.3E-08	1.0E-09	2.6E-10	9.7E-11	5.6E-11	3.8E-11	1.7E-11
SE	1.2E-08	1.1E-09	3.4E-10	1.5E-10	8.9E-11	6.0E-11	2.7E-11
ESE	1.2E-08	1.3E-09	3.6E-10	1.4E-10	8.1E-11	5.5E-11	2.5E-11
E	1.2E-08	1.3E-09	3.9E-10	1.7E-10	9.8E-11	6.6E-11	3.0E-11
ENE	1.2E-08	1.6E-09	4.2E-10	1.6E-10	9.2E-11	6.3E-11	2.9E-11
NE	1.2E-08	1.6E-09	5.0E-10	2.4E-10	1.4E-10	9.3E-11	4.2E-11
NNE	1.2E-08	1.5E-09	4.0E-10	1.5E-10	8.9E-11	6.1E-11	2.8E-11

	Distance (m)						
Direction	15000	25000	35000	45000	55000	65000	75000
N	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	7.7E-13	5.9E-13
NNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	3.6E-13	2.5E-13	2.0E-13
NW	4.7E-12	0.0E+00	0.0E+00	0.0E+00	5.6E-13	3.9E-13	3.0E-13
WNW	6.1E-12	0.0E+00	0.0E+00	0.0E+00	7.0E-13	4.6E-13	3.5E-13
W	1.1E-11	4.9E-12	2.9E-12	1.9E-12	1.3E-12	8.5E-13	6.5E-13
WSW	6.5E-12	2.9E-12	1.8E-12	1.2E-12	8.1E-13	5.5E-13	4.3E-13
SW	6.5E-12	2.9E-12	1.8E-12	1.2E-12	8.1E-13	5.6E-13	0.0E+00
SSW	4.2E-12	1.9E-12	1.1E-12	7.7E-13	0.0E+00	3.8E-13	3.0E-13
S	6.9E-12	3.1E-12	1.9E-12	1.2E-12	8.5E-13	5.8E-13	4.5E-13
SSE	6.1E-12	2.8E-12	1.7E-12	1.1E-12	7.8E-13	5.5E-13	4.3E-13
SE	9.7E-12	4.4E-12	2.7E-12	1.8E-12	1.2E-12	8.5E-13	6.6E-13
ESE	9.0E-12	4.1E-12	2.5E-12	1.7E-12	1.1E-12	8.0E-13	6.3E-13
E	1.1E-11	4.9E-12	3.0E-12	2.0E-12	1.4E-12	9.7E-13	7.5E-13
ENE	1.0E-11	4.8E-12	2.9E-12	2.0E-12	1.4E-12	9.8E-13	7.7E-13
NE	1.5E-11	7.0E-12	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NNE	1.0E-11	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	7.3E-13

COLLECTIVE FATAL CANCER RATE (deaths/y)
(All Radionuclides and Pathways)

Direction	Distance (m) 250	750	1500	2500	3500	4500	7500
N	1.5E-09	3.5E-10	3.7E-10	2.4E-10	2.0E-10	1.7E-10	4.3E-10
NNW	1.5E-09	2.7E-10	2.0E-10	7.4E-11	6.0E-11	4.8E-11	1.5E-10
NW	1.4E-09	2.3E-10	2.6E-10	1.5E-10	1.1E-10	9.9E-11	1.4E-09
WNW	1.5E-09	3.7E-10	3.7E-10	2.4E-10	1.8E-10	2.9E-10	8.4E-10
W	1.4E-09	3.9E-10	5.2E-10	4.2E-10	2.1E-09	2.9E-10	4.5E-10
WSW	1.4E-09	4.0E-10	4.0E-10	2.4E-10	1.2E-09	1.0E-09	1.5E-09
SW	1.4E-09	2.8E-10	3.3E-10	2.4E-10	2.4E-10	1.1E-09	2.8E-09
SSW	1.5E-09	2.9E-10	2.8E-10	1.6E-10	1.4E-10	5.2E-10	1.7E-09
S	1.5E-09	2.9E-10	3.5E-10	2.6E-10	1.8E-10	1.6E-10	2.6E-09
SSE	1.5E-09	3.8E-10	3.8E-10	2.3E-10	1.6E-10	1.4E-10	1.0E-09
SE	1.5E-09	4.1E-10	4.9E-10	3.7E-10	2.8E-10	2.2E-10	1.1E-09
ESE	1.5E-09	4.8E-10	5.1E-10	3.4E-10	2.7E-10	2.3E-10	8.1E-10
E	1.4E-09	4.9E-10	5.6E-10	4.0E-10	3.3E-10	2.9E-10	9.3E-10
ENE	1.5E-09	5.8E-10	6.0E-10	3.7E-10	2.3E-10	1.7E-10	1.2E-09
NE	1.5E-09	5.7E-10	7.1E-10	3.7E-10	2.0E-10	1.7E-10	1.5E-09
NNE	1.5E-09	5.5E-10	5.0E-10	2.7E-10	2.1E-10	1.6E-10	5.3E-10

Direction	Distance (m) 15000	25000	35000	45000	55000	65000	75000
N	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	7.6E-10	2.2E-09
NNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	9.7E-10	3.5E-09	1.8E-09
NW	6.2E-11	0.0E+00	0.0E+00	0.0E+00	3.6E-11	4.1E-09	2.1E-09
WNW	2.8E-10	0.0E+00	0.0E+00	0.0E+00	9.0E-15	1.5E-09	4.0E-10
W	3.8E-09	4.0E-09	3.6E-10	6.9E-10	3.5E-10	1.8E-09	2.1E-09
WSW	1.2E-09	1.8E-09	1.8E-10	1.0E-10	5.7E-11	7.0E-11	3.2E-11
SW	5.9E-09	2.1E-10	1.3E-09	2.1E-10	2.0E-11	4.9E-12	0.0E+00
SSW	6.2E-09	5.6E-11	1.1E-10	4.3E-11	0.0E+00	6.9E-13	5.7E-11
S	8.0E-09	2.1E-09	2.3E-09	9.3E-11	1.2E-09	4.7E-10	2.2E-10
SSE	6.2E-09	1.7E-08	1.9E-08	6.8E-09	1.6E-09	3.1E-10	1.4E-10
SE	2.3E-09	6.7E-09	6.4E-09	2.5E-09	7.4E-10	2.6E-10	1.9E-10
ESE	1.3E-09	4.3E-09	5.0E-10	5.2E-10	3.3E-10	7.1E-10	2.6E-10
E	1.4E-09	3.4E-09	6.2E-10	9.8E-10	2.8E-10	4.8E-10	3.8E-10
ENE	7.7E-10	1.3E-09	3.6E-10	1.7E-10	1.0E-10	4.2E-11	1.9E-11
NE	1.7E-09	1.1E-10	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NNE	6.8E-11	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.0E-10

ATTACHMENT E

NATIONAL CLIMATIC DATA CENTER, NIAGARA FALLS, NEW YORK

QUALITY CONTROLLED LOCAL CLIMATOLOGICAL DATA

(final)

NOAA, National Climatic Data Center

Month: 01/2013

Station Location: NIAGARA FALLS INTL AIRPORT (04724)
NIAGARA FALLS, NY
Lat. 43.108 Lon. -78.938
Elevation(Ground): 585 ft. above sea level

Date	Temperature (Fahrenheit)						Degree Days Base 65 Degrees		Sun		Significant Weather	Snow/Ice on Ground(In)		Precipitation (In)		Pressure(inches of Hg)		Wind: Speed=mph Dir=tens of degrees							Date
	Max.	Min.	Avg.	Dep From Normal	Avg. Dew pt.	Avg Wet Bulb	Heating	Cooling	Sunrise LST	Sunset LST		1200 UTC Depth	1800 UTC Water Equiv	2400 LST Snow Fall	2400 LST Water Equiv	Avg. Station	Avg. Sea Level	Resultant Speed	Res Dir	Avg. Speed	max 5-second Speed	max 5-second Dir	max 2-minute Speed	max 2-minute Dir	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
01	33	12	23	M	12	19	42	0	-	-	SN UP	M	M	M	T	29.34	30.04	10.2	29	11.0	25	290	20	290	01
02	25	16	21	M	12	18	44	0	-	-	SN	M	M	M	T	29.43	30.14	11.7	25	12.0	26	230	22	240	02
03	30	15	23	M	18	23	42	0	-	-	SN BR HZ	M	M	M	0.02	29.42	30.10	11.6	25	12.5	30	270	26	270	03
04	32	25	29	M	22	27	36	0	-	-	HZ BLSN	M	M	M	0.00	29.32	30.00	25.7	25	26.0	60	240	47	240	04
05	33	28	31	M	23	28	34	0	-	-		M	M	M	0.00	29.52	30.21	11.2	23	11.9	30	250	24	260	05
06	36	32	34	M	30	33	31	0	-	-	RA SN BR HZ	M	M	M	0.02	29.31	29.99	13.3	24	14.3	29	230	23	330	06
07	34	24	29	M	22	27	36	0	-	-	SN	M	M	M	T	29.62	30.31	8.0	24	11.7	35	220	23	220	07
08	36	26	31	M	26	30	34	0	-	-	HZ	M	M	M	0.00	29.57	30.27	10.8	22	11.3	28	240	22	240	08
09	44	31	38	M	29	34	27	0	-	-	RA	M	M	M	T	29.47	30.16	14.4	23	16.4	56	240	45	240	09
10	41	30	36	M	26	32	29	0	-	-		M	M	M	0.00	29.83	30.53	2.0	25	5.8	20	320	15	270	10
11	49	34	42	M	36	39	23	0	-	-	RA DZ	M	M	M	0.02	29.42	30.05	6.2	17	8.4	29	190	20	190	11
12	58	44	51	M	46	48	14	0	-	-		M	M	M	0.00	29.31	29.97	9.8	21	10.3	35	230	25	220	12
13	62	45	54	M	48	50	11	0	-	-	RA BR	M	M	M	0.60	29.19	29.82	8.1	21	11.3	39	250	30	240	13
14	45	24	35	M	24	29	30	0	-	-	RA BR	M	M	M	0.07	29.52	30.25	M	M	13.5	M	M	25	290	14
15	31	24	28	M	19	25	37	0	-	-		M	M	M	0.00	29.68	30.36	4.0	26	4.8	15	260	10	320	15
16	38	28	33	M	24	29	32	0	-	-		M	M	M	0.00	29.30	29.94	9.4	23	10.8	38	250	26	240	16
17	35	14	25	M	16	22	40	0	-	-	SN BR	M	M	M	T	29.41	30.13	4.6	36	11.3	32	250	25	250	17
18	35	12	24	M	12	19	41	0	-	-	SN BR	M	M	M	0.03	29.63	30.31	11.2	23	12.8	37	200	29	210	18
19	47	34	41	M	26	35	24	0	-	-		M	M	M	0.00	29.23	29.87	21.0	23	21.3	43	240	32	230	19
20	47	18	33	M	16	24	32	0	-	-	RA SN	M	M	M	0.01	29.14	29.87	23.9	26	24.9	61	230	45	240	20
21	20	10	15	M	6	15	50	0	-	-	SN BR	M	M	M	0.03	29.32	30.00	10.7	27	11.4	30	280	23	280	21
22	13	5	9	M	-4	6	56	0	-	-		M	M	M	0.00	29.39	30.14	20.1	26	20.1	35	250	26	260	22
23	16	4	10	M	-1	8	55	0	-	-	SN	M	M	M	T	29.51	30.22	8.8	26	9.3	21	280	17	260	23
24	14	1	8	M	3	9	57	0	-	-	SN FZFG BR BLSN	M	M	M	0.17	29.67	30.43	4.8	31	6.7	23	010	18	320	24
25	16	-2*	7*	M	4	10	58	0	-	-	SN BR HZ	M	M	M	T	29.64	30.31	2.6	18	4.0	12	260	9	140	25
26	25	5	15	M	10	14	50	0	-	-	SN BR	M	M	M	T	29.55	30.29	1.2	26	1.7	13	270	10	270	26
27	28	4	16	M	12	17	49	0	-	-	BR	M	M	M	0.00	29.80	30.50	1.7	15	2.9	10	220	9	210	27
28	41	24	33	M	31	33	32	0	-	-	RA DZ FZRA FZDZ SN BR	M	M	M	0.26	29.39	30.04	6.7	22	9.8	30	240	23	240	28
29	55	34	45	M	39	40	20	0	-	-	RA DZ BR	M	M	M	0.74	29.28	29.91	4.6	18	6.8	23	110	18	110	29
30	62*	50	56*	M	49	52	9	0	-	-	RA BR	M	M	M	0.41	28.74	29.31	15.6	20	16.2	36	200	28	250	30
31	50	21	36	M	19	25	29	0	-	-	RA SN BR UP	M	M	M	0.06	28.74	29.47	24.6	26	25.4	52	260	41	250	31
	36.5	21.7	29.1		21.1	26.5	35.6	0.0	<-----Monthly Averages | Totals----->				M	M	2.44	29.41	30.09	9.3	24	12.1	<Monthly Average				
	M	M	M	<----------Departure From Normal---------->											M										

Degree Days

	Monthly Total	Monthly Departure	Season to Date Total	Season to Date Departure
Heating:	1104	M	M	M
Cooling:	0	M	M	M

Greatest 24-hr Precipitation: 0.88 Date: 29-30
Greatest 24-hr Snowfall: M Date: M
Greatest Snow Depth: M Date: M

	Sea Level Pressure	Date	Time (LST)
Maximum	30.62	10	0953
Minimum	29.05	30	2353

Number of Days with -------->
Max Temp >=90: 0
Max Temp <=32: 11
Thunderstorms : 0

Min Temp <=32: 25
Min Temp <=0 : 1
Heavy Fog : 0

Precipitation >=.01 inch: 13
Precipitation >=.10 inch: 5
Snowfall >=1.0 inch : M

*** EXTREME FOR THE MONTH - LAST OCCURRENCE IF MORE THAN ONE.**

Data Version: VER3

QUALITY CONTROLLED LOCAL CLIMATOLOGICAL DATA

(final)

NOAA, National Climatic Data Center

Month: 02/2013

Station Location: NIAGARA FALLS INTL AIRPORT (04724)
NIAGARA FALLS, NY
Lat. 43.108 Lon. -78.938
Elevation(Ground): 585 ft. above sea level

Date	Temperature (Fahrenheit)						Degree Days Base 65 Degrees		Sun		Significant Weather	Snow/Ice on Ground(In)		Precipitation (In)		Pressure(inches of Hg)		Wind: Speed=mph Dir=tens of degrees							Date
	Max.	Min.	Avg.	Dep From Normal	Avg. Dew pt.	Avg Wet Bulb	Heating	Cooling	Sunrise LST	Sunset LST		1200 UTC Depth	1800 UTC Water Equiv	2400 LST Snow Fall	2400 LST Water Equiv	Avg. Station	Avg. Sea Level	Resultant Speed	Res Dir	Avg. Speed	max 5-second Speed	max 5-second Dir	max 2-minute Speed	max 2-minute Dir	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
01	22	16	19	M	10	17	46	0	-	-	SN FZFG BR	M	M	M	0.04	29.29	30.03	14.7	27	15.2	31	290	24	260	01
02	20	14	17	M	12	17	48	0	-	-	SN FG+ FZFG BR BLSN	M	M	M	0.28	29.41	30.09	9.7	24	10.9	33	250	28	260	02
03	22	-1	11*	M	10	13	54	0	-	-	SN FG+ FZFG BR	M	M	M	0.02	29.23	29.92	4.9	26	5.5	23	260	18	260	03
04	19	6	13	M	7	13	52	0	-	-	SN	M	M	M	0.00	29.28	29.98	10.2	26	10.4	25	270	21	270	04
05	26	11	19	M	14	19	46	0	-	-	SN BR	M	M	M	T	29.25	29.94	4.2	23	6.8	26	230	21	240	05
06	27	11	19	M	12	19	46	0	-	-	SN HZ	M	M	M	T	29.47	30.21	8.0	29	9.5	26	310	22	300	06
07	30	10	20	M	14	20	45	0	-	-		M	M	M	0.00	29.63	30.30	10.4	08	10.5	24	080	20	080	07
08	32	18	25	M	21	24	40	0	-	-	SN FG+ FZFG BR BLSN	M	M	M	0.41	29.27	29.96	10.4	03	12.8	31	020	24	360	08
09	21	3	12	M	11	14	53	0	-	-	SN BCFG BR HZ	M	M	M	T	29.66	30.40	4.7	32	6.5	21	340	15	350	09
10	40	-1*	20	M	12	18	45	0	-	-	BR	M	M	M	0.00	29.59	30.26	3.3	10	4.4	18	150	14	150	10
11	46*	33	40*	M	30	35	25	0	-	-	RA SN BR UP	M	M	M	0.14	29.08	29.73	17.7	23	19.3	53	250	40	240	11
12	34	30	32	M	24	29	33	0	-	-	SN UP	M	M	M	T	29.23	29.92	17.0	25	17.2	43	250	31	240	12
13	34	19	27	M	21	26	38	0	-	-	BR HZ	M	M	M	0.00	29.18	29.84	3.1	26	3.7	15	220	12	270	13
14	38	21	30	M	26	29	35	0	-	-	RA SN BR HZ	M	M	M	0.07	29.18	29.85	7.8	20	8.4	36	230	28	230	14
15	37	20	29	M	21	27	36	0	-	-		M	M	M	T	29.26	29.97	15.6	26	16.5	38	230	30	240	15
16	28	16	22	M	15	20	43	0	-	-	SN BR	M	M	M	0.02	29.36	30.04	4.2	25	6.3	25	340	21	340	16
17	21	11	16	M	6	13	49	0	-	-	SN BR UP	M	M	M	0.02	29.38	30.10	11.9	32	13.1	26	290	23	290	17
18	34	6	20	M	10	18	45	0	-	-		M	M	M	0.00	29.50	30.17	3.6	16	6.2	17	170	14	170	18
19	42	24	33	M	25	30	32	0	-	-	RA SN BR	M	M	M	0.38	29.04	29.70	16.3	23	19.3	48	240	37	250	19
20	24	19	22	M	12	18	43	0	-	-	SN BR BLSN	M	M	M	T	29.26	29.99	20.8	26	21.0	38	270	30	260	20
21	23	15	19	M	11	17	46	0	-	-	SN	M	M	M	T	29.59	30.31	9.6	29	10.8	31	310	25	310	21
22	36	21	29	M	22	26	36	0	-	-	SN BR UP	M	M	M	0.01	29.54	30.19	8.6	11	9.6	24	100	18	100	22
23	36	27	32	M	26	31	33	0	-	-		M	M	M	0.00	29.28	29.93	9.5	21	10.6	24	240	21	240	23
24	32	27	30	M	23	28	35	0	-	-	SN BR HZ	M	M	M	T	29.28	29.98	11.7	26	12.0	24	280	21	260	24
25	35	27	31	M	25	29	34	0	-	-	SN BR	M	M	M	T	29.52	30.22	3.5	25	5.0	16	270	14	270	25
26	42	25	34	M	25	31	31	0	-	-	RA SN PL BR HZ	M	M	M	0.80	29.41	30.03	12.4	09	12.7	37	070	29	070	26
27	35	32	34	M	31	32	31	0	-	-	RA SN FG BR	M	M	M	0.39	28.98	29.64	4.7	10	7.9	36	100	26	080	27
28	35	32	34	M	30	32	31	0	-	-	RA SN BR	M	M	M	0.06	28.96	29.64	6.3	28	9.5	21	320	17	340	28
	31.1	17.6	24.3		18.1	23.0	40.4	0.0	<-----Monthly Averages | Totals----->			M	M	2.64	29.33	30.01	5.1	25	10.8	<Monthly Average				
	M	M	M	<----------Departure From Normal---------->											M										

Degree Days

	Monthly Total	Monthly Departure	Season to Date Total	Season to Date Departure
Heating:	1131	M	M	M
Cooling:	0	M	M	M

Greatest 24-hr Precipitation: 1.11 Date: 26-27
Greatest 24-hr Snowfall: M Date: M
Greatest Snow Depth: M Date: M

	Sea Level Pressure	Date	Time (LST)
Maximum	30.47	09	2155
Minimum	29.56	28	0353

Number of Days with -------->
Max Temp >=90: 0
Max Temp <=32: 14
Thunderstorms : 0
Min Temp <=32: 27
Min Temp <=0 : 2
Heavy Fog : 3
Precipitation >=.01 inch: 13
Precipitation >=.10 inch: 6
Snowfall >=1.0 inch : M

*** EXTREME FOR THE MONTH - LAST OCCURRENCE IF MORE THAN ONE.**

Data Version: VER3

QUALITY CONTROLLED LOCAL CLIMATOLOGICAL DATA

(final)

NOAA, National Climatic Data Center

Month: 03/2013

Station Location: NIAGARA FALLS INTL AIRPORT (04724)
NIAGARA FALLS, NY
Lat. 43.108 Lon. -78.938
Elevation(Ground): 585 ft. above sea level

Date	Temperature (Fahrenheit)						Degree Days Base 65 Degrees		Sun		Significant Weather	Snow/Ice on Ground(In)		Precipitation (In)		Pressure(inches of Hg)		Wind: Speed=mph Dir=tens of degrees							Date
	Max.	Min.	Avg.	Dep From Normal	Avg. Dew pt.	Avg Wet Bulb	Heating	Cooling	Sunrise LST	Sunset LST		1200 UTC Depth	1800 UTC Water Equiv	2400 LST Snow Fall	2400 LST Water Equiv	Avg. Station	Avg. Sea Level	Resultant Speed	Res Dir	Avg. Speed	max 5-second Speed	max 5-second Dir	max 2-minute Speed	max 2-minute Dir	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
01	32	24	28	M	21	26	37	0	-	-	SN	M	M	M	0.01	29.23	29.93	11.3	33	11.7	21	320	17	320	01
02	26	21	24	M	16	21	41	0	-	-	SN UP	M	M	M	T	29.31	29.98	10.1	32	10.5	20	310	16	320	02
03	25	20	23*	M	16	21	42	0	-	-	SN BR UP	M	M	M	0.02	29.25	29.94	10.3	31	10.9	22	320	17	310	03
04	30	18	24	M	17	22	41	0	-	-	SN UP	M	M	M	T	29.34	30.05	12.4	29	13.0	24	290	21	280	04
05	33	18*	26	M	19	24	39	0	-	-		M	M	M	0.00	29.41	30.08	4.4	06	8.4	26	080	21	070	05
06	40	26	33	M	27	31	32	0	-	-		M	M	M	0.00	29.39	30.09	10.3	06	10.5	21	050	17	070	06
07	39	28	34	M	28	32	31	0	-	-	SN BR	M	M	M	0.01	29.55	30.25	5.2	02	5.5	13	350	10	360	07
08	42	27	35	M	26	31	30	0	-	-	BR	M	M	M	T	29.70	30.40	5.7	35	6.6	22	030	16	330	08
09	47	23	35	M	27	31	30	0	-	-	BR	M	M	M	0.00	29.70	30.36	2.0	09	3.7	13	030	12	030	09
10	63*	34	49	M	28	41	16	0	-	-		M	M	M	0.00	29.41	30.04	7.9	19	8.4	25	210	21	200	10
11	61	43	52*	M	32	43	13	0	-	-	RA	M	M	M	0.11	29.17	29.79	10.7	19	11.6	33	250	24	250	11
12	43	33	38	M	30	34	27	0	-	-	RA SN	M	M	M	0.01	29.16	29.84	16.5	24	16.6	31	240	26	240	12
13	35	22	29	M	22	27	36	0	-	-	SN GS FZFG BR BLSN	M	M	M	0.10	29.24	29.92	14.9	26	16.8	39	290	31	290	13
14	32	21	27	M	11	22	38	0	-	-	SN UP	M	M	M	T	29.42	30.10	14.9	29	15.6	36	280	28	300	14
15	38	26	32	M	24	29	33	0	-	-	SN HZ BLSN	M	M	M	T	29.22	29.88	11.9	26	13.5	32	290	24	300	15
16	29	20	25	M	17	23	40	0	-	-	SN	M	M	M	T	29.24	29.92	6.2	05	7.7	16	030	14	040	16
17	30	19	25	M	14	22	40	0	-	-	SN	M	M	M	T	29.52	30.24	4.6	34	7.1	21	360	17	330	17
18	36	19	28	M	19	25	37	0	-	-	RA DZ SN BR	M	M	M	0.03	29.41	30.03	11.1	11	11.8	28	130	23	130	18
19	36	24	30	M	23	28	35	0	-	-	RA SN BR	M	M	M	0.01	29.08	29.76	18.9	24	19.5	39	230	31	240	19
20	32	22	27	M	17	23	38	0	-	-	SN BR	M	M	M	T	29.18	29.87	13.7	26	14.1	29	280	24	280	20
21	29	19	24	M	18	23	41	0	-	-	SN BR	M	M	M	T	29.13	29.80	12.1	26	13.0	26	290	23	290	21
22	32	24	28	M	22	26	37	0	-	-	SN BR	M	M	M	0.01	29.19	29.88	13.8	27	13.9	25	270	22	270	22
23	39	26	33	M	22	29	32	0	-	-		M	M	M	0.00	29.34	30.02	11.0	29	11.6	25	320	21	290	23
24	38	21	30	M	21	28	35	0	-	-		M	M	M	0.00	29.26	29.90	6.0	05	8.3	22	060	17	080	24
25	41	31	36	M	26	32	29	0	-	-		M	M	M	0.00	29.02	29.69	9.8	06	11.3	23	080	18	050	25
26	48	30	39	M	26	34	26	0	-	-		M	M	M	0.00	29.20	29.89	8.5	31	8.9	21	320	16	300	26
27	45	29	37	M	29	33	28	0	-	-	RA SN BR	M	M	M	0.05	29.36	30.04	8.9	28	10.1	32	320	25	310	27
28	44	33	39	M	30	34	26	0	-	-	RA	M	M	M	T	29.49	30.18	6.2	29	8.0	17	320	14	300	28
29	50	30	40	M	29	35	25	0	-	-	RA BR	M	M	M	T	29.54	30.21	5.5	25	7.1	24	220	18	240	29
30	50	25	38	M	24	33	27	0	-	-	BR	M	M	M	0.00	29.51	30.16	4.1	21	5.0	24	220	18	210	30
31	57	35	46	M	30	39	19	0	-	-	RA BR	M	M	M	0.01	29.14	29.75	8.7	21	9.5	31	240	24	240	31
	39.4	25.5	32.5		22.9	29.1	32.3	0.0	<-----Monthly Averages | Totals----->			M	M	0.37	29.33	30.00	4.8	28	10.7	<Monthly Average				
	M	M	M	<----------Departure From Normal---------->											M									

Degree Days

	Monthly Total	Monthly Departure	Season to Date Total	Season to Date Departure
Heating:	1001	M	M	M
Cooling:	0	M	M	M

Greatest 24-hr Precipitation: 0.12 Date: 11-12
Greatest 24-hr Snowfall: M Date: M
Greatest Snow Depth: M Date: M

Sea Level Pressure	Value	Date	Time (LST)
Maximum	30.45	09	0853
Minimum	29.60	31	2253

Number of Days with -------->
Max Temp >=90: 0
Max Temp <=32: 2
Thunderstorms : 0
Min Temp <=32: 26
Min Temp <=0 : 0
Heavy Fog : 0
Precipitation >=.01 inch: 11
Precipitation >=.10 inch: 0
Snowfall >=1.0 inch : M

*** EXTREME FOR THE MONTH - LAST OCCURRENCE IF MORE THAN ONE.**

Data Version: VER3

QUALITY CONTROLLED LOCAL CLIMATOLOGICAL DATA

(final)

NOAA, National Climatic Data Center

Month: 04/2013

Station Location: NIAGARA FALLS INTL AIRPORT (04724)
NIAGARA FALLS, NY
Lat. 43.108 Lon. -78.938
Elevation(Ground): 585 ft. above sea level

Date	Temperature (Fahrenheit)						Degree Days Base 65 Degrees		Sun		Significant Weather	Snow/Ice on Ground(In)		Precipitation (In)		Pressure(inches of Hg)		Wind: Speed=mph Dir=tens of degrees							Date
	Max.	Min.	Avg.	Dep From Normal	Avg. Dew pt.	Avg Wet Bulb	Heating	Cooling	Sunrise LST	Sunset LST		1200 UTC Depth	1800 UTC Water Equiv	2400 LST Snow Fall	2400 LST Water Equiv	Avg. Station	Avg. Sea Level	Resultant Speed	Res Dir	Avg. Speed	max 5-second Speed	max 5-second Dir	max 2-minute Speed	max 2-minute Dir	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
01	42	26	34	M	21	29	31	0	-	-	RA SN BR	M	M	M	0.02	29.14	29.84	18.0	29	18.6	38	290	31	280	01
02	36	23	30*	M	15	24	35	0	-	-	SN	M	M	M	T	29.39	30.09	16.6	28	17.0	38	300	31	280	02
03	37	24	31	M	14	25	34	0	-	-	SN	M	M	M	T	29.60	30.31	13.7	30	14.3	32	310	24	300	03
04	50	22	36	M	16	29	29	0	-	-		M	M	M	0.00	29.54	30.17	10.9	22	11.2	26	230	23	220	04
05	43	28	36	M	21	30	29	0	-	-		M	M	M	T	29.35	30.05	8.5	32	9.2	26	320	22	310	05
06	47	20*	34	M	19	30	31	0	-	-	RA	M	M	M	T	29.57	30.22	1.9	07	4.7	18	130	13	150	06
07	66	41	54	M	31	43	11	0	-	-	RA	M	M	M	T	29.18	29.84	12.7	24	18.6	62	240	45	240	07
08	60	31	46	M	35	41	19	0	-	-	TSRA RA BR HZ	M	M	M	0.28	29.36	29.97	2.6	08	6.6	37	310	28	310	08
09	57	44	51	M	42	45	14	0	-	-	TSRA RA BR	M	M	M	0.66	29.34	30.01	2.6	30	9.1	31	270	23	260	09
10	46	38	42	M	40	41	23	0	-	-	TSRA RA DZ BR	M	M	M	0.62	29.32	29.98	11.1	05	11.4	25	070	22	060	10
11	39	32	36	M	29	32	29	0	-	-	RA DZ FZRA FZDZ BR	M	M	M	0.43	29.38	30.04	17.3	07	17.6	35	070	28	080	11
12	47	33	40	M	35	37	25	0	-	-	RA DZ BR	M	M	M	0.53	29.02	29.67	4.8	17	15.5	36	080	29	080	12
13	43	37	40	M	33	37	25	0	-	-	RA DZ BR	M	M	M	T	29.18	29.85	17.5	24	17.6	40	220	31	230	13
14	46	33	40	M	28	35	25	0	-	-		M	M	M	0.00	29.42	30.11	6.1	26	10.0	28	270	22	270	14
15	70	36	53	M	39	46	12	0	-	-		M	M	M	0.00	29.42	30.05	3.7	16	9.6	29	210	23	210	15
16	61	41	51	M	45	50	14	0	-	-	RA BR	M	M	M	0.08	29.39	30.05	9.1	22	13.4	51	220	38	220	16
17	57	32	45	M	32	40	20	0	-	-		M	M	M	0.00	29.65	30.30	7.5	07	8.1	24	080	18	070	17
18	81*	45	63	M	49	55	2	0	-	-		M	M	M	0.00	29.24	29.83	12.1	18	16.6	37	220	26	180	18
19	70	39	55	M	43	48	10	0	-	-	RA BR	M	M	M	0.05	28.95	29.57	19.3	22	22.0	53	250	41	250	19
20	40	30	35	M	25	31	30	0	-	-	RA SN BR	M	M	M	0.04	29.35	30.09	16.4	27	18.0	44	250	32	270	20
21	45	24	35	M	20	30	30	0	-	-		M	M	M	0.00	29.93	30.62	4.6	05	6.5	22	030	18	030	21
22	61	29	45	M	24	38	20	0	-	-		M	M	M	0.00	29.79	30.44	4.7	12	7.6	20	170	15	160	22
23	66	40	53	M	31	44	12	0	-	-		M	M	M	0.00	29.51	30.12	4.1	15	7.0	21	180	15	190	23
24	60	36	48	M	41	46	17	0	-	-	RA BR	M	M	M	0.46	29.15	29.81	11.5	23	15.6	32	270	26	280	24
25	52	33	43	M	32	38	22	0	-	-	RA BR	M	M	M	0.05	29.53	30.22	10.1	23	10.9	36	250	28	240	25
26	53	33	43	M	28	38	22	0	-	-	BR	M	M	M	0.00	29.77	30.45	2.5	25	5.2	26	270	16	200	26
27	68	34	51	M	32	44	14	0	-	-		M	M	M	0.00	29.68	30.32	1.3	13	4.0	14	030	10	030	27
28	72	44	58	M	40	49	7	0	-	-	RA	M	M	M	0.06	29.44	30.07	8.6	17	9.6	31	150	22	150	28
29	63	51	57	M	48	53	8	0	-	-	RA	M	M	M	0.04	29.33	29.98	6.9	19	7.2	23	190	17	180	29
30	73	54	64*	M	51	56	1	0	-	-		M	M	M	T	29.46	30.11	7.4	20	8.5	21	180	17	180	30
	55.0	34.4	44.7		32.0	39.5	20.0	0.0	<-----Monthly Averages | Totals----->			M	M	3.32	29.41	30.10	4.0	24	11.7	<Monthly Average				
	M	M	M	<----------Departure From Normal---------->											M									

Degree Days

	Monthly Total	Monthly Departure	Season to Date Total	Season to Date Departure
Heating:	601	M	M	M
Cooling:	0	M	M	M

Greatest 24-hr Precipitation: 1.25 Date: 09-10
Greatest 24-hr Snowfall: M Date: M
Greatest Snow Depth: M Date: M

	Sea Level Pressure	Date	Time (LST)
Maximum	30.71	21	1102
Minimum	29.32	19	1128

Number of Days with -------->
Max Temp >=90: 0
Max Temp <=32: 0
Thunderstorms : 3
Min Temp <=32: 12
Min Temp <=0 : 0
Heavy Fog : 0
Precipitation >=.01 inch: 13
Precipitation >=.10 inch: 6
Snowfall >=1.0 inch : M

*** EXTREME FOR THE MONTH - LAST OCCURRENCE IF MORE THAN ONE.**

Data Version: VER3

QUALITY CONTROLLED LOCAL CLIMATOLOGICAL DATA

(final)

NOAA, National Climatic Data Center

Month: 05/2013

Station Location: NIAGARA FALLS INTL AIRPORT (04724)
NIAGARA FALLS, NY
Lat. 43.108 Lon. -78.938
Elevation(Ground): 585 ft. above sea level

Date	Temperature (Fahrenheit)						Degree Days Base 65 Degrees		Sun		Significant Weather	Snow/Ice on Ground(In)		Precipitation (In)		Pressure(inches of Hg)		Wind: Speed=mph Dir=tens of degrees							Date
	Max.	Min.	Avg.	Dep From Normal	Avg. Dew pt.	Avg Wet Bulb	Heating	Cooling	Sunrise LST	Sunset LST		1200 UTC Depth	1800 UTC Water Equiv	2400 LST Snow Fall	2400 LST Water Equiv	Avg. Station	Avg. Sea Level	Resultant Speed	Res Dir	Avg. Speed	max 5-second Speed	max 5-second Dir	max 2-minute Speed	max 2-minute Dir	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
01	78	57	68	M	47	55	0	3	-	-		M	M	M	0.00	29.63	30.27	1.4	10	7.1	21	030	16	030	01
02	77	48	63	M	40	52	2	0	-	-		M	M	M	0.00	29.67	30.30	4.3	10	6.6	22	070	18	080	02
03	78	50	64	M	42	53	1	0	-	-		M	M	M	0.00	29.59	30.22	6.2	10	9.0	24	060	20	060	03
04	71	53	62	M	39	51	3	0	-	-		M	M	M	0.00	29.55	30.19	4.7	07	9.0	26	030	18	030	04
05	75	46	61	M	41	51	4	0	-	-		M	M	M	0.00	29.50	30.13	5.1	04	6.1	22	050	17	050	05
06	74	44	59	M	35	48	6	0	-	-		M	M	M	0.00	29.45	30.08	3.4	03	3.8	18	020	16	020	06
07	77	47	62	M	47	55	3	0	-	-		M	M	M	0.00	29.42	30.05	4.1	05	5.0	21	020	17	010	07
08	71	55	63	M	54	58	2	0	-	-	RA BR	M	M	M	0.05	29.36	29.98	3.2	07	4.4	22	030	18	030	08
09	73	53	63	M	53	56	2	0	-	-	RA BR	M	M	M	0.02	29.28	29.92	3.3	28	5.4	17	210	14	230	09
10	74	49	62	M	54	56	3	0	-	-	RA DZ BR	M	M	M	0.22	29.21	29.82	7.5	20	8.3	31	220	22	220	10
11	58	46	52	M	45	48	13	0	-	-	RA BR HZ	M	M	M	0.01	29.10	29.75	12.0	23	13.2	30	230	23	220	11
12	50	36	43	M	31	37	22	0	-	-	RA	M	M	M	0.10	29.15	29.84	16.9	26	17.7	48	270	37	270	12
13	48	33*	41*	M	30	35	24	0	-	-	RA	M	M	M	0.01	29.41	30.09	11.7	25	11.9	29	230	23	240	13
14	57	34	46	M	31	40	19	0	-	-		M	M	M	0.00	29.44	30.07	6.4	20	7.0	22	230	17	230	14
15	77	48	63	M	46	53	2	0	-	-	RA	M	M	M	0.01	29.07	29.69	5.9	24	12.1	51	230	35	230	15
16	75	47	61	M	41	51	4	0	-	-		M	M	M	0.00	29.19	29.85	7.7	30	10.6	33	290	28	300	16
17	66	40	53	M	39	47	12	0	-	-		M	M	M	0.00	29.51	30.17	4.2	06	4.8	17	010	14	030	17
18	73	43	58	M	41	51	7	0	-	-	RA	M	M	M	T	29.54	30.17	8.4	08	8.9	24	070	17	060	18
19	81	53	67	M	55	60	0	2	-	-		M	M	M	0.00	29.41	30.04	2.6	15	4.9	17	040	14	020	19
20	85	59	72	M	60	65	0	7	-	-	RA VCTS	M	M	M	0.02	29.33	29.94	3.7	21	5.5	38	320	31	310	20
21	86	61	74	M	62	65	0	9	-	-	RA HZ VCTS	M	M	M	0.04	29.20	29.80	8.3	23	9.5	32	280	24	290	21
22	86*	61	74	M	60	65	0	9	-	-	RA	M	M	M	T	29.11	29.72	10.8	23	11.5	30	250	22	250	22
23	75	41	58	M	54	56	7	0	-	-	RA BR	M	M	M	0.50	29.12	29.77	7.5	28	14.2	33	330	24	350	23
24	51	38	45	M	34	39	20	0	-	-	RA BR	M	M	M	0.14	29.48	30.17	13.1	34	13.5	28	350	22	350	24
25	58	38	48	M	34	42	17	0	-	-		M	M	M	0.00	29.59	30.25	11.3	33	11.7	26	310	21	310	25
26	63	40	52	M	32	43	13	0	-	-		M	M	M	0.00	29.57	30.23	7.3	31	8.0	16	340	15	300	26
27	70	39	55	M	37	48	10	0	-	-	BR	M	M	M	0.00	29.57	30.21	0.9	22	2.5	18	200	12	260	27
28	64	50	57	M	54	56	8	0	-	-	RA BCFG BR VCTS	M	M	M	1.51	29.40	30.00	5.1	14	6.7	31	340	26	330	28
29	78	62	70	M	61	64	0	5	-	-	RA BR VCTS	M	M	M	0.29	29.31	29.94	10.4	23	10.9	37	250	28	240	29
30	83	61	72	M	62	66	0	7	-	-	HZ	M	M	M	0.00	29.44	30.06	8.0	21	8.1	24	220	20	210	30
31	85	65	75*	M	62	67	0	10	-	-	RA	M	M	M	0.04	29.38	29.99	9.6	22	10.3	35	260	25	260	31
	71.5	48.3	59.9		45.9	52.7	6.6	1.7	<-----Monthly Averages | Totals----->			M	M	M	2.96	29.39	30.02	2.5	25	8.7	<Monthly Average				
	M	M	M	<----------Departure From Normal---------->											M									

Degree Days

	Monthly Total	Monthly Departure	Season to Date Total	Season to Date Departure
Heating:	204	M	M	M
Cooling:	52	M	M	M

Greatest 24-hr Precipitation: 1.78 Date: 28-29
Greatest 24-hr Snowfall: M Date: M
Greatest Snow Depth: M Date: M

	Sea Level Pressure	Date	Time (LST)
Maximum	30.40	02	0917
Minimum	29.53	15	1158

Number of Days with -------->
Max Temp >=90: 0
Max Temp <=32: 0
Thunderstorms : 0
Min Temp <=32: 0
Min Temp <=0 : 0
Heavy Fog : 0
Precipitation >=.01 inch: 14
Precipitation >=.10 inch: 6
Snowfall >=1.0 inch : M

*** EXTREME FOR THE MONTH - LAST OCCURRENCE IF MORE THAN ONE.**

Data Version: VER3

QUALITY CONTROLLED LOCAL CLIMATOLOGICAL DATA

(final)

NOAA, National Climatic Data Center

Month: 06/2013

Station Location: NIAGARA FALLS INTL AIRPORT (04724)
NIAGARA FALLS, NY
Lat. 43.108 Lon. -78.938
Elevation(Ground): 585 ft. above sea level

Date	Temperature (Fahrenheit)						Degree Days Base 65 Degrees		Sun		Significant Weather	Snow/Ice on Ground(In)		Precipitation (In)		Pressure(inches of Hg)		Wind: Speed=mph Dir=tens of degrees							Date
	Max.	Min.	Avg.	Dep From Normal	Avg. Dew pt.	Avg Wet Bulb	Heating	Cooling	Sunrise LST	Sunset LST		1200 UTC Depth	1800 UTC Water Equiv	2400 LST Snow Fall	2400 LST Water Equiv	Avg. Station	Avg. Sea Level	Resultant Speed	Res Dir	Avg. Speed	max 5-second Speed	max 5-second Dir	max 2-minute Speed	max 2-minute Dir	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
01	84	65	75	M	65	67	0	10	-	-	RA BR	M	M	M	0.84	29.23	29.82	11.6	21	12.1	36	220	28	220	01
02	73	53	63	M	58	61	2	0	-	-	RA BR	M	M	M	0.86	29.11	29.75	12.8	24	16.0	43	240	32	240	02
03	62	45*	54*	M	43	48	11	0	-	-		M	M	M	0.00	29.34	29.99	7.8	28	9.7	23	320	18	320	03
04	67	46	57	M	40	49	8	0	-	-		M	M	M	0.00	29.49	30.14	5.1	31	7.6	20	230	16	220	04
05	69	48	59	M	43	51	6	0	-	-		M	M	M	0.00	29.51	30.15	8.0	07	8.2	22	080	18	050	05
06	60	50	55	M	52	54	10	0	-	-	RA DZ FG BR VCTS	M	M	M	0.80	29.30	29.91	8.4	07	8.9	23	070	20	070	06
07	59	51	55	M	54	54	10	0	-	-	DZ FG+ BR	M	M	M	0.03	29.21	29.85	6.2	01	6.9	13	020	12	010	07
08	64	55	60	M	54	56	5	0	-	-	DZ BR	M	M	M	0.02	29.31	29.97	5.0	25	7.4	25	240	16	210	08
09	76	52	64	M	54	58	1	0	-	-	BR	M	M	M	0.00	29.49	30.14	2.0	08	5.2	13	050	10	050	09
10	72	61	67	M	61	63	0	2	-	-	RA BR	M	M	M	1.01	29.27	29.86	5.2	11	8.0	22	230	17	230	10
11	73	59	66	M	58	61	0	1	-	-	RA BR	M	M	M	0.07	29.11	29.75	8.8	30	10.3	23	300	18	300	11
12	77	54	66	M	55	60	0	1	-	-	RA	M	M	M	T	29.23	29.85	1.0	08	2.3	13	070	9	100	12
13	68	57	63	M	57	59	2	0	-	-	RA BR	M	M	M	0.72	29.02	29.65	8.8	03	9.3	33	030	23	030	13
14	72	51	62	M	55	58	3	0	-	-	FG BR	M	M	M	0.00	29.27	29.93	5.1	31	6.4	17	290	14	270	14
15	71	49	60	M	50	56	5	0	-	-		M	M	M	0.00	29.38	30.01	6.8	23	7.2	20	240	17	220	15
16	79	62	71	M	60	63	0	6	-	-	RA DZ BR	M	M	M	0.09	29.18	29.80	9.6	23	11.2	30	300	24	300	16
17	79	59	69	M	58	62	0	4	-	-	BR	M	M	M	0.00	29.23	29.87	4.0	28	8.1	23	300	18	310	17
18	70	55	63	M	50	56	2	0	-	-		M	M	M	0.00	29.34	29.97	8.0	04	8.7	22	040	17	040	18
19	68	51	60	M	44	52	5	0	-	-		M	M	M	0.00	29.49	30.15	4.9	04	5.9	17	040	13	030	19
20	76	46	61	M	46	54	4	0	-	-		M	M	M	0.00	29.57	30.22	1.5	06	3.2	20	020	15	020	20
21	81	50	66	M	50	57	0	1	-	-		M	M	M	0.00	29.59	30.21	0.5	17	2.1	14	250	12	220	21
22	85	61	73	M	62	67	0	8	-	-	TS RA BR	M	M	M	0.16	29.44	30.05	8.6	22	8.9	33	230	26	230	22
23	87*	68	78*	M	65	69	0	13	-	-	BR	M	M	M	T	29.40	30.01	11.1	23	11.9	32	230	25	240	23
24	84	69	77	M	65	69	0	12	-	-		M	M	M	0.00	29.38	29.98	11.7	22	11.9	30	220	22	240	24
25	80	69	75	M	65	68	0	10	-	-	RA BR HZ	M	M	M	0.12	29.24	29.85	11.0	22	11.3	29	240	22	230	25
26	80	67	74	M	65	68	0	9	-	-	BR	M	M	M	0.00	29.19	29.80	10.2	22	10.4	23	210	20	210	26
27	78	64	71	M	65	66	0	6	-	-	RA BR	M	M	M	0.68	29.10	29.70	0.9	01	3.6	25	110	17	120	27
28	71	62	67	M	63	64	0	2	-	-	RA BR VCTS	M	M	M	2.04	28.93	29.54	2.9	03	4.3	12	040	9	040	28
29	77	61	69	M	60	63	0	4	-	-	RA	M	M	M	0.03	28.94	29.58	2.2	35	6.4	17	220	14	360	29
30	76	60	68	M	60	63	0	3	-	-		M	M	M	0.00	29.18	29.82	4.7	03	5.0	17	040	14	010	30
	73.9	56.7	65.3		55.9	59.9	2.5	3.1	<-----Monthly Averages | Totals----->				M	M	7.47	29.28	29.91	1.9	25	7.9	<Monthly Average				
	M	M	M	<----------Departure From Normal---------->											M										

Degree Days

	Monthly Total	Monthly Departure	Season to Date Total	Season to Date Departure
Heating:	74	M	M	M
Cooling:	92	M	M	M

Greatest 24-hr Precipitation: 2.66 Date: 27-28
Greatest 24-hr Snowfall: M Date: M
Greatest Snow Depth: M Date: M

	Sea Level Pressure	Date	Time (LST)
Maximum	30.26	21	0914
Minimum	29.48	29	0316

Number of Days with -------->
Max Temp >=90: 0
Max Temp <=32: 0
Thunderstorms : 1
Min Temp <=32: 0
Min Temp <=0 : 0
Heavy Fog : 1
Precipitation >=.01 inch: 14
Precipitation >=.10 inch: 9
Snowfall >=1.0 inch : M

*** EXTREME FOR THE MONTH - LAST OCCURRENCE IF MORE THAN ONE.**

Data Version: VER3

QUALITY CONTROLLED LOCAL CLIMATOLOGICAL DATA (final)

NOAA, National Climatic Data Center

Month: 07/2013

Station Location: NIAGARA FALLS INTL AIRPORT (04724)
NIAGARA FALLS, NY
Lat. 43.108 Lon. -78.938
Elevation(Ground): 585 ft. above sea level

Date	Temperature (Fahrenheit)						Degree Days Base 65 Degrees		Sun		Significant Weather	Snow/Ice on Ground(In)		Precipitation (In)		Pressure(inches of Hg)		Wind: Speed=mph Dir=tens of degrees							Date
	Max.	Min.	Avg.	Dep From Normal	Avg. Dew pt.	Avg Wet Bulb	Heating	Cooling	Sunrise LST	Sunset LST		1200 UTC Depth	1800 UTC Water Equiv	2400 LST Snow Fall	2400 LST Water Equiv	Avg. Station	Avg. Sea Level	Resultant Speed	Res Dir	Avg. Speed	max 5-second Speed	max 5-second Dir	max 2-minute Speed	max 2-minute Dir	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
01	70	60	65	M	58	61	0	0	-	-	RA DZ BR HZ	M	M	M	0.01	29.36	30.00	11.4	05	11.5	26	040	20	050	01
02	73	59	66	M	60	62	0	1	-	-	BR HZ	M	M	M	T	29.43	30.06	5.9	04	6.4	18	060	14	060	02
03	85	63	74	M	68	70	0	9	-	-	TS RA FG+ BR HZ	M	M	0.0	0.54	29.47	30.10	0.9	34	4.6	23	080	15	070	03
04	82	69	76	M	68	70	0	11	-	-	RA BR	M	M	M	0.08	29.51	30.12	6.5	22	7.3	21	240	16	250	04
05	82	69	76	M	68	70	0	11	-	-	RA BR	M	M	0.0	0.02	29.47	30.09	8.1	21	8.6	24	250	18	240	05
06	84	67	76	M	67	70	0	11	-	-	RA BR	M	M	0.0	0.03	29.47	30.08	6.2	22	6.4	18	220	13	220	06
07	80	70	75	M	67	69	0	10	-	-	RA	M	M	M	0.07	29.38	29.99	10.9	23	11.6	30	240	23	230	07
08	82	68	75	M	67	70	0	10	-	-	RA BR	M	M	0.0	T	29.39	30.01	6.3	22	7.2	22	210	17	210	08
09	80	70	75	M	69	70	0	10	-	-	RA BR	M	M	M	0.05	29.36	29.96	6.9	20	7.1	17	240	15	230	09
10	85	67	76	M	68	70	0	11	-	-	TS RA BR	M	M	M	T	29.18	29.79	14.4	23	16.0	32	230	24	220	10
11	78	58	68	M	56	61	0	3	-	-		M	M	M	0.00	29.33	29.96	5.5	31	6.2	21	330	16	320	11
12	75	59	67	M	61	64	0	2	-	-		M	M	M	0.00	29.48	30.12	4.0	06	5.0	17	090	13	100	12
13	85	59	72	M	63	67	0	7	-	-		M	M	M	0.00	29.57	30.20	4.9	05	5.4	28	090	14	360	13
14	88	66	77	M	68	71	0	12	-	-	BR	M	M	M	0.00	29.63	30.25	0.8	06	3.4	26	100	15	150	14
15	89	72	81	M	66	71	0	16	-	-		M	M	0.0	0.00	29.63	30.25	1.9	32	3.2	16	340	12	350	15
16	90	72	81	M	68	73	0	16	-	-	FG BR	M	M	M	0.00	29.62	30.23	2.8	25	4.5	14	330	10	330	16
17	91	75	83	M	74	77	0	18	-	-	BR	M	M	M	0.00	29.54	30.14	9.1	22	9.3	25	230	22	220	17
18	92*	75	84*	M	73	76	0	19	-	-	BR	M	M	M	T	29.41	30.01	9.2	22	9.4	23	210	18	210	18
19	90	68	79	M	71	74	0	14	-	-	TSRA RA BR	M	M	M	3.67	29.22	29.79	15.9	23	18.0	66	270	52	270	19
20	83	68	76	M	62	66	0	11	-	-	RA BR	M	M	M	0.37	29.15	29.78	6.0	27	8.6	31	220	26	210	20
21	78	63	71	M	59	64	0	6	-	-		M	M	M	0.00	29.33	29.96	4.4	04	4.9	17	030	14	030	21
22	79	59	69	M	61	65	0	4	-	-		M	M	M	0.00	29.27	29.87	5.5	08	6.0	18	110	15	120	22
23	80	62	71	M	64	66	0	6	-	-	TS BR	M	M	M	0.15	29.05	29.68	6.6	25	8.3	30	250	23	230	23
24	69	55	62*	M	49	55	3	0	-	-		M	M	0.0	0.00	29.27	29.93	7.6	34	8.6	24	310	20	320	24
25	76	52	64	M	51	57	1	0	-	-		M	M	M	0.00	29.45	30.10	3.0	05	4.3	25	350	14	050	25
26	78	51*	65	M	53	58	0	0	-	-		M	M	M	0.00	29.44	30.06	3.6	08	4.0	16	120	12	060	26
27	75	59	67	M	61	64	0	2	-	-	RA BR	M	M	M	0.45	29.27	29.87	4.0	18	5.2	25	230	21	230	27
28	72	58	65	M	54	59	0	0	-	-	RA	M	M	M	0.09	29.24	29.89	10.2	24	10.7	28	250	22	250	28
29	70	58	64	M	55	59	1	0	-	-	RA	M	M	0.0	0.06	29.39	30.05	8.1	23	8.5	25	210	20	210	29
30	75	55	65	M	56	60	0	0	-	-		M	M	M	0.00	29.54	30.17	4.0	25	5.8	18	240	15	330	30
31	78	60	69	M	60	63	0	4	-	-		M	M	0.0	0.00	29.44	30.05	1.6	15	4.5	16	210	12	190	31
	80.5	63.4	71.9		62.7	66.2	0.2	7.2	<-----Monthly Averages | Totals----->			M	M	5.59	29.40	30.02	2.8	23	7.4	<Monthly Average				
	M	M	M	<----------Departure From Normal---------->											M									

Degree Days

	Monthly Total	Monthly Departure	Season to Date Total	Season to Date Departure
Heating:	5	M	M	M
Cooling:	224	M	M	M

Greatest 24-hr Precipitation: 4.04 Date: 19-20
Greatest 24-hr Snowfall: M Date: M
Greatest Snow Depth: M Date: M

	Sea Level Pressure	Date	Time (LST)
Maximum	30.29	15	0821
Minimum	29.61	23	1853

Number of Days with -------->
Max Temp >=90: 4
Max Temp <=32: 0
Thunderstorms : 4
Min Temp <=32: 0
Min Temp <=0 : 0
Heavy Fog : 1
Precipitation >=.01 inch: 13
Precipitation >=.10 inch: 5
Snowfall >=1.0 inch : M

*** EXTREME FOR THE MONTH - LAST OCCURRENCE IF MORE THAN ONE.**

Data Version: VER3

QUALITY CONTROLLED LOCAL CLIMATOLOGICAL DATA (final)

NOAA, National Climatic Data Center

Month: 08/2013

Station Location: NIAGARA FALLS INTL AIRPORT (04724)
NIAGARA FALLS, NY
Lat. 43.108 Lon. -78.938
Elevation(Ground): 585 ft. above sea level

Date	Temperature (Fahrenheit)						Degree Days Base 65 Degrees		Sun		Significant Weather	Snow/Ice on Ground(In)		Precipitation (In)		Pressure(inches of Hg)		Wind: Speed=mph Dir=tens of degrees							Date
	Max.	Min.	Avg.	Dep From Normal	Avg. Dew pt.	Avg Wet Bulb	Heating	Cooling	Sunrise LST	Sunset LST		1200 UTC Depth	1800 UTC Water Equiv	2400 LST Snow Fall	2400 LST Water Equiv	Avg. Station	Avg. Sea Level	Resultant Speed	Res Dir	Avg. Speed	max 5-second Speed	max 5-second Dir	max 2-minute Speed	max 2-minute Dir	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
01	78	61	70	M	62	65	0	5	-	-	TS RA BR VCTS	M	M	M	0.38	29.21	29.82	6.0	26	8.7	23	240	20	310	01
02	78	56	67	M	58	62	0	2	-	-	RA	M	M	0.0	0.25	29.23	29.85	8.9	25	10.1	35	230	25	240	02
03	76	57	67	M	54	60	0	2	-	-	BR	M	M	0.0	0.00	29.27	29.91	8.9	29	9.3	23	290	17	300	03
04	72	53	63	M	52	57	2	0	-	-		M	M	M	T	29.38	30.03	8.7	32	9.2	22	310	17	320	04
05	72	51	62	M	50	55	3	0	-	-		M	M	0.0	0.00	29.44	30.07	4.0	23	4.3	16	210	13	240	05
06	78	55	67	M	55	60	0	2	-	-	RA	M	M	M	T	29.38	30.01	1.5	13	3.1	14	170	10	250	06
07	80	66	73	M	64	67	0	8	-	-	RA	M	M	M	0.05	29.28	29.90	9.8	20	10.4	25	220	20	220	07
08	80	66	73	M	67	69	0	8	-	-	RA BR VCTS	M	M	M	0.57	29.29	29.92	0.9	32	4.6	21	230	17	220	08
09	77	63	70	M	60	63	0	5	-	-	RA BR	M	M	M	0.15	29.27	29.89	5.1	28	8.0	21	210	16	220	09
10	72	57	65	M	51	57	0	0	-	-		M	M	M	0.00	29.43	30.06	6.6	31	7.0	22	290	17	280	10
11	74	51	63	M	52	57	2	0	-	-		M	M	M	0.00	29.46	30.09	3.5	24	4.5	16	220	14	220	11
12	74	61	68	M	60	63	0	3	-	-	RA BR VCTS	M	M	0.0	0.11	29.35	29.96	6.5	22	6.9	26	220	18	230	12
13	69	54	62	M	55	59	3	0	-	-	RA BR	M	M	M	0.16	29.20	29.83	12.0	29	13.1	29	300	23	300	13
14	69	52	61*	M	48	54	4	0	-	-		M	M	0.0	0.00	29.35	30.01	11.6	31	12.5	31	350	23	320	14
15	73	51	62	M	49	55	3	0	-	-		M	M	M	0.00	29.47	30.11	7.3	25	8.1	29	210	21	220	15
16	74	52	63	M	53	58	2	0	-	-		M	M	M	0.00	29.52	30.16	3.8	23	4.1	17	250	13	240	16
17	80	53	67	M	55	60	0	2	-	-	BR	M	M	M	0.00	29.61	30.25	2.0	04	3.5	18	340	13	040	17
18	80	55	68	M	57	61	0	3	-	-		M	M	M	0.00	29.55	30.18	0.6	11	2.1	13	260	9	250	18
19	80	59	70	M	60	64	0	5	-	-	BR	M	M	M	0.00	29.45	30.07	3.8	24	5.8	22	300	14	220	19
20	81	64	73	M	63	66	0	8	-	-	BR	M	M	M	0.00	29.47	30.10	8.5	22	8.7	24	230	17	200	20
21	84	65	75	M	63	67	0	10	-	-	BR	M	M	M	0.00	29.47	30.09	8.4	21	8.6	21	220	17	220	21
22	83	61	72	M	63	67	0	7	-	-	BR HZ	M	M	M	T	29.34	29.96	5.2	26	8.6	24	230	20	230	22
23	75	56	66	M	53	59	0	1	-	-		M	M	M	0.00	29.47	30.11	4.3	04	5.0	20	350	15	020	23
24	78	51	65	M	51	57	0	0	-	-		M	M	M	0.00	29.65	30.31	2.9	09	4.0	17	060	14	040	24
25	81	51*	66	M	54	60	0	1	-	-	RA	M	M	M	0.03	29.62	30.24	7.1	22	8.0	25	200	21	210	25
26	79	68	74	M	67	69	0	9	-	-	TSRA RA BR	M	M	M	0.62	29.41	30.01	11.0	23	11.2	25	240	21	210	26
27	83	67	75	M	70	71	0	10	-	-	RA FG+ FG BR HZ	M	M	M	0.18	29.28	29.90	5.3	21	5.9	17	200	15	200	27
28	82	68	75*	M	69	71	0	10	-	-	RA FG BR	M	M	M	0.01	29.25	29.87	3.9	04	4.9	18	030	16	030	28
29	84*	63	74	M	65	68	0	9	-	-	FG+ BR	M	M	M	0.00	29.38	30.01	1.3	04	1.9	15	360	12	350	29
30	81	66	74	M	67	69	0	9	-	-	RA FG+ FG BR	M	M	M	0.02	29.28	29.87	7.9	22	8.2	28	210	21	230	30
31	79	66	73	M	67	69	0	8	-	-	BR	M	M	M	0.00	29.14	29.77	3.6	31	7.5	23	220	18	210	31
	77.6	58.7	68.1		58.5	62.5	0.6	4.1	<-----Monthly Averages | Totals----->			M	M	2.53	29.38	30.01	3.7	25	7.0	<Monthly Average				
	M	M	M	<----------Departure From Normal---------->											M									

Degree Days

	Monthly Total	Monthly Departure	Season to Date Total	Season to Date Departure
Heating:	19	M	M	M
Cooling:	127	M	M	M

Greatest 24-hr Precipitation: 0.65 Date: 25-26
Greatest 24-hr Snowfall: M Date: M
Greatest Snow Depth: M Date: M

	Sea Level Pressure	Date	Time (LST)
Maximum	30.35	24	1053
Minimum	29.70	31	0410

Number of Days with -------->
Max Temp >=90: 0
Max Temp <=32: 0
Thunderstorms : 2
Min Temp <=32: 0
Min Temp <=0 : 0
Heavy Fog : 3
Precipitation >=.01 inch: 12
Precipitation >=.10 inch: 8
Snowfall >=1.0 inch : M

*** EXTREME FOR THE MONTH - LAST OCCURRENCE IF MORE THAN ONE.**

Data Version: VER3

QUALITY CONTROLLED LOCAL CLIMATOLOGICAL DATA (final)

NOAA, National Climatic Data Center

Month: 09/2013

Station Location: NIAGARA FALLS INTL AIRPORT (04724)
NIAGARA FALLS, NY
Lat. 43.108 Lon. -78.938
Elevation(Ground): 585 ft. above sea level

Date	Temperature (Fahrenheit)						Degree Days Base 65 Degrees		Sun		Significant Weather	Snow/Ice on Ground(In)		Precipitation (In)		Pressure(inches of Hg)		Wind: Speed=mph Dir=tens of degrees							Date
	Max.	Min.	Avg.	Dep From Normal	Avg. Dew pt.	Avg Wet Bulb	Heating	Cooling	Sunrise LST	Sunset LST		1200 UTC Depth	1800 UTC Water Equiv	2400 LST Snow Fall	2400 LST Water Equiv	Avg. Station	Avg. Sea Level	Resultant Speed	Res Dir	Avg. Speed	max 5-second Speed	max 5-second Dir	max 2-minute Speed	max 2-minute Dir	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
01	81	66	74	M	68	69	0	9	-	-	RA BR	M	M	M	0.07	29.17	29.78	4.0	09	5.5	14	060	10	080	01
02	79	63	71	M	63	66	0	6	-	-	RA BR HZ	M	M	M	0.03	29.11	29.73	7.4	28	9.0	28	310	23	300	02
03	68	56	62	M	54	57	3	0	-	-		M	M	M	T	29.23	29.88	11.2	26	11.4	24	270	18	270	03
04	76	57	67	M	56	61	0	2	-	-	RA	M	M	M	T	29.34	29.98	10.5	25	12.1	31	240	25	220	04
05	65	47	56	M	45	51	9	0	-	-		M	M	M	0.00	29.49	30.16	6.8	34	7.2	22	010	17	350	05
06	68	43	56	M	45	51	9	0	-	-		M	M	M	0.00	29.59	30.22	5.5	21	5.7	18	210	15	200	06
07	67	58	63	M	58	60	2	0	-	-	RA BR	M	M	M	0.31	29.36	29.97	8.7	21	8.9	28	220	22	220	07
08	68	48	58	M	50	55	7	0	-	-	RA DZ BR	M	M	M	0.01	29.38	30.04	7.3	03	8.4	28	030	22	030	08
09	72	45	59	M	53	56	6	0	-	-		M	M	M	0.00	29.44	30.06	4.6	20	5.8	21	200	16	190	09
10	86	68	77	M	68	72	0	12	-	-	TSRA RA VCTS	M	M	M	0.11	29.31	29.94	15.0	22	14.9	38	220	25	220	10
11	86*	69	78*	M	69	72	0	13	-	-	TSRA RA HZ VCTS	M	M	M	0.05	29.34	29.96	12.6	22	13.4	31	230	24	230	11
12	74	61	68	M	63	65	0	3	-	-	TS RA BR	M	M	M	0.20	29.20	29.81	7.7	27	10.3	33	280	25	310	12
13	61	50	56	M	47	49	9	0	-	-	RA DZ BR	M	M	M	0.09	29.28	29.94	8.6	34	8.9	20	340	15	340	13
14	62	47	55	M	41	48	10	0	-	-		M	M	M	0.00	29.45	30.11	4.4	29	7.2	18	230	15	210	14
15	67	48	58	M	50	54	7	0	-	-	RA	M	M	M	0.09	29.46	30.11	5.7	23	7.8	24	220	18	320	15
16	56	39	48*	M	45	48	17	0	-	-	RA BR	M	M	M	0.03	29.57	30.25	3.5	01	5.9	25	020	21	020	16
17	65	34*	50	M	41	46	15	0	-	-	BCFG	M	M	M	0.00	29.75	30.40	2.5	09	3.4	16	110	10	080	17
18	71	41	56	M	45	51	9	0	-	-		M	M	M	0.00	29.56	30.19	2.7	19	3.4	16	220	13	220	18
19	74	47	61	M	53	57	4	0	-	-	BR	M	M	M	0.00	29.44	30.07	4.1	21	4.3	17	250	14	200	19
20	79	54	67	M	61	64	0	2	-	-	BR HZ	M	M	M	0.00	29.26	29.87	9.3	19	9.5	24	190	20	190	20
21	73	51	62	M	58	59	3	0	-	-	RA BR	M	M	M	1.65	29.07	29.69	3.9	23	8.3	38	330	30	320	21
22	55	46	51	M	42	47	14	0	-	-	RA	M	M	M	T	29.26	29.93	8.8	32	9.7	22	320	17	320	22
23	58	41	50	M	40	46	15	0	-	-		M	M	M	0.00	29.47	30.14	3.4	34	3.9	20	300	14	330	23
24	63	38	51	M	42	47	14	0	-	-	FG+ BCFG	M	M	M	0.00	29.46	30.10	1.6	36	2.0	15	330	10	350	24
25	69	39	54	M	44	49	11	0	-	-		M	M	M	0.00	29.36	30.01	2.1	02	2.2	16	020	13	020	25
26	71	42	57	M	47	51	8	0	-	-		M	M	M	0.00	29.44	30.10	2.6	04	3.1	17	040	13	030	26
27	69	48	59	M	50	54	6	0	-	-		M	M	M	0.00	29.59	30.24	4.0	07	4.5	16	060	13	060	27
28	73	47	60	M	51	55	5	0	-	-	BR	M	M	M	0.00	29.59	30.22	2.1	14	3.7	15	200	10	170	28
29	74	47	61	M	52	56	4	0	-	-		M	M	M	0.00	29.43	30.05	5.3	19	5.8	20	180	16	180	29
30	71	59	65	M	58	61	0	0	-	-	DZ BR	M	M	M	T	29.35	29.98	7.4	21	8.1	30	210	22	220	30
	70.0	50.0	60.0		52.0	55.9	6.2	1.6	<-----Monthly Averages | Totals----->				M	M	2.64	29.39	30.03	2.8	25	7.1	<Monthly Average				
	M	M	M	<----------Departure From Normal---------->											M										

Degree Days

	Monthly Total	Monthly Departure	Season to Date Total	Season to Date Departure
Heating:	187	M	M	M
Cooling:	47	M	M	M

Greatest 24-hr Precipitation: 1.65 Date: 21
Greatest 24-hr Snowfall: M Date: M
Greatest Snow Depth: M Date: M

	Sea Level Pressure	Date	Time (LST)
Maximum	30.50	17	0855
Minimum	29.62	21	1809

Number of Days with -------->
Max Temp >=90: 0
Max Temp <=32: 0
Thunderstorms : 3
Min Temp <=32: 0
Min Temp <=0 : 0
Heavy Fog : 1
Precipitation >=.01 inch: 11
Precipitation >=.10 inch: 4
Snowfall >=1.0 inch : M

*** EXTREME FOR THE MONTH - LAST OCCURRENCE IF MORE THAN ONE.**

Data Version: VER3

QUALITY CONTROLLED LOCAL CLIMATOLOGICAL DATA (final)

NOAA, National Climatic Data Center

Month: 10/2013

Station Location: NIAGARA FALLS INTL AIRPORT (04724)
NIAGARA FALLS, NY
Lat. 43.108 Lon. -78.938
Elevation(Ground): 585 ft. above sea level

Date	Temperature (Fahrenheit) Max.	Min.	Avg.	Dep From Normal	Avg. Dew pt.	Avg Wet Bulb	Degree Days Base 65 Degrees Heating	Cooling	Sun Sunrise LST	Sunset LST	Significant Weather	Snow/Ice on Ground(In) 1200 UTC Depth	1800 UTC Water Equiv	Precipitation (In) 2400 LST Snow Fall	2400 LST Water Equiv	Pressure(inches of Hg) Avg. Station	Avg. Sea Level	Wind: Speed=mph Dir=tens of degrees Resultant Speed	Res Dir	Avg. Speed	max 5-second Speed	max 5-second Dir	max 2-minute Speed	max 2-minute Dir	Date
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
01	72	54	63	M	59	61	2	0	-	-	BR HZ	M	M	M	0.00	29.34	29.97	8.6	22	8.9	25	230	22	220	01
02	76	51	64	M	57	61	1	0	-	-		M	M	M	0.00	29.35	30.00	7.3	25	8.4	22	270	17	240	02
03	71	44	58	M	47	53	7	0	-	-	RA	M	M	M	T	29.44	30.07	2.5	08	2.7	12	070	10	080	03
04	72	60	66	M	63	63	0	1	-	-	RA BR	M	M	M	0.61	29.38	30.01	0.7	07	4.9	14	250	10	080	04
05	65	58	62	M	57	58	3	0	-	-	TSRA RA BR	M	M	M	0.42	29.42	30.05	8.2	07	8.5	18	080	14	080	05
06	80*	58	69*	M	63	65	0	4	-	-	RA BR	M	M	M	1.05	29.23	29.84	5.7	16	7.2	24	180	18	180	06
07	74	46	60	M	50	M	5	0	-	-	RA BR	M	M	M	0.44	29.14	M	13.7	25	14.2	44	240	32	240	07
08	63	43	53	M	44	48	12	0	-	-		M	M	M	0.00	29.59	30.28	1.1	23	3.0	14	190	9	190	08
09	68	39	54	M	44	49	11	0	-	-		M	M	M	0.00	29.68	30.33	1.3	04	2.3	13	040	10	030	09
10	70	40	55	M	45	49	10	0	-	-		M	M	M	0.00	29.58	30.22	2.3	05	2.9	15	030	13	010	10
11	71	43	57	M	46	50	8	0	-	-		M	M	M	0.00	29.49	30.15	4.5	05	4.7	16	050	13	010	11
12	75	41	58	M	45	52	7	0	-	-	BR	M	M	M	0.00	29.50	30.14	3.2	09	4.3	16	070	14	060	12
13	67	58	63	M	53	57	2	0	-	-	RA BR	M	M	M	0.40	29.58	30.23	4.4	21	6.3	22	350	18	350	13
14	62	44	53	M	45	50	12	0	-	-		M	M	M	0.01	29.67	30.32	3.2	33	4.2	20	150	14	340	14
15	69	42	56	M	50	53	9	0	-	-		M	M	M	0.00	29.51	30.11	4.0	15	4.8	18	190	13	170	15
16	68	52	60	M	55	58	5	0	-	-	RA	M	M	M	0.31	29.20	29.82	11.0	21	12.1	26	190	21	210	16
17	61	49	55	M	48	51	10	0	-	-	RA BR	M	M	M	0.50	29.18	29.81	6.0	24	7.0	22	250	17	250	17
18	59	46	53	M	43	48	12	0	-	-	RA	M	M	M	T	29.20	29.86	13.2	26	13.8	31	260	25	280	18
19	58	43	51	M	44	47	14	0	-	-	RA BR	M	M	M	0.16	29.13	29.77	5.5	25	9.1	28	240	18	250	19
20	56	40	48	M	39	43	17	0	-	-	RA MIFG	M	M	M	0.03	29.23	29.91	5.0	24	8.6	22	220	16	220	20
21	63	46	55	M	42	49	10	0	-	-	RA BR	M	M	M	0.18	29.24	29.87	12.2	22	13.9	39	230	29	220	21
22	50	39	45	M	31	38	20	0	-	-		M	M	M	0.08	29.18	29.84	13.5	26	14.8	32	260	23	260	22
23	47	35	41	M	33	37	24	0	-	-	RA BR	M	M	M	0.07	29.13	29.79	5.2	28	6.8	20	330	16	330	23
24	46	33	40	M	32	36	25	0	-	-	RA	M	M	M	T	29.23	29.93	13.2	26	13.5	32	250	25	260	24
25	49	33	41	M	33	38	24	0	-	-		M	M	M	T	29.49	30.17	8.9	27	9.3	25	280	20	280	25
26	45	41	43	M	35	39	22	0	-	-	RA BR	M	M	M	0.26	29.23	29.87	15.9	23	18.8	45	230	35	240	26
27	48	34	41	M	33	38	24	0	-	-	RA	M	M	M	T	29.31	30.00	6.2	26	9.6	17	310	17	310	27
28	47	29	38	M	29	36	27	0	-	-		M	M	M	0.00	29.56	30.27	5.0	01	8.3	24	010	20	350	28
29	48	27*	38*	M	28	35	27	0	-	-	RA	M	M	M	0.01	29.75	30.42	2.3	08	2.4	14	080	12	080	29
30	58	36	47	M	37	41	18	0	-	-		M	M	M	T	29.55	30.20	2.5	08	3.0	13	010	10	010	30
31	66	42	54	M	52	54	11	0	-	-	RA BR	M	M	M	0.96	29.14	29.70	12.2	20	12.8	47	210	32	210	31
	62.1	43.4	52.7		44.6	48.6	12.2	0.2	<-----Monthly Averages | Totals----->			M	M	5.49	29.38	30.03	4.0	24	8.1	<Monthly Average				
	M	M	M	<----------Departure From Normal---------->											M									

Degree Days

	Monthly Total	Monthly Departure	Season to Date Total	Season to Date Departure
Heating:	379	M	M	M
Cooling:	5	M	M	M

Greatest 24-hr Precipitation: 1.10 Date: 05-06
Greatest 24-hr Snowfall: M Date: M
Greatest Snow Depth: M Date: M

	Sea Level Pressure	Date	Time (LST)
Maximum	30.49	29	1053
Minimum	29.32	31	2253

Number of Days with -------->
Max Temp >=90: 0
Max Temp <=32: 0
Thunderstorms : 1
Min Temp <=32: 2
Min Temp <=0 : 0
Heavy Fog : 0
Precipitation >=.01 inch: 16
Precipitation >=.10 inch: 11
Snowfall >=1.0 inch : M

*** EXTREME FOR THE MONTH - LAST OCCURRENCE IF MORE THAN ONE.**

Data Version: VER3

QUALITY CONTROLLED LOCAL CLIMATOLOGICAL DATA (final)

NOAA, National Climatic Data Center

Month: 11/2013

Station Location: NIAGARA FALLS INTL AIRPORT (04724)
NIAGARA FALLS, NY
Lat. 43.108 Lon. -78.938
Elevation(Ground): 585 ft. above sea level

Date	Temperature (Fahrenheit)						Degree Days Base 65 Degrees		Sun		Significant Weather	Snow/Ice on Ground(In)		Precipitation (In)		Pressure(inches of Hg)		Wind: Speed=mph Dir=tens of degrees							Date
	Max.	Min.	Avg.	Dep From Normal	Avg. Dew pt.	Avg Wet Bulb	Heating	Cooling	Sunrise LST	Sunset LST		1200 UTC Depth	1800 UTC Water Equiv	2400 LST Snow Fall	2400 LST Water Equiv	Avg. Station	Avg. Sea Level	Resultant Speed	Res Dir	Avg. Speed	max 5-second Speed	max 5-second Dir	max 2-minute Speed	max 2-minute Dir	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
01	63	47	55	M	46	50	10	0	-	-	RA DZ	M	M	M	0.23	28.79	29.45	22.0	23	22.9	61	240	44	240	01
02	48	36	42	M	39	41	23	0	-	-	RA DZ BR	M	M	M	0.14	29.08	29.78	5.5	35	9.7	23	020	17	010	02
03	38	25	32	M	22	29	33	0	-	-		M	M	M	0.00	29.65	30.38	5.4	02	5.6	18	010	15	030	03
04	41	23	32	M	21	29	33	0	-	-		M	M	M	0.00	29.89	30.58	5.8	11	6.0	21	100	15	100	04
05	58	32	45	M	30	39	20	0	-	-		M	M	M	0.00	29.75	30.41	7.9	18	8.4	18	180	15	190	05
06	65*	47	56	M	43	49	9	0	-	-	RA	M	M	M	0.29	29.42	30.02	12.4	21	13.1	35	230	26	240	06
07	55	37	46	M	M	M	19	0	-	-	RA	M	M	M	T	29.29	M	M	M	9.2	29	310	23	300	07
08	41	32	37	M	28	34	28	0	-	-	RA	M	M	M	T	29.46	30.16	10.8	29	11.4	28	280	20	300	08
09	51	33	42	M	32	39	23	0	-	-	RA	M	M	M	0.01	29.39	30.01	8.9	21	10.7	30	280	24	280	09
10	49	36	43	M	33	38	22	0	-	-	RA	M	M	M	0.07	29.27	29.97	16.5	27	16.9	41	300	30	280	10
11	45	31	38	M	31	35	27	0	-	-	RA SN BR	M	M	M	0.15	29.42	30.08	10.0	26	13.1	36	210	28	230	11
12	34	27	31	M	18	26	34	0	-	-	SN	M	M	M	T	29.64	30.35	9.8	33	10.4	24	310	16	310	12
13	39	22	31	M	22	29	34	0	-	-		M	M	M	0.00	29.69	30.34	16.1	24	16.7	46	230	35	220	13
14	48	27	38	M	28	37	27	0	-	-		M	M	M	0.00	29.41	30.08	22.8	23	22.9	46	220	31	220	14
15	51	44	48	M	30	39	17	0	-	-		M	M	M	0.00	29.41	30.08	13.6	22	13.8	32	220	25	210	15
16	58	38	48	M	37	44	17	0	-	-		M	M	M	0.00	29.49	30.13	5.6	18	6.9	20	230	14	220	16
17	62	52	57*	M	50	53	8	0	-	-	RA	M	M	M	0.31	29.13	29.70	13.9	19	14.4	56	240	40	230	17
18	55	35	45	M	33	39	20	0	-	-	RA SN	M	M	M	0.01	29.03	29.67	24.1	25	24.4	63	240	44	240	18
19	37	24	31	M	22	29	34	0	-	-	SN	M	M	M	T	29.60	M	8.8	30	10.0	30	280	20	280	19
20	41	20	31	M	20	26	34	0	-	-		M	M	M	0.00	29.83	30.52	7.0	09	7.2	22	100	16	080	20
21	44	28	36	M	27	35	29	0	-	-	RA BR	M	M	M	T	29.72	30.37	7.9	18	8.1	23	190	17	190	21
22	46	30	38	M	38	40	27	0	-	-	RA DZ BR	M	M	M	0.09	29.47	30.14	8.1	28	9.2	31	290	25	290	22
23	32	18	25	M	17	24	40	0	-	-	SN	M	M	M	T	29.51	30.19	16.0	29	17.7	44	300	32	300	23
24	24	15	20	M	10	17	45	0	-	-	SN	M	M	M	T	29.70	30.42	12.7	30	14.0	30	320	24	310	24
25	36	17	27	M	16	25	38	0	-	-	SN BR	M	M	M	T	29.59	30.26	16.2	23	17.0	41	220	30	230	25
26	34	31	33	M	30	31	32	0	-	-	FZRA SN BR	M	M	M	0.03	29.41	30.06	4.1	22	5.8	24	220	20	220	26
27	33	23	28	M	24	27	37	0	-	-	SN BR UP	M	M	M	0.05	29.12	29.81	12.9	31	13.3	29	320	24	320	27
28	25	16	21	M	14	20	44	0	-	-	SN BR	M	M	M	0.01	29.57	30.31	6.2	29	7.6	29	310	23	320	28
29	27	7*	17*	M	13	18	48	0	-	-	SN MIFG BR	M	M	M	T	29.93	30.67	2.3	07	2.8	10	030	7	040	29
30	35	9	22	M	16	22	43	0	-	-		M	M	M	0.00	29.80	30.45	7.2	17	8.4	23	190	18	190	30
	43.8	28.7	36.3		27.2	33.2	28.5	0.0	<-----Monthly Averages | Totals----->			M	M	1.39	29.48	30.16	7.1	25	11.9	<Monthly Average				
	M	M	M	<----------Departure From Normal---------->											M										

Degree Days

	Monthly Total	Monthly Departure	Season to Date Total	Season to Date Departure
Heating:	855	M	M	M
Cooling:	0	M	M	M

Greatest 24-hr Precipitation: 0.32 Date: 17-18
Greatest 24-hr Snowfall: M Date: M
Greatest Snow Depth: M Date: M

	Sea Level Pressure	Date	Time (LST)
Maximum	30.78	29	2224
Minimum	29.14	01	0353

Number of Days with -------->
Max Temp >=90: 0
Max Temp <=32: 4
Thunderstorms : 0
Min Temp <=32: 20
Min Temp <=0 : 0
Heavy Fog : 0
Precipitation >=.01 inch: 12
Precipitation >=.10 inch: 5
Snowfall >=1.0 inch : M

*** EXTREME FOR THE MONTH - LAST OCCURRENCE IF MORE THAN ONE.**

Data Version: VER3

QUALITY CONTROLLED LOCAL CLIMATOLOGICAL DATA

(final)

NOAA, National Climatic Data Center

Month: 12/2013

Station Location: NIAGARA FALLS INTL AIRPORT (04724)
NIAGARA FALLS, NY
Lat. 43.108 Lon. -78.938
Elevation(Ground): 585 ft. above sea level

Date	Temperature (Fahrenheit)						Degree Days Base 65 Degrees		Sun		Significant Weather	Snow/Ice on Ground(In)		Precipitation (In)		Pressure(inches of Hg)		Wind: Speed=mph Dir=tens of degrees							Date
	Max.	Min.	Avg.	Dep From Normal	Avg. Dew pt.	Avg Wet Bulb	Heating	Cooling	Sunrise LST	Sunset LST		1200 UTC Depth	1800 UTC Water Equiv	2400 LST Snow Fall	2400 LST Water Equiv	Avg. Station	Avg. Sea Level	Resultant Speed	Res Dir	Avg. Speed	max 5-second Speed	max 5-second Dir	max 2-minute Speed	max 2-minute Dir	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
01	39	33	36	M	29	34	29	0	-	-	RA	M	M	M	T	29.41	30.06	6.6	19	6.8	17	190	14	190	01
02	37	26	32	M	30	32	33	0	-	-	BR	M	M	M	0.00	29.26	29.93	3.0	24	3.7	9	290	8	300	02
03	39	20	30	M	24	28	35	0	-	-	DZ BR	M	M	M	T	29.31	29.99	2.9	07	3.3	16	080	13	070	03
04	49	33	41	M	34	37	24	0	-	-	RA BR HZ	M	M	M	T	29.31	29.96	4.8	09	5.1	24	200	12	080	04
05	59*	35	47*	M	41	45	18	0	-	-	RA SN BR	M	M	M	T	29.15	29.83	12.6	23	14.6	38	230	30	230	05
06	35	29	32	M	23	29	33	0	-	-		M	M	M	T	29.50	30.19	8.6	28	9.2	18	300	16	300	06
07	29	20	25	M	15	22	40	0	-	-	SN	M	M	M	T	29.75	30.47	11.8	27	11.9	25	260	22	270	07
08	28	17	23	M	14	21	42	0	-	-	SN	M	M	M	T	29.82	30.49	4.4	11	6.6	21	130	16	120	08
09	37	26	32	M	26	30	33	0	-	-	RA FZDZ SN BR	M	M	M	T	29.31	29.96	14.2	24	17.9	45	250	32	240	09
10	28	19	24	M	11	19	41	0	-	-	SN BR	M	M	M	T	29.33	30.03	17.1	27	17.7	35	250	28	250	10
11	25	14	20	M	10	18	45	0	-	-	SN	M	M	M	T	29.52	30.24	16.4	27	16.5	36	270	26	270	11
12	21	11	16	M	5	13	49	0	-	-	SN	M	M	M	T	29.59	30.27	17.6	26	17.8	38	280	29	260	12
13	25	13	19	M	11	16	46	0	-	-	SN FZFG	M	M	M	T	29.51	30.24	5.7	27	11.4	35	250	28	260	13
14	19	12	16	M	10	13	49	0	-	-	SN FZFG BR	M	M	M	0.11	29.57	30.21	13.7	08	13.9	28	080	22	080	14
15	25	15	20	M	14	18	45	0	-	-	SN BR UP	M	M	M	0.05	29.07	29.78	10.8	27	13.0	37	260	29	260	15
16	19	2	11*	M	4	10	54	0	-	-		M	M	M	0.00	29.39	30.12	7.6	26	8.2	30	260	24	260	16
17	28	2	15	M	14	17	50	0	-	-	SN BR HZ	M	M	M	T	29.31	29.99	3.1	21	7.6	26	270	20	260	17
18	31	21	26	M	20	25	39	0	-	-	SN BR UP HZ	M	M	M	T	29.34	30.04	13.2	25	13.8	32	260	25	250	18
19	39	28	34	M	27	32	31	0	-	-	RA BR	M	M	M	T	29.31	29.98	10.9	23	11.6	32	240	28	250	19
20	41	33	37	M	35	36	28	0	-	-	RA FG+ FG BR	M	M	M	0.38	29.21	29.86	2.0	21	4.9	20	220	15	220	20
21	49	31	40	M	35	36	25	0	-	-	RA FZRA FG+ BR	M	M	M	0.25	29.15	29.82	3.3	04	8.4	29	060	24	060	21
22	38	31	35	M	32	33	30	0	-	-	RA DZ FZRA BR	M	M	M	1.34	29.08	29.78	1.7	10	10.6	36	080	29	070	22
23	37	23	30	M	27	30	35	0	-	-	RA SN BR	M	M	M	T	29.42	30.14	9.1	27	10.7	25	280	18	290	23
24	26	5	16	M	13	17	49	0	-	-	SN BR	M	M	M	0.16	29.64	30.37	5.6	32	7.6	22	320	18	310	24
25	27	-3*	12	M	6	12	53	0	-	-	SN FZFG BR	M	M	M	T	29.75	30.44	3.2	15	4.3	13	190	10	190	25
26	30	19	25	M	19	24	40	0	-	-	SN FZFG BR	M	M	M	0.06	29.47	30.18	10.1	25	11.9	26	280	23	260	26
27	37	19	28	M	23	27	37	0	-	-	SN BR	M	M	M	T	29.59	30.25	9.2	24	10.4	28	220	20	210	27
28	42	34	38	M	30	35	27	0	-	-		M	M	M	0.00	29.38	30.04	15.8	23	16.1	38	240	32	230	28
29	44	25	35	M	28	34	30	0	-	-	SN	M	M	M	T	29.13	29.77	10.8	23	13.2	36	290	28	290	29
30	25	16	21	M	8	16	44	0	-	-	SN	M	M	M	T	29.44	30.16	9.0	31	11.1	31	300	25	300	30
31	20	12	16	M	9	15	49	0	-	-	SN FG+ FZFG BR BLSN	M	M	M	0.14	29.44	30.16	11.1	26	13.5	41	280	35	280	31
	33.2	20.0	26.6		20.2	25.0	38.2	0.0	<-----Monthly Averages | Totals----->			M	M	2.49	29.40	30.09	6.2	25	10.8	<Monthly Average				
	M	M	M	<----------Departure From Normal---------->											M										

Degree Days

	Monthly Total	Monthly Departure	Season to Date Total	Season to Date Departure
Heating:	1183	M	M	M
Cooling:	0	M	M	M

Greatest 24-hr Precipitation: 1.34 Date: 22
Greatest 24-hr Snowfall: M Date: M
Greatest Snow Depth: M Date: M

	Sea Level Pressure	Date	Time (LST)
Maximum	30.62	08	0021
Minimum	29.65	29	1653

Number of Days with -------->
Max Temp >=90: 0
Max Temp <=32: 16
Thunderstorms : 0

Min Temp <=32: 26
Min Temp <=0 : 1
Heavy Fog : 3

Precipitation >=.01 inch: 8
Precipitation >=.10 inch: 6
Snowfall >=1.0 inch : M

*** EXTREME FOR THE MONTH - LAST OCCURRENCE IF MORE THAN ONE.**

Data Version: VER3

U.S. Department of Commerce
National Oceanic & Atmospheric Administration
National Environmental Satellite, Data, and Information Service

Annual Climatological Summary (2013)

National Climatic Data Center
Federal Building
151 Patton Avenue
Asheville, North Carolina 28801
www.ncdc.noaa.gov

Station: **NIAGARA FALLS INTERNATIONAL AIRPORT, NY US**

COOP:305841
Elev: 584 ft. Lat: 43.108° N Lon: 78.938° W

Date	Temperature (°F)														Precipitation (inches)									
Elem->	MMXT	MMNT	MNTM	DPNT	HTDD	CLDD	EMXT		EMNT		DT90	DX32	DT32	DT00	TPCP	DPNP	EMXP		TSNW	MXSD		DP01	DP05	DP10
Month	Mean Max.	Mean Min.	Mean	Depart. from Normal	Heating Degree Days	Cooling Degree Days	Highest	High Date	Lowest	Low Date	Number Of Days				Total	Depart. from Normal	Greatest Observed		Snow, Sleet			Number Of Days		
											Max >=90°	Max <=32°	Min <=32°	Min <=0°			Day	Date	Total Fall	Max Depth	Max Date	>=.10	>=.50	>=1.0
1	36.5	21.7	29.1		1104	0	62	30	-2	25	0	11	25	1	2.44		0.74	29	1.6X			5	2	0
2	31.1X	17.6X	24.3X			0	46	11	-1	10	0	14	27	2	2.64X		0.80	26	1.0X			6	1	0
3	39.4	25.5	32.5		1001	0	63	10	18	05	0	10	26	0	0.37		0.11	11	0.0X			2	0	0
4	55.0	34.4	44.7		601	0	81	18	20	06	0	0	12	0	3.32		0.66	09	0.0X			6	3	0
5	71.5	48.3	59.9		204	52	86	22	33	13	0	0	0	0	2.96		1.51	28	0.0X			6	2	1
6	73.9	56.7	65.3		74	92	87	23	45	03	0	0	0	0	7.47		2.04	28	0.0X			9	7	2
7	80.5	63.4	71.9		5	224	92	18	51	26	4	0	0	0	5.59		3.67	19	0.0X			5	2	1
8	77.6	58.7	68.1		19	127	84	29	51	25	0	0	0	0	2.52		0.62	26	0.0X			8	2	0
9	70.0	50.0	60.0		187	47	86	11	34	17	0	0	0	0	2.64		1.65	21	0.0X			4	1	1
10	62.1	43.4	52.7		379	5	80	06	27	29	0	0	2	0	5.49		1.05	06	0.0X			11	4	1
11	43.8	28.7	36.3		855	0	65	06	7	29	0	4	20	0	1.39		0.31	17	0.1X			5	0	0
12	33.2	20.0	26.6		1183	0	59	05	-3	25	0	16	26	1	2.49		1.34	22	5.7X			6	1	1
Annual	56.2*	39.0*	45.6		5612*	547	92	Jul	-3	Dec	4*	55*	138*	4*	39.32		3.67*	Jul	8.4*			73*	25*	7*

Notes

(blank) Data element not reported or missing.

\+ Occurred on one or more previous dates during the month. The date in the Date field is the last day of occurrence. Used through December 1983 only.

A Accumulated amount. This value is a total that may include data from a previous month or months or year (for annual value).

B Adjusted total. Monthly value totals based on proportional available data across the entire month.

E An estimated monthly or annual total.

X Monthly means or totals based on incomplete time series. 1 to 9 days are missing. Annual means or totals include one or more months which had 1 to 9 days that were missing.

T Trace of precipitation, snowfall, or snowdepth. The precipitation data value will equal zero.

Elem Element types are included to provide cross-reference for users of the NCDC CDO system.

Station Station is identified by: COOP ID, Station Name, State

S Precipitation amount is continuing to be accumulated. Total will be included in a subsequent monthly or yearly value. Example: Days 1-20 had 1.35 inches of precipitation, then a period of accumulation began. The element TPCP would then be 00135S and the total accumulated amount value appears in a subsequent monthly value.

* Annual value missing; summary value computed from available month values.

Attachment F

2013 NIAGARA FALLS STORAGE SITE

- **Radon Flux Results**
- **Site Map**

NSEHAPS

2013 Radon Flux Monitoring Results[a]

Niagara Falls Storage Site

NFSS Sample ID	Qualifier[d]	Radon-222 Flux (pCi/m^2/s)	±		MDA	NFSS Sample ID	Qualifier[d]	Radon-222 Flux (pCi/m^2/s)	±		MDA
1	U	0.033	±	0.027	0.067	51	U	0.015	±	0.024	0.062
2	U	0.053	±	0.031	0.083	52	U	0.033	±	0.022	0.056
3	U	0.031	±	0.021	0.059	53	U	-0.009	±	0.014	0.028
4	U	0.045	±	0.028	0.073	54	U	0.039	±	0.032	0.069
5	U	0.042	±	0.029	0.074	55	U	0.043	±	0.023	0.064
6	U	0.042	±	0.025	0.067	56	U	0.033	±	0.021	0.062
7	U	0.035	±	0.025	0.061	57	U	0.022	±	0.023	0.058
8	U	0.055	±	0.036	0.087	58	U	0.009	±	0.023	0.055
9	U	0.042	±	0.033	0.077	59	U	0.034	±	0.030	0.069
10	U	0.034	±	0.023	0.064	60		0.042	±	0.019	0.037
10-DUP[b]	U	0.045	±	0.025	0.069	60-DUP[b]	U	0.053	±	0.037	0.079
11	U	0.070	±	0.038	0.098	61	U	0.056	±	0.038	0.096
12	U	0.057	±	0.029	0.072	62	U	0.049	±	0.032	0.080
13	U	0.060	±	0.033	0.086	63	U	3.256	±	2.235	5.205
14	U	0.054	±	0.028	0.076	64	U	0.032	±	0.023	0.057
15	U	0.059	±	0.029	0.077	65	U	0.061	±	0.036	0.083
16	U	0.006	±	0.024	0.058	66	U	0.001	±	0.022	0.052
17	U	0.069	±	0.031	0.081	67	U	0.039	±	0.036	0.075
18	U	0.047	±	0.031	0.076	68	U	0.026	±	0.025	0.056
19		0.094	±	0.025	0.012	69	U	0.006	±	0.017	0.047
20	U	0.041	±	0.034	0.073	70	U	0.029	±	0.029	0.062
20-DUP[b]	U	0.058	±	0.034	0.078	70-DUP[b]	U	0.043	±	0.033	0.063
21	U	0.059	±	0.033	0.089	71	U	0.016	±	0.024	0.058
22		0.141	±	0.028	0.037	72	U	0.056	±	0.036	0.086
23	U	0.061	±	0.036	0.094	73	U	0.058	±	0.031	0.081
24	U	0.041	±	0.026	0.067	74	U	0.011	±	0.024	0.058
25	U	0.093	±	0.040	0.098	75	U	0.036	±	0.021	0.058
26	U	0.052	±	0.040	0.082	76	U	0.000	±	0.023	0.050
27	U	0.019	±	0.022	0.055	77	U	0.049	±	0.033	0.085
28	U	0.010	±	0.022	0.053	78	U	0.043	±	0.031	0.066
29	U	0.067	±	0.040	0.098	79	U	0.042	±	0.026	0.069
30	U	0.067	±	0.030	0.076	80	U	0.049	±	0.039	0.088
30-DUP[b]		0.065	±	0.019	0.041	80-DUP[b]	U	0.005	±	0.024	0.057
31	U	0.024	±	0.023	0.060	81	U	0.033	±	0.023	0.056
32	U	0.047	±	0.029	0.079	82	U	0.042	±	0.031	0.072
33	U	0.020	±	0.025	0.062	83	U	0.073	±	0.032	0.084
34	U	0.061	±	0.036	0.089	84	U	0.032	±	0.024	0.067
35	U	0.044	±	0.024	0.064	85	U	0.053	±	0.033	0.080
36	U	0.041	±	0.035	0.078	86	U	0.034	±	0.025	0.064
37	U	0.045	±	0.027	0.074	87	U	0.010	±	0.019	0.053
38	U	0.045	±	0.023	0.061	88	U	0.008	±	0.022	0.052
39	U	0.009	±	0.021	0.050	89	U	0.048	±	0.027	0.071
40	U	-0.004	±	0.022	0.046	90		0.108	±	0.028	0.012
40-DUP[b]	U	0.012	±	0.021	0.053	90-DUP[b]	U	0.100	±	0.042	0.110
41	U	0.068	±	0.034	0.089	91	U	0.040	±	0.024	0.064
42	U	0.051	±	0.031	0.083	92	U	0.006	±	0.016	0.042
43	U	0.061	±	0.030	0.080	93	U	0.035	±	0.030	0.066
44	U	0.054	±	0.030	0.073	94	U	0.043	±	0.028	0.070
45	U	0.022	±	0.027	0.069	95	U	0.004	±	0.016	0.045
46	U	0.013	±	0.020	0.050	96	U	0.035	±	0.024	0.064
47	U	0.009	±	0.020	0.050	97	U	0.009	±	0.017	0.046
48	U	0.015	±	0.027	0.066	98	U	0.061	±	0.041	0.094
49	U	0.050	±	0.027	0.072	99	U	0.055	±	0.031	0.073
50	U	0.040	±	0.030	0.069	100	U	0.039	±	0.025	0.066
50-DUP[b]	U	0.006	±	0.021	0.050	100-DUP[b]	U	0.013	±	0.023	0.056

NESHAPS

2013 Radon Flux Monitoring Results[a]

Niagara Falls Storage Site

NFSS Sample ID	Qualifier[d]	Radon-222 Flux (pCi/m^2/s)	±	MDA	NFSS Sample ID	Qualifier[d]	Radon-222 Flux (pCi/m^2/s)	±	MDA
101	U	0.029	± 0.03423	0.09035	151	U	0.042	± 0.034	0.075
102	U	0.006	± 0.02143	0.05435	152	U	0.059	± 0.032	0.086
103	U	0.034	± 0.02616	0.06409	153	U	0.002	± 0.014	0.038
104	U	0.029	± 0.02179	0.06037	154	U	0.001	± 0.023	0.054
105	U	0.018	± 0.01849	0.04318	155	U	0.033	± 0.027	0.062
106	U	0.060	± 0.02191	0.05965	156	U	0.016	± 0.024	0.058
107	U	0.012	± 0.04096	0.08947	157	U	0.050	± 0.034	0.084
108	U	0.070	± 0.02048	0.05729	158	U	0.050	± 0.029	0.071
109	U	0.060	± 0.02155	0.05874	159	U	0.033	± 0.027	0.061
110	U	0.039	± 0.01731	0.04338	160	U	0.093	± 0.042	0.107
110-DUP[b]	U	0.060	± 0.01732	0.04342	160-DUP[b]	U	0.072	± 0.034	0.091
111	U	0.052	± 0.02606	0.0615	161	U	0.021	± 0.019	0.055
112	U	0.036	± 0.02188	0.056	162	U	0.058	± 0.033	0.084
113	U	0.015	± 0.02612	0.06986	163	U	0.052	± 0.035	0.093
114	U	0.038	± 0.01514	0.04216	164	U	0.064	± 0.030	0.080
115	U	0.013	± 0.02058	0.05501	165	U	0.054	± 0.030	0.080
116	U	-0.003	± 0.02441	0.06612	166	U	0.060	± 0.041	0.098
117	U	0.027	± 0.02188	0.05963	167	U	0.045	± 0.036	0.086
118	U	0.001	± 0.02523	0.06646	168	U	0.078	± 0.038	0.098
119	U	0.014	± 0.02333	0.05396	169	U	0.012	± 0.029	0.069
120	U	0.037	± 0.03731	0.09891	170	U	0.046	± 0.031	0.074
120-DUP[b]	U	0.039	± 0.02719	0.07535	170-DUP[b]	U	0.081	± 0.035	0.093
121	U	-0.003	± 0.03169	0.06203	171	U	0.032	± 0.025	0.066
122		0.053	± 0.02749	0.06339	172	U	0.054	± 0.034	0.086
123	U	0.033	± 0.01981	0.05299	173	U	-0.001	± 0.023	0.052
124	U	0.035	± 0.02159	0.05885	174	U	0.084	± 0.047	0.110
125	U	0.079	± 0.02073	0.05257	175	U	0.010	± 0.025	0.059
126	U	0.057	± 0.02054	0.05747	176	U	0.018	± 0.022	0.059
127	U	0.036	± 0.02909	0.07199	177	U	0.054	± 0.033	0.081
128	U	0.070	± 0.02931	0.07747	178	U	0.047	± 0.029	0.073
129	U	0.033	± 0.02002	0.01952	179	U	0.039	± 0.033	0.076
130	U	0.041	± 0.02776	0.07129	180	U	0.016	± 0.024	0.066
130-DUP[b]	U	0.039	± 0.03108	0.08257	180-DUP[b]	U	0.016	± 0.020	0.060
131	U	0.034	± 0.02696	0.06547	181[c]	U	0.003	± 0.022	0.053
132	U	0.037	± 0.01988	0.05706	182[c]	U	0.037	± 0.028	0.067
133	U	0.033	± 0.02847	0.07744	183[c]	U	0.036	± 0.028	0.070
134	U	0.058	± 0.02566	0.07052	Average background	U	0.02556 (pCi/m^2/s)		
135	U	0.043	± 0.04352	0.09247					
136	U	0.047	± 0.03344	0.09128					
137	U	0.064	± 0.04627	0.09705					
138	U	0.037	± 0.0309	0.07435					
139	U	0.002	± 0.03026	0.08278					
140	U	0.033	± 0.0229	0.06407					
140-DUP[b]	U	0.053	± 0.02373	0.05707					
141	U	0.045	± 0.02396	0.0653					
142	U	0.060	± 0.02817	0.06997					
143	U	0.056	± 0.02779	0.07139					
144	U	0.094	± 0.02679	0.07311					
145	U	0.027	± 0.02496	0.06616					
146		0.073	± 0.02606	0.07055					
147	U	0.006	± 0.0292	0.07297					
148	U	0.057	± 0.02896	0.06277					
149	U	0.013	± 0.02655	0.07515					
150	U	0.039	± 0.02372	0.05705					
150-DUP[b]	U	0.042	± 0.03449	0.08087					

IWCS	Value	Units
Average[e]	0.056	(pCi/m^2/s)
High[f]	0.141	(pCi/m^2/s)
Low	-0.009	(pCi/m^2/s)

NOTE: The EPA Standard for Radon-222 Flux is 20 pCi/m2/sec

a. Radon-222 flux was performed on August 22-23, 2013

b. Every 10th canister is counted twice as a quality control (QC) duplicate to evaluate analytical precision.

c. Background:
181-Lewiston-Porter Central School
182-Lewiston Water Pollution Control Center
183-Balmer Rd. (CWM Secondary Gate)

d. Validated Qualifier: U - indicates that no analyte was detected (Non-Detect).

e. Average of all values (detects and Un-detects)

f. Highest detectable finding.

NFSS Environmental Surveillance and RI Program Locations

Legend

- Monitoring Wells
- Temporary Wellpoints
- SW/SD Samples
- USACE TLDs
- NYSDEC TLDs
- Radon Flux Monitoring Locations
- Surface Waterways
- NFSS Boundary

N
W E
S

0 125 250 500 750 1,000 Feet