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NIAGARA FALLS STORAGE SITE
Formerly Utilized Sites Remedial Action Program

2018
ENVIRONMENTAL SURVEILLANCE TECHNICAL MEMORANDUM

PREPARED BY:
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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 (U.S. EPA)
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
DOD	Department of Defense
DOE	United States Department of Energy
DOH	Department of Health
EPA	United States Environmental Protection Agency
ESP	environmental surveillance program
FUSRAP	Formerly Utilized Sites Remedial Action Program
IWCS	Interim Waste Containment Structure
KAPL	Knolls Atomic Power Laboratory
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
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
OSLD	optically stimulated luminescence dosimeter
PAH	polycyclic aromatic hydrocarbon
pCi/g	picocuries per gram
pCi/L	picocuries per liter
Ra	radium
RCRA	Resource Conservation and Recovery Act
RSL	regional screening level
SCO	soil cleanup objective
SDWA	Safe Drinking Water Act
TDS	total dissolved solids
TED	total effective dose
U	lab qualifier–nondetect
U_3O_8	triuranium octoxide
USACE	United States Army Corps of Engineers
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: This technical memorandum documents the scientific methods, criteria, data, and findings of the Environmental Surveillance Program (ESP) at the Niagara Falls Storage Site (NFSS). The U.S. Army Corps of Engineers Buffalo District is executing this program in support of its mission under the Formerly Utilized Sites Remedial Action Program (FUSRAP) to protect human health and the environment at the NFSS. The Buffalo District publishes this technical memorandum annually and posts it to the Corps website in the "Environmental Monitoring" section: https://www.lrb.usace.army.mil/Missions/HTRW/FUSRAP/Niagara-Falls-Storage-Site/.

Site Description and Background: The NFSS is located at 1397 Pletcher Road in the Town of Lewiston, New York, 19 miles (30.6 km) north of Buffalo, New York. The NFSS is 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 [DOE]) brought radioactive wastes and residues to a small portion of the LOOW. Throughout the 1970s, the AEC gradually consolidated its operations and sold excess property to the public. In the 1980s, the DOE constructed a ten-acre Interim Waste Containment Structure (IWCS) on the NFSS to contain the radioactive wastes and residues.

In October 1997, Congress transferred management of FUSRAP (which had been initiated in 1974) from the DOE to the Corps of Engineers. In addition to investigating and remediating site contaminants at the NFSS, the Corps of Engineers is responsible for maintaining the site and conducting the ESP. The environmental surveillance activities the DOE initiated in 1979 have continuously been reviewed and updated; today the Corps of Engineers Buffalo District ensures that 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 Corps of Engineers completed the *Remedial Investigation Report for the NFSS* and *NFSS Remedial Investigation Report Addendum*, respectively (USACE 2007, USACE 2011). These reports defined the nature and extent of contaminants on the NFSS and assessed their potential long-term risks. Based on findings from these investigations and public input, the Corps of Engineers further enhanced the ESP.

Between 2012 and 2014, the Corps of Engineers investigated further to locate the source of elevated uranium in groundwater south and east of the IWCS. As part of these investigations, the Corps of Engineers worked to prevent possible off-site migration of contaminants through site utilities. The work included installing monitoring wells, collecting and analyzing soil and groundwater samples, sealing manholes and pipelines near the property boundary, excavating investigative trenches, and completing a geophysical survey. The Corps of Engineers presented results of these investigations in reports issued in August 2013 (U.S. Army Corps of Engineers [USACE], 2013a) and February 2015 (USACE 2015a).

In 2013, the Corps of Engineers implemented the following modifications to the ESP:

- The number of wells monitored semiannually increased from 39 to 54 (to include several wells installed in 2012); the analytical parameters were refined to include total uranium, radium-226, and volatile organic compounds (for a limited number of wells)
- The number of surface water and sediment locations sampled semiannually decreased from 11 to 9; the analytical parameters were refined to include total uranium, radium-226, polycyclic aromatic hydrocarbons, and metals.

In 2014, the Corps of Engineers added well MW943 to the ESP, increasing the total number of wells monitored semiannually to 55. Well MW943 monitors the upper water-bearing zone south of the IWCS.

The Corps of Engineers made no changes to air monitoring and continues to measure radon-222 flux on the IWCS cap annually and radon-222 concentrations and gamma emissions at the IWCS perimeter and NFSS property boundary semiannually.

To evaluate environmental surveillance data, the Corps of Engineers uses the criteria, standards, and guidelines of the DOE, U.S. Environmental Protection Agency (EPA), Nuclear Regulatory Commission (NRC), and New York State Department of Environmental Conservation (NYSDEC) for comparison purposes.

Additional information about the site and the ESP is available on the Corps of Engineers Buffalo District website:
https://www.lrb.usace.army.mil/Missions/HTRW/FUSRAP/Niagara-Falls-Storage-Site/.

Key Findings: The 2018 environmental surveillance analytical results confirm that site controls continue to perform as designed; they are fully protective of human health and the environment.

Results of the 2018 surveillance program are consistent with previous years and show:

- Site radon-222 concentrations are below the DOE off-site limit of 3.0 picocuries/liter; radon-222 flux measurements taken on the IWCS are less than the DOE flux standard of 20 $pCi/m^2/s$.
- The calculated dose to a receptor due to airborne particulates is below the EPA guideline of 10 millirem/year (excluding radon); the cumulative dose, which is calculated by adding the maximum external gamma dose to the maximum airborne particulate dose, is significantly less than the DOE limit of 100 millirem/year.
- Trace levels of polycyclic aromatic hydrocarbons, predominantly at upgradient locations, and several metals were detected in surface water samples collected in 2018; the results were comparable to previous years.
- Concentrations of several metals detected in all sediment samples and several polycyclic aromatic hydrocarbons detected predominantly in upstream sediment samples were comparable to past results.
- No chlorinated solvents were present in groundwater monitoring wells in the former acidification area at concentrations above detection limits.

Total uranium concentrations in the majority of surface water samples collected at locations along the Central and West Drainage Ditches show no evidence of a statistically increasing or decreasing trend. Two exceptions are the most downgradient locations in the Central and West Drainage Ditches, SWSD011 and WDD3, respectively, that show evidence of a "probably increasing" trend. Total uranium concentrations at these locations in 2018 remain low: 2.67 µg/L and 3.34 µg/L at WDD3 and 7.2 µg/L and 13.7 µg/L at SWSD011. Location WDD2 also shows a "probably increasing" trend with low concentrations, 3.15 µg/L and 2.12 µg/L, in 2018. For comparison, the site-specific background total uranium concentration in surface water developed for use in the NFSS remedial investigation was 12.5 µg/L (USACE 2007).

The trend analysis shows uranium-238 concentrations in sediment increasing in a downgradient path along the Central Drainage Ditch. However, the highest concentration of uranium-238 detected at any location in 2018 was 2.51 pCi/g (SWSD010), which is less than the site-specific background concentration of 3.08 pCi/g reported in the NFSS remedial investigation (USACE 2007).

The maximum concentration of radium-226 in sediment detected in 2018 was 2.05 pCi/g at location SWSD011, which is less than 2.43 pCi/g, the site-specific background concentration developed during the NFSS remedial investigation (USACE 2007). Radium-226 is known to be readily adsorbed to clays and mineral oxides present in sediment, especially near neutral and alkaline pH conditions, so it is usually not a mobile constituent in the environment. Therefore, radium-226 would not be expected to migrate significantly from the area where it is released or generated, and its presence in Central Drainage Ditch sediment likely originated from legacy impacts, adjacent upgradient sources, and/or overland flow. Radium-226 concentrations in surface water continue to be predominantly nondetect or less than the laboratory detection limit.

The 2018 groundwater analytical data showed that total uranium concentrations in 26 groundwater monitoring wells exceeded the uranium drinking water criterion (30 µg/L). It's important to note that ESP groundwater sampling results are compared to federal and state drinking water standards as a conservative basis for evaluation. Groundwater resources underlying the NFSS reflect the U.S. Environmental Protection Agency (EPA) Class IIIB criteria for nonpotable and limited beneficial use water (EPA 1986). To be a potable water source, groundwater at the NFSS would require expensive and energy intensive treatment by reverse osmosis (desalination). Since there's a replaceable surface water source via the Niagara River/Lake Ontario and groundwater south of the site (Lockport Formation), it's reasonable to assume that no municipality or service would find NFSS groundwater an economically viable source of potable water.

The most elevated total uranium concentrations continue to be detected in wells installed in late 2012 east and south of the IWCS as part of the Balance of Plant field investigation. The Corps of Engineers believes the source of uranium in wells east of the IWCS is 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 the sewer line plugged, may have contributed to groundwater contamination in this area. The Corps of Engineers believes the former storage piles and residual contamination from former Building 409 are the source of the uranium in wells south of the IWCS (USACE 2015a). The uranium contamination in groundwater south of the IWCS, and in other site areas, was produced when the historical residue piles and storage areas leached uranium into the underlying low-permeability soils. Subsequent remediation removed the residue sources and some contaminated soils, whereas the underlying groundwater retained the dissolved uranium impacts.

Trend analysis shows increasing or "probably increasing" trends in nine of 57 wells evaluated. Among these nine wells, only two wells, OW04A and BH49A, are located proximate to the IWCS. Total uranium concentrations in OW04A range from 1.32 micrograms per liter (µg/L) to 5.27 µg/L and in BH49A from 11 µg/L to 23.5 µg/L. The cause of these increasing uranium concentrations is likely legacy sources since there is no apparent trend pattern of increasing uranium concentrations when considering either their respective paired wells (OW04B and BH49) or nearby wells.

It is noted that uranium concentrations normally increase during wet-season periods (winter through spring) and decline during dry-season periods (late spring through fall), which is evident to varying degrees in many upper water-bearing zone wells. This variation is due to a combination of residual low-concentration soil impacts (especially south of the IWCS) and changes in uranium solubility during seasonal soil saturation (or groundwater recharge) that increases the oxygen content in the subsurface. The seasonal oxygenation of groundwater increases the uranium solubility of pre-existing contamination, and thus increases concentrations in spring-time samples. Water levels decline throughout the summer and fall due to evapotranspiration of rainfall, which increases groundwater temperatures and reduces the

oxygen content in groundwater. Iron-reducing bacteria samples also increase during this period. This geochemical mechanism lowers uranium solubility, promotes uranium adsorption to soil minerals, and lowers groundwater concentrations in fall samples. This geochemical process repeats annually, as seen in the spring and fall sampling data. This trend may be less evident or absent in wells with larger sand lenses, but is commonly evident in upper water-bearing zone wells.

1.0 INTRODUCTION

The U.S. Army Corps of Engineers is addressing the Niagara Falls Storage Site (NFSS) as part of the Formerly Utilized Sites Remedial Action Program (FUSRAP); this effort is 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).

The Corps of Engineers Buffalo District conducts the NFSS Environmental Surveillance Program (ESP); it performs site operations, maintenance, and monitoring to ensure protection of human health and the environment. These activities are ongoing across the site, including at Interim Waste Containment Structure (IWCS). The IWCS contains radiologically contaminated materials from cleanup actions the U.S. Department of Energy (DOE) conducted 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). Portions of the LOOW were used by the Corps of Engineers 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 originated from uranium (U) 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 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 came about as a result of processing ores with different uranium (U_3O_8) contents; they are categorized as follows:

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

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-liter (L) (55-gallon [gal]) drums for storage. The residues were generated from uranium ore containing 35 to 65 percent 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 there until the DOE transferred them to the IWCS in the 1980s.

The K-65 residues represent the main hazard in the IWCS. Uncontained, the high levels of radium-226 (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. 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; most of the buildings where they were stored were later destroyed (EA 1998).

Based on an investigation of the former storage areas, the DOE concluded that all suspect areas had been 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" (DOE 2012).

From 1981 to 1991, the DOE performed a number of cleanup activities at the site and nearby areas known as vicinity properties. The DOE placed the radioactive materials generated by these activities in an engineered structure on the west side of the NFSS property, the IWCS (Figure 2).

Within the IWCS, the DOE placed the more highly contaminated residues (K-65, L-30, L-50, and F-32) in existing concrete structures that had been part of the freshwater treatment plant for the LOOW during the 1940s. It placed L-50 residues in Buildings 413 and 414, cylindrical structures made of reinforced concrete. They had been used as clarifier tanks at the treatment plant. The DOE placed the remaining residues in several bays of Building 411, which was also made of reinforced concrete. It had originally been designed to securely hold liquids.

The DOE placed contaminated soil and debris from its cleanup of the site and vicinity properties together with the R-10 residues within the IWCS and then compacted them to increase stability. Soils contaminated by the K-65 residues during interim storage, referred to as tower soils, were placed in the north end of Building 411. The DOE addressed the R-10 residues in the same manner as contaminated soil due to their similar radionuclide concentrations. It put additional contaminated soil and debris in the remaining areas of the IWCS so as 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 wall was tied into the underlying clay formation. A multi-layered cap was placed over the contents after the cleanup actions were completed. These DOE actions are described in further detail in the Remedial Investigation Report (U.S. Army Corps of Engineers [USACE] 2007) and the references cited therein.

In September 1986, the DOE issued a Record of Decision under the National Environmental Policy Act to store the consolidated residues and other contaminated materials in the IWCS. The Record of Decision identified the IWCS as an acceptable long-term management solution for the residues once the existing interim cap was replaced with a long-term, multi-layered, engineered cap. The design service life of the clay dike and cutoff walls surrounding the IWCS and the natural glaciolacustrine clay beneath the IWCS is 200 to 1,000 years (Bechtel National, Inc. [BNI] 1986); the design service life of the interim IWCS cap is 25 to 50 years (BNI 1986).

In October 1997, Congress transferred overall responsibility for implementing FUSRAP from DOE to the Corps of Engineers and directed that FUSRAP remediation be done according to CERCLA. With this transfer, the Corps of Engineers assumed responsibility for the remedial action process at NFSS.

Since that time, the Corps of Engineers completed a number of studies of the NFSS, including the *Remedial Investigation Report for the Niagara Falls Storage Site* (USACE 2007), *NFSS Remedial Investigation Report Addendum* (USACE 2011), *Feasibility Study Report for the IWCS at the NFSS* (USACE 2015b), and the *Proposed Plan IWCS Operable Unit* (USACE 2015c). The *Record of Decision for the Interim Waste Containment Structure* signed in March 2019 selected remedial Alternative 4, complete removal and off-site disposal of all waste in the IWCS (USACE 2017).

1.2 Overview of Environmental Surveillance Program

The DOE initiated the ESP at the NFSS in 1979 before the construction of the IWCS, monitoring air, water, and external gamma radiation (and later streambed sediments) to ensure human health and environmental protection from radioactive residues and wastes later buried in the IWCS. In 1997, when responsibility for FUSRAP transferred to the Corps of Engineers, the Corps of Engineers Buffalo District continued to follow the DOE ESP, with some revisions over the years. The Corps of Engineers reports its findings annually in the form of this technical memorandum, which is posted to the NFSS website at https://www.lrb.usace.army.mil/Missions/HTRW/FUSRAP/Niagara-Falls-Storage-Site/.

The surveillance program is designed to achieve the following objectives:

- Ensure protection of human health and the environment
- Verify compliance with environmental regulatory standards
- Verify the IWCS is performing as designed

To meet these objectives, the Corps of Engineers monitors environmental media and regularly reassesses the adequacy of the program. If warranted, the Corps of Engineers makes necessary adjustments to the program. It has made several modifications 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. Sample locations and analytical parameters and methods are detailed in Section 2.0.

In addition to collecting and analyzing environmental samples, the ESP calculates the dose to off-site receptors from airborne emissions of site soils. To do this, the Corps of Engineers uses 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 added to the airborne emissions dose to determine the cumulative dose to the public from the NFSS.

1.3 Regional Hydrogeology

1.3.1 Groundwater

The NFSS and surrounding vicinity are underlain by two water-bearing zones within 50 feet of the ground surface; these are separated by an aquitard, or confining unit. The two water-bearing zones, the upper water-bearing zone and the lower water-bearing zone, are detailed below.

The upper water-bearing zone is present in the surficial Brown Clay Unit. This is situated above the Gray Clay Unit (Figure 3). The Brown Clay Unit consists of a clayey silt and silty clay groundmass. It has occasional sand and gravel lenses. Coarse-grained deposits appear in places along the undulating contact between the Brown Clay Unit and the Gray Clay Unit.

The Corps of Engineers conducted a geostatistical analysis of these coarse-grained lenses 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 4.57 to 6.1 meters (15 to 20 feet) and vertical

distances of 1.22 to 1.83 meters (4 to 6 feet). As a result, the occurrence of groundwater varies across the site (i.e., proximate wells may have noticeably different water levels depending on the presence or absence of sand lenses). 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 and minimizes transport between the two zones (Figure 3). For purposes of classification, wells that terminate in the Gray Clay Unit are considered representative of the upper water-bearing zone.

The lower water-bearing zone consists of unconsolidated glacial sediments, most notably the Alluvial Sand and Gravel that overlie the upper, fractured portion of the Queenston Formation (Figure 3). It extends from the bottom of the Gray Clay Unit to the bottom of the weathered zone of the Queenston Formation. A regional groundwater divide (the Lockport Escarpment) is 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 entire lower zone varies from 3.05 to 11.73 meters (10 feet to 38.5 feet) in thickness; it 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 in the upper 3.05 meters (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

Before site development, surface drainage from the NFSS entered Four Mile, Six Mile, and Twelve Mile Creeks. All of these 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. 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 near the ditches are notably lower throughout the summer and early fall; this is due to higher localized evapotranspiration. In other words, 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 in the clayey soils 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 and other site media for release of hazardous constituents.

To monitor the integrity of the IWCS, the Corps of Engineers collects:

- Annual radon-222 flux data via 180 radon flux canisters placed on the IWCS protective cap at discrete grid intersections and at three off-site (background) locations, as shown on Figure 4.
- Semiannual groundwater samples from 44 monitoring wells, 13 wells screened in the lower water-bearing zone and 31 wells screened in the upper water-bearing zone, near the IWCS (two wells are sampled on a quarterly basis), as shown on Figure 5.
- Semiannual 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.
- Semiannual 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 onto 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.

In addition, the Corps of Engineers collects:

- Semiannual groundwater samples from 11 monitoring wells, one well screened in the lower water-bearing zone and ten wells screened in the upper water-bearing zone, as shown on Figure 5 (note that well MW922 is sampled only if well MW921 is dry).
- Semiannual 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.
- 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 concentrations and gamma emissions.
- Sediment is monitored for total uranium and radium-226, as well as metals and polycyclic aromatic hydrocarbons (PAHs) (to evaluate potential impacts from off-site sources such as Modern Landfill).
- 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.

The Corps of Engineers uses standard analytical methods approved and published by EPA and the American Society for Testing and Materials (ASTM) for chemical (i.e., all nonradiological) analyses. The laboratories conducting the radiological analyses adhere to EPA, 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. That accreditation is based on conformance to the DOD Quality Systems Manual 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 6010/6020/7470	SW 846 6010/7470
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[1]	---	---
Water Quality •Alkalinity •Total Dissolved Solids	SM-2320B SM-2540C	---	---

[1] Ortho-phosphate is tested as phosphorus using method A4500-P-F (4500-P Standard Method)
--- 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 (DOD 2013) and the Uniform Federal Policy for Quality

Assurance Project Plans (UFP-QAPP). The UFP-QAPP provides procedures and guidance on 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 Corps of Engineers collects groundwater samples using low-flow sampling techniques in accordance with EPA's Ground Water Issue Low-Flow (Minimal Drawdown) Ground-Water Sampling Procedures (EPA/540/S-95/504). Existing polyethylene tubing is used for each well during each sampling event and is replaced when necessary. The Corps of Engineers also measures groundwater levels and uses sample collection techniques in accordance with Engineering Manual 1110-2-1421, *Groundwater Hydrology* (USACE 1999).

The Corps of Engineers collects surface water samples by using a peristaltic pump. This type of pump is needed because of the shallowness of the designated ditch locations. New polyethylene tubing is carefully placed below the water line to minimize disturbance of organic materials and sediments in the ditch.

If turbidity measurements for any groundwater or surface water sample exceed 50 nephelometric turbidity units (NTUs), the Corps of Engineers field filters the sample via a disposable 0.45 micron in-line filter to remove solids and reduce the turbidity readings to below the 50 NTU threshold. Both the filtered and unfiltered samples are sent to the laboratory for analysis.

2.3.2 Sediment

The Corps of Engineers collects sediment using a stainless steel posthole digger. This digger works well in areas where there are excess fibrous materials and roots from phragmites. A sample consists of several grab samples (5 to 10 centimeters [2 to 4 inches] in depth) near 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

The Corps of Engineers measures radon flux at the NFSS once a year between early to late summer. An effective means of trapping radon gas is activated charcoal. 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 adsorbs the radon gas emanating from the surface over which the canister is placed. The charcoal holds the radon, which 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 and the time that exposure took place.

2.3.4 Radon Gas

The Corps of Engineers monitors radon gas concentrations using Landauer Radtrak® detectors placed around the IWCS and the NFSS. The Radtrak® detectors are placed on the fence at breathing height (1.7 meters [5.6 feet] 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; 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 Landauer optically stimulated luminescent dosimeters (OSLDs) placed around the IWCS and the NFSS at the same locations as the Radtrak® detectors, at a height of 0.91 meters (3 feet) above the ground. Two OSLDs are placed at each location for quality control. The OSLDs are also replaced every six months.

Optically-stimulated luminescence technology is the newest advancement in passive radiation protection dosimetry; it improves on the best features of traditional film and thermo-luminescent dosimeter (TLD) technologies. The specific OSLDs used at NFSS consist of specially formulated aluminum oxide crystalline detector material; this 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; this causes 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 relevant to activities at NFSS 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 cleanup 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 U.S. Army, the DOE, and the Nuclear Regulatory Commission (NRC). This limit is stated in Army Pamphlet 385-24 entitled "The Army Radiation Safety Program," DOE Order 458.1 entitled "Radiation Protection of the Public and the Environment" (DOE 2011), and NRC 10 CFR Part 20 entitled "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

3.2.1 U.S. Department of Energy Order 458.1

The DOE limits for radon concentrations in air from operations at DOE-owned and -operated facilities are presented in DOE Order 458.1. Based on the radioactive constituents in the wastes contained in the IWCS, it's unlikely that radon-220 would be emitted from the IWCS. This is because the radon-220 half-life is approximately 55.6 seconds; this isotope would decay before it permeated the IWCS cap. It is possible, however, that radon-222 with a half-life of 3.8 days could be emitted. The DOE limit for an annual average radon-222 concentration at the site boundary, not including background, is 3.0 picocuries/liter (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 U.S. Environmental Protection Agency Clean Air Act

The EPA 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 is a conservative basis for comparing the outdoor air results of the environmental surveillance. To compare further, 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 EPA to promulgate the National Emission Standards for Hazardous Air Pollutants (NESHAPs), which are provided in 40 Code of Federal Regulations (CFR) Part 61. The 40 CFR Part 61, Subparts H and Q, apply to the NFSS; they are summarized below:

- 40 CFR 61.92, Subpart H, National Emission Standards for Emissions of Radionuclides Other Than Radon from DOE Facilities: emissions of radionuclides to the ambient air from DOE facilities shall not exceed amounts that would cause any member of the public to receive in any year an effective dose equivalent of 10 mrem.
- 40 CFR 61.192, Subpart Q, National Emission Standards for Radon Emissions from DOE Facilities: no source at a DOE facility shall emit into the air more than 20 picocuries per square

meter per second (pCi/(meter^2-sec)) (1.9 pCi/(feet^2-sec)) of radon-222 as an average for the entire source.

At the NFSS, the Corps of Engineers complies with 40 CFR 61.92, Subpart H, by running the EPA-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 radon-222 flux.

3.3 Radioactive and Chemical Constituents in Groundwater

3.3.1 General Groundwater Quality

Shallow groundwater resources at the NFSS demonstrate uniformly poor groundwater quality and availability in the 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 indicate that the low permeability of the upper water-bearing zone doesn't provide sustainable production quantities to standard wells for water supply use (Wehran 1977 and Acres American, 1981). On-site permeability testing at the NFSS confirms the low permeability.

In 1988, the DOE conducted a well survey; it found eight wells within three miles (4.8 km) of the site. They are used mainly for irrigation; none are drinking water wells (DOE 1994).

In 2007, the Niagara County Department of Health (DOH) updated its well inventory to include nine potable wells (two were a sole source for drinking water), eight nonpotable wells, 20 abandoned wells, and 77 idle wells within the survey area. Based on the DOE report and the recent Niagara County DOH inventory, groundwater isn't 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 and surrounding area, in both the upper and lower water-bearing zones, consistently (and naturally) exceeds sodium and sulfate Class GA standards; it exhibits over 1,000 milligrams/liter (mg/L) total dissolved solids and commonly over 250 mg/L of chloride. By definition, these levels indicate that the natural condition of groundwater in the NFSS area is saline and qualifies for the GSA groundwater classification (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 that applies to operating a public water system and developing drinking water quality standards [*EPA Drinking Water Regulations and Health Advisories* (*EPA* 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 micrograms per liter (µg/L).

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

Aside from adopting the federal SDWA standards, the NYSDEC has promulgated its own standards; they are presented in 6 NYCRR Part 703.5, "Water Quality Standards for Taste-, Color- and Odor-producing, Toxic and Other Deleterious Substances" (NYSDEC 1998). The New York State (NYS) limit for radium-226 in groundwater is 3 pCi/L.

Also, the New York State DOH, per 10 NYCRR Part 5, Subpart 5-1, established an MCL of 30 µg/L for uranium in drinking water that applies to community water systems but doesn't apply to groundwater at the site. Since this limit is identical to the federal criteria, the analytical results discussed in Section 4.0 only reference NYS criteria.

3.4 Radioactive and Chemical Constituents in Sediment

The 2007 NFSS Remedial Investigation Report evaluated sediment analytical data and considered a weight-of-evidence approach to conclude no further actions were needed to protect ecological resources from exposure to site sediment. (No human health impacts were identified either.) Therefore, data collected as part of the ESP will not be compared to regulatory criteria but will be subjected to statistical trend analysis (radionuclides only), e.g., Mann-Kendall test, to ensure that the IWCS is performing as designed.

3.5 Radioactive and Chemical Constituents in Surface Water

The 2007 NFSS Remedial Investigation Report evaluated surface water analytical data and considered a weight-of-evidence approach to conclude no further actions were needed to protect ecological resources from exposure to site surface water. (No human health impacts were identified either.) Therefore, data collected as part of the ESP will not be compared to regulatory criteria but will be subjected to statistical trend analysis (radionuclides only), e.g., Mann-Kendall test, to ensure that the IWCS is performing as designed.

4.0 ANALYTICAL DATA AND INTERPRETATION OF RESULTS

This section presents the 2018 ESP analytical results for groundwater, surface water, sediment, airborne particulate, radon, and gamma radiation. It's important to note that 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; background activity is subtracted from the measured sample activity to calculate the result. Also, when results fall below the laboratory's minimum detectable activity (MDA), they are interpreted as having unknown values between zero and the MDA; these are referred to herein as nondetects.

4.1 Air

To establish the annual dose to the public from radiological sources in air, the Corps of Engineers determines doses at specific off-site receptors 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 later field investigations and annual average wind speed.

4.1.1 External Gamma Radiation

OSLDs measure gamma radiation doses at the NFSS but these measurements also include natural sources of background radiation, such as cosmic radiation and terrestrial radiation.[1] To measure background gamma radiation near the NFSS, OSLDs are placed at several locations in the vicinity of the NFSS including Lewiston Porter High School, Balmer Road, and the Lewiston Water Pollution Control Center. At the NFSS, the OSLDs are placed along the property boundary and perimeter of the IWCS (Figure 6). Two OSLDs are placed at each monitoring location as a quality control check and to provide data if an OSLD is lost or a result is rejected. The OSLDs are replaced semi-annually.

Following receipt of the laboratory analytical data, the Corps of Engineers calculates a time-weighted or normalized annual dose that accounts for exposure periods having different integration times (a different number of measurement days). The 2018 results, presented in Table 4, show net dose rates that represent the measured (OSLD) rates minus the average of a laboratory control dose rate. The net dose rate at each OSLD location is used to calculate the annual gamma radiation dose at each of the four property boundary or perimeter fences, as shown in the table below (background rates are shown for comparison).

Direction	OSLD Locations	Calculated Average Net Dose Rate (mrem/year)
Eastern Perimeter (closest to worker receptor)	45, 50, 55, 60	24.2
Western Perimeter (closest to residential receptor)	8, 10, 11, 13, 15, 29, 36	24.1
Northern Perimeter	1, 11, 12, 60, 65, 122	22.9
Southern Perimeter	7, 28, 29, 45	25.8
Lew-Port School (background)	105	14.5
Balmer Road (background)	116	21.9
Lewiston Water Pollution Control Center (background)	120	24.4

[1] In the United States, the annual average per capita cosmic and terrestrial radiation doses are 34 millirem per year and 22 millirem per year, respectively (NCRP Report 160)

As indicated in the table above, the calculated average net dose rates at the NFSS perimeter fences ranged from 22.9 to 25.8 mrem/year, which is:

- Below the allowable public dose limit of 100 mrem/year above background (see Section 3.1)
- Similar to the range of measured background net dose rates of 14.5 to 24.4 mrem/year
- Indistinguishable from the average cosmic and terrestrial doses of 34 mrem/year and 22 mrem/year, respectively

The average net dose rates at the NFSS perimeter fences are used to calculate the hypothetical dose to the nearest worker and residential receptors, which considers both exposure time and distance. For example, the dose received by a hypothetical industrial worker standing at the eastern perimeter fence over the period of one year is 5.57 mrem/year. Calculation details are as follows:

- The worker stands at the fence for 2,000 hours (8 hours per day, 5 days a week, 50 weeks per year); note that distance is ignored here although the worker would not be at the fence all the time
- 2,000 hours out of a possible 8,760 hours in a year (24 hours in a day, 365 days in a year) represents a fraction of 0.23 (2,000/8,760 hours)
- An industrial worker standing at the eastern perimeter fence where the calculated net dose is 24.2 mrem/year receives a dose of 5.57 mrem/year (20.08 mrem/year multiplied by 0.23)

Trend graphs depicting external gamma dose rates at the NFSS and IWCS perimeters from 1998 thru 2018 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 2018, the Corps of Engineers calculates airborne particulate release rates using site soil data (from the Remedial Investigation initiated in 1999 through field investigations conducted in 2014) and weather data collected at the Niagara Falls International Airport in 2018.

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 EPA's CAP88-PC (Version 4.0) computer model to calculate:

- Doses from airborne particulates to individuals of several population age groups in the nearest residence, school, farm, and commercial/industrial facility, as measured from a central location on site. Doses are then corrected for occupancy at an assumed rate, and the individual receiving the higher of these calculated doses is identified as the maximally exposed off-site individual (MEI) for airborne particulate dose
- Airborne particulate collective dose to the population within 50 miles (80 km) of the site using population data for the United States and Canada from Landscan 2013 Global Population Data from Oak Ridge National Laboratory (Figure 10)

The first calculation indicates that the annual airborne particulate dose to the MEI, a resident, 914 meters (2,999 feet) south-southwest of the site, in 2018, was 0.00045 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 80 km (50 miles) of the site in 2018 was 0.00955 person-rem. This compares to an annual

background dose to the same population of 5,425,000 person-rem. Details of the calculations, including methodology, are presented in the Corps of Engineers' "FUSRAP CY2018 NESHAP Annual Report for Niagara Falls Storage Site (NFSS), Lewiston, New York" (USACE 2019).

4.1.3 Calculated Cumulative Dose

As a conservative measure, the cumulative dose to the MEI, which is calculated by adding the maximum airborne particulate dose to the maximum external gamma dose, is compared to the 100 mrem per year dose limit (excluding radon). The maximum external dose is conservatively estimated to be the dose at the western perimeter fence (i.e., a resident is assumed to stand at the fence 24 hours a day for 365 days). Based on 2018 data, the cumulative annual dose is 24.13 mrem (0.00045 mrem + 24.13 mrem), which is significantly less than the DOE limit of 100 mrem per year[2] (excluding radon) and the U.S. average per capita background dose of approximately 620 mrem per year (NCRP 2009).

4.1.4 Radon Gas

Radon monitoring at NFSS is performed at a height that represents the human breathing zone (1.7 meters or 5.6 feet 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's unlikely that the IWCS would emit radon-220; however, it's possible that it would emit radon-222. The Corps of Engineers uses Radtrak® detectors to conduct air surveillance to determine the concentration of radon gas at NFSS. These Radtrak® detectors measure alpha particle emissions from both isotopes of radon (radon-220 and radon-222) and collect passive, integrated data throughout the period of exposure. Because radon-220 isn't 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 semiannual monitoring for 2018 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 2018 ESP were well below the DOE off-site limit of 3.0 pCi/L above background. Results presented are without background subtracted and ranged from nondetect (less than 0.2 pCi/L) to 0.3 pCi/L. The results from the background locations also ranged from nondetect (less than 0.2 pCi/L) to 0.3 pCi/L. Including nondetects, the site and background averages are both 0.2 pCi/L, which is less than the average outdoor value of 0.4 pCi/L (EPA 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 15 meters (49.2 feet) on center across the surface of the IWCS for a 24-hour exposure period. Sample locations are shown on Figure 4.

The initial 2018 radon flux event took place on July 9 and 10. Measured results from this event, presented on Table 6A, ranged from nondetect to 19.2784 pCi/m^2/s, with an average result (of detects and nondetects) of 0.1576 pCi/m^2/s. Average background flux rate was 0.06030 pCi/m^2/s. These results were

[2] The U.S. per capita dose from background radiation has been increased to 620 mrem/person due mainly to increased use of nuclear medical imaging.

similar to previous years at most locations, however, the results at sample location 62, 19.2784 pCi/m^2/s, and surrounding locations 61 and 65, slightly greater than 1 pCi/m^2/s and 63 and 64, slightly less than 1 pCi/m^2/s, were higher results than in the past. Despite being elevated compared to past results, all the data remained below the 20 pCi/m^2/s standard specified in 40 CFR Part 61, Subpart Q.

To further evaluate these elevated results, USACE performed a second but limited sampling event on September 9, 2018. Radon flux samples were collected from 16 locations shown on Figure 4A that included 46, 47, 48, and 61 through 66, as well as seven samples surrounding location 62. The results of the second sampling event, presented on Table 6B, ranged from non-detect to 0.0884 pCi/m^2/s and were comparable to background. The data demonstrates the effectiveness of the IWCS containment to mitigate the release of radon-222.

4.2 Surface Water

In 2018, all surface water samples were collected semiannually (2nd and 4th quarters) from nine designated locations. Location SWSD025 also is sampled during 1st and 3rd quarters and during significant rain events (by an automatic sampler). Sample locations are presented in Figure 7.

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

- 2nd quarter samples were collected on April 23, 2018
- 4th quarter samples were collected on October 24 and 25, 2018
- 1st and 3rd quarter samples were also collected from SWSD025 on February 7 and August 1, 2018, respectively; four additional sampling events occurred at SWSD025 between June and August 2018 during significant rain events
- Analytical parameters included radium-226, total uranium, PAHs, and metals (samples collected during significant rain events were analyzed for radium-226 and total uranium only)

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

Details of the findings are presented in the following sections.

4.2.1 Surface Water Field Measurements

Before sampling, the Corps of Engineers measures field parameters 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.

4.2.2 Surface Water Radiological Findings

In general, the 2018 analytical results for radionuclides in surface water, which are presented on Table 8, were comparable to past results. Details are presented in the following sections.

Radium-226

Radium-226 was not detected in 18 of 29 surface water samples, which included three filtered and two

field duplicate samples, collected in 2018. Among the 11 detections, the concentrations ranged between 0.139 pCi/L (SWSD025) to 0.671 pCi/L (SWSD009) and were within the range of historical results.

Radium-226 concentrations in surface water are not subjected to trend analysis (e.g., Mann-Kendall) because reported results 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 (below detection limits).

Total Uranium

Uranium was detected in all 30 surface water samples collected in 2018, which included four filtered and two field duplicate samples. Concentrations ranged from 2 µg/L at SWSD023 to 23.8 µg/L at SWSD025.

Total uranium concentrations detected in surface water over the course of the Corps of Engineers' ESP (1997 through 2018) are evaluated by the Mann-Kendall test to identify the presence of a statistically significant trend using *GSI Mann-Kendall Toolkit* software (GSI Environmental 2012). The Mann-Kendall test, described in the Corps of Engineers' Manual *Environmental Quality–Environmental Statistics* (USACE 2013b), is an accepted method for identifying the presence of a significant trend in surface water.

The *GSI Mann-Kendall Toolkit* limits the amount of data considered per monitoring location to 40 data points, so if the amount of data exceeds 40, the most recent results are evaluated. In addition, although the *GSI Mann-Kendall Toolkit* evaluates a data set with as few as four data points, sample sizes of 10 or less are marginal for definitively determining a trend because the test's statistical power increases as the amount of data evaluated increases.

The *GSI Mann-Kendall Toolkit* software employs the following statistical metrics to define the concentration trend at each monitoring location:

- ***The 'S' Statistic:*** Indicates whether concentration trend vs. time is generally decreasing (negative *S* value) or increasing (positive *S* value).
- ***The Confidence Factor (CF):*** The CF value modifies the *S* Statistic calculation to indicate the degree of confidence in the trend result, as in 'Decreasing" vs. "Probably Decreasing" or "Increasing" vs. "Probably Increasing." Additionally, if the confidence factor is quite low, due either to considerable variability in concentrations vs. time or little change in concentrations vs. time, the CF is used to apply a preliminary "No Trend" classification, pending consideration of the COV.
- ***The Coefficient of Variation (COV):*** The COV is used to distinguish between a "No Trend" result (significant scatter in concentration trend vs. time) and a "Stable" result (limited variability in concentration vs. time) for datasets with no significant increasing or decreasing trend (e.g. low CF).

By using the metrics described above, the concentration trend is matched to one of six categories: Increasing, Decreasing, Probably Increasing, Probably Decreasing, Stable, or No Trend. The following table presents the logic used by *GSI Mann-Kendall Toolkit*.

Statistical Metrics Used in GSI Mann-Kendall Toolkit

S Statistic	Confidence In Trend	Trend
S > 0	CF > 95%	Increasing
S > 0	95% ≥ CF≥ 90%	Probably Increasing
S > 0	CF < 90%	No Trend
S ≤ 0	CF < 90% and COV ≥ 1	No Trend
S ≤ 0	CF < 90% and COV < 1	Stable
S < 0	95% ≥ CF ≥ 90%	Probably Decreasing
S < 0	CF > 95%	Decreasing

Source: Aziz et al. (2003).
Note: The user can identify two other categories of data: ND = Dataset where all values are non-detect, and N/A = locations with < 4 sample results.

The results of the trend evaluation (spring and fall data from 1997 to 2018) of total uranium in surface water are presented in Attachment B-1 and summarized in the table below.

Mann-Kendall Trend Results for Total Uranium in Surface Water

SAMPLE ID	SAMPLE SIZE	RESULTING TREND	LOCATION ALONG DITCH
SWSD009	33	No trend	Upgradient
SWSD021	32	Stable	Upgradient
SWSD023	14	No trend	Upgradient
SWSD010	35	Stable	Midgradient 1
SWSD022	34	No trend	Midgradient 2
SWSD025[1]	40	Stable	Midgradient 3
SWSD011	34	Probably Increasing	Downgradient
WDD2	14	Probably Increasing	Upgradient
WDD3	14	Probably Increasing	Downgradient

[1]Only the results from the scheduled semi-annual sampling events (i.e., not the rain events) are included in the trend analysis (due to the sample set exceeding the maximum allowable 40 data points when all data is considered).

The results indicate fairly stable total uranium concentrations in surface water across the Central Drainage Ditch with no evidence of a statistically increasing or decreasing trend. The most downgradient locations in the Central and West Drainage Ditches, SWSD011 and WDD3, respectively, show evidence of a "probably increasing" trend. Total uranium concentrations at these locations in 2018 remain low: 2.67 µg/L and 3.34 µg/L at WDD3 and 7.2 µg/L and 13.7 µg/L at SWSD011. Location WDD2 also shows a "probably increasing" trend with low concentrations, 3.15 µg/L and 2.12 µg/L, in 2018. For comparison, the site-specific background total uranium concentration in surface water developed for use in the remedial investigation was 12.5 µg/L (USACE 2007).

4.2.3 Surface Water Chemical Findings

The 2018 analytical results for PAHs and metals in surface water are presented in Attachment A as Tables A-1 and A-2, respectively. Trace levels of PAHs, predominantly at upgradient locations, were detected in the surface water samples collected in 2018. Several metals were detected in surface water samples collected in 2018; the results were comparable to previous years.

4.3 Sediment

In accordance with the 2018 analytical schedule, the Corps of Engineers collected sediment samples from eight locations in the 2nd and 4th quarters (i.e., semiannually) and one location (SWSD025) in all four quarters (i.e., quarterly). Sampling locations are presented on Figure 7.

A summary of the sediment sample collection effort for 2018 is as follows:

- 2nd quarter samples were collected on April 24 and 25, 2018
- 4th quarter samples were collected on October 26 and 29, 2018
- Location SWSD025 was also sampled on February 7 and August 1, 2018 (1st and 3rd quarters)
- Analytical parameters include radionuclides (radium-226, uranium-234, uranium-235, and uranium-238), metals, and PAHs

Details of the findings are presented in the following sections.

4.3.1 Sediment Radiological Findings

The 2018 analytical results for radionuclides in sediment are presented on Table 9.

Radium-226

The 2018 analytical results for the 22 sediment samples (including two field duplicate samples) analyzed for radium-226 ranged from 0.78 pCi/g (SWSD009) to 2.05 (SWSD011). These results are similar to historical data, as shown on the graph on Figure 11, which presents radium-226 concentrations in sediment between 1997 and 2018.

In August 2017, a sediment sample collected from location SWSD025 exhibited an elevated radium-226 activity of 8.338 pCi/g. Although the results of the samples collected at this same location before and after in April 2017 and November 2017 were 1.826 and 1.51 pCi/g, respectively, indicating that the August 2017 data was anomalous, USACE further investigated the area in 2018. USACE collected five additional sediment samples in May 2018 with the following results:

- 0.28 pCi/g at SWSD025-M, a mix of stones, sediment, and snail shells
- 1.37 pCi/g at SWSD025-D, a deeper sample with sediment and stone
- 0.27 pCi/g at SWSD025-DS, rocks/stones from SWSD025-D
- 0.31 pCi/g at SWSD025-S, stones from the adjacent culvert
- 1.42 pCi/g at N-SWSD010, an area of activity with heavy equipment in the Central Drainage Ditch (and possible disruption of sediments)

These activity levels are similar to historical data, which is further evidence that the elevated activity level detected at SWSD025 in the summer of 2017 was anomalous. As reported in the 2017 ESP report, the only other comparable data (i.e., radium-226 concentrations greater than 8 pCi/g) were collected between 1999 and 2001 as part of the RIR, although none appear to be located near SWSD025.

Trend analysis of radium-226 in sediment using the *GSI Mann-Kendall Toolkit* shows evidence of an increasing trend at sample locations WDD2 and SWSD023, a probably increasing trend at locations SWSD010 and SWSD011, a decreasing trend at WDD3, and no trend at the remaining four locations. Results are summarized below and presented in Attachment B-2.

Mann-Kendall Trend Results[1] for Radium-226 in Sediment

SAMPLE ID	SAMPLE SIZE	RESULTING TREND	LOCATION ALONG DITCH
SWSD009	16	No trend	Upgradient
SWSD021	16	No trend	Upgradient
SWSD023	14	Increasing	Upgradient
SWSD010	16	Probably Increasing	Midgradient 1
SWSD022	16	No trend	Midgradient 2
SWSD025	31	No trend	Midgradient 3
SWSD011	13	Probably Increasing	Downgradient
WDD2	16	Increasing	Upgradient
WDD3	16	Decreasing	Downgradient

[1]Trend evaluation was performed on samples analyzed by gamma spectroscopy (EPA Method 901.1)

It is noted that the predominant source of flow in the Central Drainage Ditch is runoff from Modern's property located east and south of the NFSS; overland flow across the NFSS during storm events is a minor contributor. Stormwater from Modern's landfill is collected in a retention pond (observable on Figure 7) that discharges onto NFSS property via South 31 Ditch at sample location SWSD009. Surface water runoff from Modern's property to the south that is used primarily as parking and storage discharges onto NFSS property via the Central Drainage Ditch at sample locations SWSD021 and SWSD023.

Radium-226 is known to be readily adsorbed to clays and mineral oxides present in sediment, especially near neutral and alkaline pH conditions, so it is usually not a mobile constituent in the environment. Therefore, radium-226 would not be expected to migrate significantly from the area where it is released or generated, and its presence in Central Drainage Ditch sediment likely originated from legacy impacts, adjacent upgradient sources, and/or overland flow. As previously noted, radium-226 concentrations in surface water continue to be predominantly nondetect or less than the laboratory detection limit. The maximum concentration of radium-226 in sediment detected in 2018 was 2.05 pCi/g at location SWSD011. For comparison, the site-specific background concentration developed for the remedial investigation was 2.43 pCi/g (USACE 2007).

Uranium

The 2018 analytical results for uranium isotopes uranium-234, uranium-235 and uranium-238 in sediment showed detections in all but one of the samples collected. Among the detections, the isotopic activity levels ranged from 0.047 pCi/g to 3.1 pCi/g. The isotopic uranium data are similar to historical data. A graphical representation of the analytical data is shown on Figure 12.

Mann-Kendall trend analysis for uranium-238 (used as a surrogate for total uranium) shows evidence of decreasing trends at sample locations SWSD009 and SWSD021; increasing trends at SWSD010, SWSD011, and SWSD022; probably increasing trend at SWSD025; and stable or no trend at SWSD023, WDD2, and WDD3. Based on this data, it appears that uranium concentrations in sediment are increasing in a downgradient path along the Central Drainage Ditch. The highest concentration of uranium-238 detected at any location in 2018 was 2.51 pCi/g (SWSD010), which is less than the site-specific background concentration of 3.08 pCi/g developed for use in the remedial investigation (USACE 2007). Mann-Kendall trend results are summarized below and presented in Attachment B-3.

Mann-Kendall Trend Results[1] for Uranium-238 in Sediment

SAMPLE ID	SAMPLE SIZE	RESULTING TREND	LOCATION ALONG DITCH
SWSD009	31	Decreasing	Upgradient
SWSD021	31	Decreasing	Upgradient
SWSD023	22	Stable	Upgradient
SWSD010	32	Increasing	Midgradient 1
SWSD022	31	Increasing	Midgradient 2
SWSD025	33	Probably Increasing	Midgradient 3
SWSD011	31	Increasing	Downgradient
WDD2	22	No trend	Upgradient
WDD3	22	No trend	Downgradient

[1]Tests were performed using the *GSI Mann-Kendall Toolkit*

4.3.2 Sediment Chemical Findings

The 2018 analytical results for metals and PAHs in sediment are presented in Attachment A as Tables A-3 and A-4, respectively. Several metals and PAHs were detected in sediment samples collected in 2018 and the data were comparable to past results.

4.4 Groundwater

There are 55 monitoring wells in the groundwater monitoring program; they are sampled semiannually. Two of these wells, OW04A and OW04B, are also sampled quarterly. Occasionally, additional or replacement wells are sampled when the program wells are dry or will not yield acceptable sample quantity. The 2018 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 2018 are as follows:

- The semiannual sampling took place between April 17 and May 3 (2nd quarter) and October 23 and November 6 (4th quarter); wells OW04A and OW04B were also sampled on February 7 and August 1, 2018.
- 17 groundwater samples were filtered for total U analysis and 9 samples were filtered for Ra-226 analysis.
- Groundwater samples were collected from 53 of the 55 monitoring wells in both the spring and fall of 2018; wells A43 and OW15B were not sampled in the spring and wells MW944, MW945, MW946, and MW947 were not sampled in the fall but wells MW423 and 808A were sampled as substitutes.
- Water level measurements were recorded from over 100 wells.
- Groundwater samples were analyzed for radium-226, total uranium, VOCs (five 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) were used. 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.

4.4.1 Groundwater Level Measurements

In 2018, the Corps of Engineers measured groundwater levels in 118 wells using an electronic depth-to-water meter. Potentiometric data were recorded from 74 wells in the upper water-bearing zone and 44 wells in the lower water-bearing zone (including six bedrock wells). Water level measurements are presented on Table 10. Figures 13 through 16 show the seasonal high and low groundwater elevations in the upper and lower units.

The upper water-bearing zone exists in a fine-grained glacial till that was derived from ice advancement through a pro-glacial lake, where beach ridges were modified into discontinuous sand lenses within the clayey ground mass. The clayey sediments exhibit capillary characteristics that cause non-uniform saturation and desaturation of the upper water-bearing zone during seasonal periods. This variability (texture and saturation) can produce groundwater levels that are significantly different in proximal wells. Previous reports included groundwater-level contour maps to exemplify general groundwater elevations and flow-directions; beginning with this 2018 report, only seasonal high- and low-water elevation data from each water-bearing zone will be posted on site maps to show the spatial and temporal variability of levels. Groundwater contours will be omitted from theses and future figures.

The screened intervals for wells completed in the upper water-bearing zone range from 0.92 to 8.4 meters (3.02 to 27.6 feet) below ground surface; the screened intervals for wells completed in the lower water-bearing zone range from 6.8 to 31.9 meters (22.4 to 104.5 feet) below ground surface.

In the upper water-bearing zone, the depth to water ranged from 0.42 to 6.42 meters (1.39 to 21.09 feet) below ground surface during 2018. The quarterly water level fluctuations in the upper water-bearing zone averaged 0.82 meters (2.69 feet) and showed low and high elevations on October 26, 2018 and April 17, 2018, respectively.

In the lower groundwater system, the depth to water ranged from 0.37 to 3.91 meters (1.23 to 12.83 feet) below ground surface during 2018. Quarterly water level fluctuations in the lower groundwater system averaged 0.48 meters (1.57 feet) and showed low and high elevations also on October 26, 2018 and April 17, 2018, respectively. The lower groundwater system exhibits artesian conditions due to the overlying clay aquitard that confines the zone.

The high-water elevations in the upper system ranged from 92.28 to 97.53 meters (302.74 to 319.97 feet) above mean sea level, whereas the low-water condition ranged from 91.00 to 97.08 meters (298.55 to 318.51 feet). The high-water elevation in the lower system ranged from 94.88 to 97.21 meters (311.30 to 318.93 feet) above mean sea level, whereas the low-water condition ranged from 93.22 to 95.89 meters (305.84 to 314.60 feet).

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 seen in the data (i.e., the range and timing of fluctuations). The high-stress (dry) summer conditions normally lower water levels throughout the upper water-bearing zone, whereas the lower water-bearing zone is much less reactive to seasonal variations due to the aquitard. Upper zone water levels collected during 2018 reflect normal seasonal patterns of a wet spring and dry fall; the average fluctuation of 2.69 feet also reflects historic values. The lower zone exhibited a continuation of late-2017 high-water levels that peaked in February 2018 and steadily declined to produce a low-water condition in the fall. The average fluctuation of 1.57 feet reflects historic values.

Vertical gradients calculated using water levels obtained from monitoring well pairs indicate vertical groundwater flow from the upper zone to the lower zone (or downward) is most significant during the midwinter and early summer period, when evapotranspiration is less robust. From midsummer to late fall, when evapotranspiration is more robust, vertical gradients normally show more upward pressure due to water level declines in the upper water-bearing zone. This seasonal saturation of the soils and vertical flow variation mitigates the potential transport of contaminants from the upper zone into the lower zone.

4.4.2 Groundwater Field Parameters

Before sampling, the Corps of Engineers measures field parameters 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 11.

4.4.3 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; this produces poor-quality (near-saline) groundwater with 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's likely that the lower groundwater system receives recharge along the base of the Niagara Escarpment, situated approximately 3.2 kilometers (2 miles) south of the site (DOE 1994) and, to a lesser extent, via downward flow from the upper unit. Table 12 presents water quality parameter data for 2018.

Analytical results for sulfate and total dissolved solids were consistently above the NYS Class GA groundwater quality standards, while total alkalinity, chloride, and bromide exceeded NYS standards in a limited number of samples.

Sampling of wells during the Remedial Investigation 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; it is definable as a Class GSA water, although the comparison to the drinking water standards continues to be used as a conservative basis for evaluating the results of groundwater analysis.

4.4.4 Groundwater Radiological Findings

The 2018 analytical results for radium-226 and total uranium in groundwater are presented on Table 13 and discussed in detail below.

Radium-226

Radium-226 was not detected in 57 of the 106 samples collected in 2018. Among the 49 detections, radium-226 concentrations were below the NYS drinking water standard of 3 pCi/L and ranged from 0.0825 pCi/L to 0.983 pCi/L. The highest activity level was detected in well A50, which is screened in the upper water-bearing zone and is situated east 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
2017 and 2018

Groundwater Zone Monitored	Concentration Range	
	2017	2018
Upper water-bearing zone	Nondetect—0.784 pCi/L	Nondetect— 0.983 pCi/L
Lower water-bearing zone	Nondetect—1.06 pCi/L	Nondetect— 0.859 pCi/L

Total Uranium

The 2018 groundwater analytical data showed that total uranium concentrations in 26 groundwater monitoring wells exceeded the uranium drinking water criterion (30 µg/L). The most elevated total uranium concentrations continue to be detected in wells installed in late 2012 east and south of the IWCS as part of the Balance of Plant field investigation. The two wells with the highest total uranium concentrations are MW953 (8,927 µg/L), located east and across the Central Drainage Ditch from the IWCS and immediately east of well OW11B, and MW951 (3,124 µg/L), located south of the IWCS. The table below shows analytical data from 2017 and 2018.

Total Uranium Findings
2017 and 2018

Groundwater Zone Monitored	Concentration Range	
	2017	2018
Upper water-bearing zone	3.56 – 7,207 µg/L	4.83 – 8,927 µg/L
Lower water-bearing zone	0.039 – 12.4 µg/L	0.178 – 10.9 µg/L

The Corps of Engineers believes the source of uranium in wells east of and across the Central Drainage Ditch from the IWCS is residual soil contamination from former operations in this area; these 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 the field investigation, may have contributed to groundwater contamination in this area. The Corps of Engineers believes the source of the uranium in wells south of the IWCS is the former storage piles and possibly residual contamination in and around former Building 409. The uranium contamination in these areas, and in other site areas, was produced when the historical residue piles and storage areas leached uranium into the underlying low-permeability soils. Subsequent remediation removed the residue sources and some contaminated soils, whereas the underlying groundwater retained the dissolved uranium impacts. Historical aerial photographs show land scarring in the OW11B area during the time of USDOE remediation activities. Also, video footage taken during IWCS construction show extensive activities, such as equipment decontamination (on and around the decontamination pad) and materials unloading, storage, and loading, occurred in this area. The uranium impacts detected in the groundwater collected from recent investigative excavations in the vicinity of OW11B might be associated with those former remediation activities. In addition to advancing five investigative excavations along the sanitary sewer line between South Ditch 31 and the former decontamination pad, 35 delineation soil borings were advanced in the OW11B area in 2013. The fact that none of these investigation activities identified a source term in this area indicates that the source term, if previously present, had been removed and the current groundwater contamination is the result of the historical movement residue material in this area.

As previously reported, declining to dynamic steady-state (i.e., annually fluctuating about a mean) uranium

trends in the majority of wells surrounding the IWCS indicate attenuating legacy sources (i.e., surface stored wastes) that impacted soil and groundwater before and during IWCS construction. Analysis of trends for total uranium in groundwater is discussed in more detail in Section 4.4.6.

4.4.5 Groundwater Chemical Findings

Analysis of VOCs 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. All of these wells monitor the upper water-bearing zone except well MW949, which monitors the lower water-bearing zone. These wells were selected to monitor potential migration of the chlorinated solvent plume (i.e., tetrachloroethylene [PCE] and its degradation products). Although not part of the ESP, well MW423 was sampled in the fall as a substitute for well MW947, which had an insufficient volume of water to sample.

Results from the 2018 analysis showed no detections of chlorinated solvent compounds in the wells sampled. However, several VOCs, primarily laboratory contaminants (e.g., acetone, methylene chloride, and chloroform), were detected in several wells at concentrations below state drinking water standards. The analytical results are presented in Table 14.

4.4.6 Groundwater Trend Analysis

Total uranium concentrations in monitoring wells over the course of the Corps of Engineers' ESP (1997 through 2018) are evaluated by the Mann-Kendall test to identify the presence of a statistically significant trend using *GSI Mann-Kendall Toolkit* software (GSI Environmental 2012). It is noted that the sample sizes for some of the wells are 10 or less, which are marginal for definitively determining a trend. The test's statistical power is limited by the sample size of data collected from the wells but as additional data is collected through the surveillance program, the statistical power of the test increases. In addition, the maximum number of data points per monitoring location considered by the *GSI Mann-Kendall Toolkit* is set at 40, so if the amount of data exceeds 40, the most recent results are evaluated.

The results of the trend evaluation indicated no increasing or decreasing trends (i.e., stable or no trend) in total uranium concentrations in 27 of 57 wells analyzed. Decreasing or "Probably Decreasing" trends in total uranium concentrations were identified in 21 wells. Increasing or "Probably Increasing" trends were identified in nine wells: OW12B, BH49A, OW04A, MW423, MW934, MW946, MW953, MW954, and MW955. The results are presented in Attachment B-4 and summarized in the table below.

Mann-Kendall Trend Results for Total Uranium in Groundwater

Well	Sample Size (n)	Resulting Trend
OW03B	18	Stable
OW04B	***40***	***Decreasing***
OW05B	18	No trend
OW06B	***35***	***Decreasing***
OW07B	23	Stable
OW11B	30	***Probably Decreasing***
OW12B	***16***	***Increasing[1]***
OW13B	27	***Decreasing***
OW15B	33	***Probably Decreasing***
OW17B	***33***	***Decreasing***
OW18B	***23***	***Decreasing***
BH49	18	***Decreasing***
BH49A	23	***Increasing[2]***

A42	***33***	***Decreasing***
A43	13	Stable
A45	***35***	***Decreasing***
A50	34	***Probably Decreasing***
A55	18	No trend
505	21	No trend
302A	***32***	***Decreasing***
411A	19	***Decreasing***
808A	8	No trend
OW03A	18	Stable
OW04A	***37***	***Increasing***[3]
OW05A	19	Stable
OW06A	19	Stable
OW07A	19	Stable
OW11A	18	No trend
OW12A	***17***	***Decreasing***
OW13A	19	***Decreasing***
OW15A	***17***	***Decreasing***
OW17A	18	Stable
MW423	9	***Probably Increasing***
MW862	19	No Trend
MW863	19	***Decreasing***
MW921	11	Stable
MW922	10	No trend
MW934	***18***	***Increasing***[4]
MW935	***18***	***Decreasing***
MW938	13	***Probably Decreasing***
MW943	10	Stable
MW944	***8***	***Decreasing***
MW945	9	No trend
MW946	9	***Probably Increasing***
MW948	12	Stable
MW949	13	No trend
MW950	14	No trend
MW951	14	Stable
MW952	12	***Decreasing***
MW953	13	***Probably Increasing***
MW954	12	***Probably Increasing***
MW955	13	***Increasing***[5]
MW956	13	No trend
MW957	13	No trend
MW958	13	No trend
MW959	13	No trend
MW960	13	No trend

[1] Total uranium concentrations in OW12B ranged from 17.9 µg/L to 64.2 µg/L.
[2] Total uranium concentrations in BH49A ranged from 11 µg/L to 23.5 µg/L.
[3] Total uranium concentrations in OW04A ranged from 1.32 µg/L to 5.27 µg/L.
[4] Total uranium concentrations in MW934 ranged from 19.6 µg/L to 41.1 µg/L.
[5] Total uranium concentrations in MW955 ranged from 20.3 µg/L to 42.3 µg/L.

Among the wells exhibiting an increasing or probably increasing trend, only wells OW04A and BH49A are located proximate and downgradient of the IWCS. Well OW04A is screened in the lower-water bearing zone and well BH49A is screened in the upper-water bearing zone. Between 2010 and 2018, total uranium concentrations in well BH49A ranged from 11 µg/L to 23.5 µg/L, with concentrations in 2018 of 18.4 µg/L and 20.6 µg/L. Between 2008 and 2018, total uranium concentrations in well OW04A ranged from 1.32 µg/L to 5.27 µg/L, with concentrations in 2018 of 2.66 µg/L, 2.9 µg/L, 3.17 µg/L, and 3.68 µg/L. The cause of these increasing uranium concentrations is likely legacy sources since there is no apparent pattern of increasing uranium concentrations in the area surrounding wells OW04A and BH49A. For example, well OW04B, the companion well to OW04A that is screened in the upper-water bearing zone, exhibits a decreasing trend. The companion well to BH49A, well BH49 that is screened in the lower-water bearing zone, also exhibits a decreasing trend. An adjacent well pair, wells OW03A and OW03B, both exhibit a stable trend.

It is noted that uranium concentrations normally increase during wet-season periods (winter through spring) and decline during dry-season periods (late spring through fall), which is evident to varying degrees in many upper water-bearing zone wells. This variation is due to a combination of residual low-concentration soil impacts (especially south of the IWCS) and changes in uranium solubility during seasonal soil saturation (or groundwater recharge) that increases the oxygen content in the subsurface. The seasonal oxygenation of groundwater increases the uranium solubility of pre-existing contamination, and thus increases concentrations in spring-time samples. Water levels decline throughout the summer and fall due to evapotranspiration of rainfall, which increases groundwater temperatures and reduces the oxygen content in groundwater. Iron-reducing bacteria samples also increase during this period. This geochemical mechanism lowers uranium solubility, promotes uranium adsorption to soil minerals, and lowers groundwater concentrations in fall samples. This geochemical process repeats annually, as seen in the spring and fall sampling data. This trend may be less evident or absent in wells with larger sand lenses, but is commonly evident in upper water-bearing zone wells.

Trend analysis for radium-226 concentrations (pCi/L) in groundwater was not performed because concentrations over the course of the Corps of Engineers ESP (1997 through 2018) 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 CONCLUSION

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 Corps of Engineers:

- 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 (as well as metals and PAHs to monitor potential impact from off-site sources such as Modern Landfill)
- Analyzes groundwater samples for radionuclides and VOCs in a limited area of the site

A summary of the 2018 trend evaluations for total uranium in surface water and uranium-238 and radium-226 in sediment are presented in the following table:

LOCATION		SURFACE WATER[1]	SEDIMENT	
		Total uranium	Uranium-238	Radium-226[3]
SWSD009	ugradient	No trend	Decreasing	No trend
SWSD021	upgradient	Stable	Decreasing	No trend
SWSD023	upgradient	No trend	Stable	Increasing
SWSD010	midstream	Stable	Increasing	Probably Increasing
SWSD022	midstream	No trend	Increasing	No trend
SWSD025	midstream	Stable	Probably Increasing	No trend
SWSD011[2]	downgradient	Probably Increasing	Increasing	Probably Increasing
WDD2	upgradient	Probably Increasing	No trend	Increasing
WDD3	downgradient	Probably Increasing	No trend	Decreasing

[1] Radium-226 concentrations in surface water are not evaluated for trending because concentrations are either nondetect or predominantly less than the laboratory detection limit, precluding the accurate assessment of trends.
[2] SWSD011 is the most downgradient sampling location on the Central Drainage Ditch and the point at which surface water flows off-site.
[3]Trending tests were performed on samples analyzed by gamma spectroscopy (EPA Method 901.1)

Total uranium concentrations at the majority of surface water sample locations support a stable trend with the exception of WDD2 in the West Drainage Ditch and the most downgradient locations in the Central and West Drainage Ditches, SWSD011 and WDD3, respectively. These locations show evidence of a "probably increasing" trend. However, total uranium concentrations at these locations in 2018 remain low: 3.15 µg/L and 2.12 µg/L at WDD2; 2.67 µg/L and 3.34 µg/L at WDD3; and, 7.2 µg/L and 13.7 µg/L at SWSD011. For comparison, the site-specific background total uranium concentration in surface water developed during the remedial investigation was 12.5 µg/L (USACE 2007).

The trend analysis shows uranium-238 concentrations in sediment increasing in a downgradient path along the Central Drainage Ditch. However, the highest concentration of uranium-238 detected at any location in 2018 was 2.51 pCi/g (SWSD010), which is less than the site-specific background concentration of 3.08 pCi/g reported in the remedial investigation (USACE 2007).

The maximum concentration of radium-226 in sediment detected in 2018 was 2.05 pCi/g at location SWSD011, which is less than 2.43 pCi/g, the site-specific background concentration developed during the remedial investigation (USACE 2007). Radium-226 is known to be readily adsorbed to clays and mineral oxides present in sediment, especially near neutral and alkaline pH conditions, so it is usually not a mobile constituent in the environment. Therefore, radium-226 would not be expected to migrate significantly from the area where it is released or generated, and its presence in Central Drainage Ditch sediment likely originated from legacy impacts, adjacent upgradient sources, and/or overland flow. Radium-226 concentrations in surface water continue to be predominantly nondetect or less than the laboratory detection limit.

The 2018 groundwater analytical data showed that total uranium concentrations in 26 groundwater monitoring wells exceeded the uranium drinking water criterion (30 µg/L). The most elevated total uranium concentrations continue to be detected in wells installed in late 2012 east and south of the IWCS as part of the Balance of Plant field investigation. The Corps of Engineers believes the source of uranium in wells east of the IWCS is 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 the sewer line plugged, may have contributed to groundwater contamination in this area. The Corps of Engineers believes the former storage piles and residual contamination from former Building 409 are the source of the uranium in wells south of the IWCS (USACE 2015a). The uranium contamination in groundwater south of the IWCS, and in other site areas, was produced when the historical residue piles and storage areas leached uranium into the underlying low-permeability soils. Subsequent remediation removed the residue sources and some contaminated soils, whereas the underlying groundwater retained the dissolved uranium impacts.

Trend analysis shows increasing or "probably increasing" trends in nine of 57 wells evaluated. Among these nine wells, only two wells, OW04A and BH49A, are located proximate to the IWCS. The cause of these increasing uranium concentrations is likely legacy sources since there is no apparent trend pattern of increasing uranium concentrations when considering either their respective paired wells (OW04B and BH49) or nearby wells.

It is noted that uranium concentrations normally increase during wet-season periods (winter through spring) and decline during dry-season periods (late spring through fall), which is evident to varying degrees in many upper water-bearing zone wells. This variation is due to a combination of residual low-concentration soil impacts (especially south of the IWCS) and changes in uranium solubility during seasonal soil saturation (or groundwater recharge) that increases the oxygen content in the subsurface. The seasonal oxygenation of groundwater increases the uranium solubility of pre-existing contamination, and thus increases concentrations in spring-time samples. Water levels decline throughout the summer and fall due to evapotranspiration of rainfall, which increases groundwater temperatures and reduces the oxygen content in groundwater. Iron-reducing bacteria samples also increase during this period. This geochemical mechanism lowers uranium solubility, promotes uranium adsorption to soil minerals, and lowers groundwater concentrations in fall samples. This geochemical process repeats annually, as seen in the spring and fall sampling data. This trend may be less evident or absent in wells with larger sand lenses, but is commonly evident in upper water-bearing zone wells.

The results of the 2018 ESP show that the IWCS is continuing to perform as designed and is fully protective of human health and the environment.

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TABLES

Acronyms and Abbreviations (in Tables)

BKGD	background
CY	calendar year
DO	dissolved oxygen
DOE	Department of Energy
°F	degrees Fahrenheit.
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 Regulations
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/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
U	not detected
UG/L	microgram per liter
VOC	volatile organic compound

Table 1: Evolution of NFSS Environmental Surveillance Plan

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

Parameter	1997	2000	2003	2008	2009	2010 (fall) (spring 2010	2013 (fall) (spring same as 2010)	2014
Radon Flux (Radon-222 emissions)	-----	180 monitoring locations	183 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	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	26 locations 1 duplicate location
Groundwater level measurements	66 wells	66 wells	91 wells	91 wells	91 wells	101 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:	55 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	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	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	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	Metals: Same VOCs: Only wells 411A, 302A, MW947, MW948, MW949

Table 1 Continued: Evolution of NFSS Environmental Surveillance Plan

Parameter	1997	2000	2003	2008	2009	2010	2013	2014
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: PCBs, pesticides, VOCs, 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	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	9 locations (removed SWSD024 and WDD1) Radionuclides: Total Uranium Radium-226 Metals: Same Organics: PAHs only

Table 2
2018 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-943	UWBZ	S (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[3]	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

[3] MW422 or MW423 is substituted for MW947 when well MW947 is dry

Table 3

2018 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
2018 External Gamma Radiation Dose Rates
Niagara Falls Storage Site

Monitoring Location	Monitoring Station	Net OSL Data (mrem/monitoring period) 12/31/2017-6/30/2018	Net OSL Data (mrem/monitoring period) 7/1/2018-1/3/2019	Normalized Net OSL Data[b] (mrem/yr)
NFSS Perimeter	1	10.0	14.0	23.9
	1	13.0	13.0	25.9
	7	12.0	12.0	23.9
	7	13.0	10.0	22.9
	11	9.0	6.0	15.0
	11	9.0	8.0	17.0
	12	10.0	11.0	20.9
	12	12.0	14.0	25.9
	13	9.0	14.0	22.9
	13	9.0	16.0	24.9
	15	14.0	15.0	28.9
	15	14.0	14.0	27.9
	28	15.0	18.0	32.9
	28	13.0	18.0	30.9
	29	12.0	15.0	26.9
	29	14.0	14.0	27.9
	32*	9.0	10.0	18.9
	32*	9.0	13.0	21.9
	36	10.0	16.0	25.9
	36	11.0	15.0	25.9
	45	10.0	10.0	19.9
	45	10.0	11.0	20.9
	50	13.0	16.0	28.9
	50	12.0	17.0	28.9
	55	11.0	15.0	25.9
	55	11.0	11.0	21.9
	60	11.0	13.0	23.9
	60	11.0	12.0	22.9
	65	9.0	15.0	23.9
	65	11.0	14.0	24.9
	122	10.0	12.0	21.9
	122	14.0	15.0	28.9
	123	12.0	13.0	24.9
	123	12.0	11.0	22.9
IWCS Perimeter	8	10.0	10.0	19.9
	8	9.0	12.0	20.9
	10	12.0	15.0	26.9
	10	12.0	15.0	26.9
	18	10.0	11.0	20.9
	18	10.0	10.0	19.9
	21	10.0	13.0	22.9
	21	9.0	12.0	20.9
	23	9.0	12.0	20.9
	23	9.0	11.0	19.9
	24	12.0	13.0	24.9
	24	11.0	14.0	24.9
	40	9.0	10.0	18.9
	40	9.0	11.0	19.9
Background[c]	105	9.0	7.0	16.0
	105	9.0	4.0	13.0
	116	12.0	10.0	21.9
	116	9.0	13.0	21.9
	120	9.0	12.0	20.9
	120	11.0	17.0	27.9
Average Background		9.8	10.5	20.3

a Lab subtracts average control value from each measurement, so all data are net results in mrem per monitoring period.
b Net data for each period are normalized to a daily dose rate, averaged, and then normalized for the length of the year (365 days).
c Background Locations: 105-Lewiston-Porter School, 116-Balmer Road and 120-Lewiston Water Pollution Control Center
* Location 32 is a duplicate sample for location 12.
OSL - Optically Stimulated Luminescence dosimeters

NOTE: "0" values indicate that the measured OSLD value was less than or equal to the average control value.

Table 5
2018 Radon Gas Concentrations[a]

Monitoring Location[b]	Station	Average Daily Concentration (pCi/L) 1/04/18 - 07/02/18[c]			Average Daily Concentration (pCi/L) 7/02/18 - 1/03/19[c]		
NFSS Perimeter	1	< 0.2	±	-	< 0.2	±	-
	7	< 0.2	±	-	< 0.2	±	-
	11	0.2	±	0.2	0.2	±	0.2
	12	< 0.2	±	-	< 0.2	±	-
	12 (dup[d])	0.3	±	0.2	< 0.2	±	-
	13	0.3	±	0.2	0.2	±	0.2
	15	< 0.2	±	-	< 0.2	±	-
	28	< 0.2	±	-	< 0.2	±	-
	29	< 0.2	±	-	< 0.2	±	-
	36	< 0.2	±	-	<0.2	±	-
	45	< 0.2	±	-	0.2	±	0.2
	50	0.2	±	0.2	< 0.2	±	-
	55	< 0.2	±	-	< 0.2	±	-
	60	< 0.2	±	-	< 0.2	±	-
	65	0.2	±	0.2	< 0.2	±	-
	122	< 0.2	±	-	< 0.2	±	-
	123	0.2	±	0.2	< 0.2	±	-
IWCS Perimeter	8	0.2	±	0.2	0.2	±	0.2
	10	0.2	±	0.2	< 0.2	±	-
	18	0.2	±	0.2	< 0.2	±	-
	21	< 0.2	±	-	< 0.2	±	-
	23	< 0.2	±	-	0.2	±	0.2
	24	0.2	±	0.2	< 0.2	±	-
	40	< 0.2	±	-	< 0.2	±	-
Background	105	0.2	±	0.2	< 0.2	±	-
	116	< 0.2	±	-	0.3	±	0.2
	120	0.2	±	0.2	< 0.2	±	-

a. Radon gas concentrations were measured with RadTrak2® detectors
These detectors measure the combined concentration of radon-220 and radon-222 in air.
b. Monitoring locations are shown on Figure 6.
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 pCi/L above background.
(<0.X) Indicates detection limit is reported. Actual result is less than this value.
1 pCi = 0.037 becquerel

Table 6A
2018 Radon Flux Monitoring Results[a]
Niagara Falls Storage Site

NFSS Sample ID	Qualifie	Radon-222 Flux (pCi/m²/s)			MDA	NFSS Sample ID	Qualifie	Radon-222 Flux (pCi/m²/s)			MDA
1		0.0489	±	0.0109	0.0187	51	U	0.0210	±	0.0150	0.0564
2		0.0502	±	0.0100	0.0285	52		0.0692	±	0.0163	0.0432
3	U	0.0000	±	0.0000	0.0668	53		0.0286	±	0.0065	0.0100
4	U	0.0129	±	0.0355	0.1214	54		0.0167	±	0.0155	0.0624
5		0.0443	±	0.0092	0.0347	55		0.1394	±	0.0271	0.0625
6		0.0346	±	0.0102	0.0351	56		0.0413	±	0.0091	0.0250
7		0.0707	±	0.0136	0.0421	57		0.0449	±	0.0101	0.0196
8		0.1471	±	0.0249	0.0427	58		0.0478	±	0.0117	0.0159
9		0.0398	±	0.0096	0.0323	59		0.0658	±	0.0118	0.0190
10		0.0589	±	0.0134	0.0111	60		0.1097	±	0.0171	0.0423
10-DUP[b]		0.0202	±	0.0090	0.0384	60-DUP[b]		0.1137	±	0.0170	0.0451
11		0.0692	±	0.0151	0.0510	61		1.3250	±	0.1326	0.2167
12		0.0923	±	0.0250	0.0851	62		19.2784	±	1.6081	0.4470
13		0.0378	±	0.0084	0.0282	63		0.7824	±	0.0765	0.1083
14	U	0.0123	±	0.0134	0.0552	64		0.7077	±	0.0754	0.1112
15		0.0650	±	0.0172	0.0425	65		1.2903	±	0.1159	0.0572
16		0.0336	±	0.0077	0.0223	66		0.0980	±	0.0165	0.0257
17		0.0645	±	0.0122	0.0193	67	U	0.0008	±	0.0202	0.0596
18	U	0.0125	±	0.0178	0.0524	68	U	0.0000	±	0.0000	0.1061
19		0.0737	±	0.0249	0.0965	69		0.0501	±	0.0108	0.0298
20	U	0.0079	±	0.0191	0.0420	70		0.0604	±	0.0117	0.0312
20-DUP[b]		0.0404	±	0.0110	0.0361	70-DUP[b]		0.0551	±	0.0127	0.0440
21		0.0442	±	0.0097	0.0164	71	U	0.0513	±	0.0226	0.0695
22		0.0797	±	0.0218	0.0640	72		0.1412	±	0.0254	0.0438
23		0.0444	±	0.0102	0.0252	73		0.0869	±	0.0133	0.0354
24		0.0558	±	0.0131	0.0443	74	U	-0.0055	±	0.0101	0.0750
25	U	0.1370	±	0.0366	0.0994	75		0.0515	±	0.0200	0.0630
26	U	0.0045	±	0.0151	0.0471	76	U	0.0088	±	0.0174	0.0571
27		0.0351	±	0.0086	0.0284	77		0.0377	±	0.0093	0.0198
28		0.0296	±	0.0092	0.0287	78	U	-0.0068	±	0.0176	0.0458
29	U	0.0195	±	0.0188	0.0628	79	U	0.0330	±	0.0305	0.0880
30	U	0.0343	±	0.0167	0.0462	80		0.0425	±	0.0089	0.0191
30-DUP[b]	U	0.0083	±	0.0173	0.0576	80-DUP[b]	U	0.0333	±	0.0172	0.0507
31	U	0.0430	±	0.0197	0.1117	81	U	0.0008	±	0.0156	0.0557
32		0.0640	±	0.0105	0.0187	82	U	0.0194	±	0.0132	0.0288
33		0.0264	±	0.0082	0.0253	83		0.0305	±	0.0123	0.0529
34	U	0.0413	±	0.0309	0.1225	84	U	0.0050	±	0.0162	0.0576
35	U	0.0134	±	0.0068	0.0389	85	U	0.0166	±	0.0498	0.0776
36		0.0476	±	0.0100	0.0194	86	U	0.0094	±	0.0159	0.0315
37	U	0.0298	±	0.0198	0.0747	87	U	0.0195	±	0.0164	0.0609
38		0.0779	±	0.0184	0.0588	88	U	0.0105	±	0.0208	0.0627
39	U	-0.0034	±	0.0048	0.0280	89		0.0668	±	0.0219	0.0637
40	U	0.0295	±	0.0157	0.0457	90		0.0751	±	0.0139	0.0360
40-DUP[b]		0.0323	±	0.0086	0.0254	90-DUP[b]		0.0850	±	0.0134	0.0444
41		0.0398	±	0.0096	0.0368	91		0.0260	±	0.0106	0.0402
42	U	0.0046	±	0.0164	0.0596	92	U	0.0472	±	0.0149	0.0595
43	U	0.0478	±	0.0171	0.0612	93	U	0.0623	±	0.0243	0.0941
44		0.0939	±	0.0209	0.0431	94	U	0.0261	±	0.0109	0.0547
45		0.0637	±	0.0117	0.0262	95	U	-0.0146	±	0.0224	0.0629
46		0.0679	±	0.0129	0.0334	96	U	0.0000	±	0.0000	0.1187
47	U	0.0419	±	0.0179	0.0658	97		0.0308	±	0.0085	0.0193
48	U	0.0043	±	0.0115	0.1161	98		0.0478	±	0.0118	0.0261
49	U	0.0180	±	0.0109	0.0505	99	U	0.0086	±	0.0178	0.0683
50	U	0.0000	±	0.0000	0.0653	100	U	0.0000	±	0.0000	0.1502
50-DUP[b]	U	0.0170	±	0.0086	0.0510	100-DUP[b]		0.0705	±	0.0185	0.0635

Table 6A (cont.)
2018 Radon Flux Monitoring Results[a]
Niagara Falls Storage Site

NFSS Sample ID	Qualifie	Radon-222 Flux (pCi/m²/s)			MDA	NFSS Sample ID	Qualifie	Radon-222 Flux (pCi/m²/s)			MDA
101		0.0520	±	0.0106	0.0262	151	U	0.0233	±	0.0126	0.0544
102	U	0.0000	±	0.0000	0.0676	152		0.0385	±	0.0110	0.0360
103		0.0346	±	0.0092	0.0295	153	U	0.0087	±	0.0224	0.0582
104		0.0244	±	0.0117	0.0461	154	U	0.0233	±	0.0292	0.1202
105	U	0.0173	±	0.0180	0.5350	155		0.0283	±	0.0080	0.0267
106	U	0.0257	±	0.0201	0.0779	156	U	0.0278	±	0.0251	0.0637
107	U	-0.0011	±	0.0632	0.1222	157	U	0.0440	±	0.0181	0.0733
108	U	0.0187	±	0.0154	0.0385	158	U	0.0830	±	0.0314	0.0975
109		0.0486	±	0.0144	0.0529	159	U	0.0037	±	0.0158	0.0546
110		0.0566	±	0.0137	0.0196	160		0.0765	±	0.0184	0.0498
110-DUP[b]	U	0.0000	±	0.0000	0.0725	160-DUP[b]		0.0798	±	0.0170	0.0531
111		0.0995	±	0.0279	0.1092	161		0 1193	±	0.0266	0.0710
112	U	0.0352	±	0.0143	0.0553	162		0.0462	±	0.0105	0.0302
113		0.0223	±	0.0080	0.0229	163		0.0620	±	0.0150	0.0199
114		0.0697	±	0.0219	0.0725	164		0.0483	±	0.0118	0.0340
115	U	0.0191	±	0.0116	0.0552	165		0.0489	±	0.0115	0.0233
116	U	0.0124	±	0.0135	0.0569	166	U	0.0277	±	0.0208	0.0786
117	U	0.0136	±	0.0258	0.0573	167	U	0.0061	±	0.0136	0.0529
118	U	0.0330	±	0.0147	0.0549	168		0.0984	±	0.0187	0.0306
119		0.0590	±	0.0147	0.0358	169	U	0.0000	±	0.0090	0.0609
120		0.0328	±	0.0112	0.0194	170		0.0564	±	0.0131	0.0118
120-DUP[b]		0.0440	±	0.0127	0.0195	170-DUP[b]		0.0569	±	0.0125	0.0226
121		0.0260	±	0.0081	0.0160	171		0.0797	±	0.0161	0.0305
122		0.0453	±	0.0112	0.0297	172		0.0770	±	0.0169	0.0190
123		0.0591	±	0.0203	0.0505	173		0.0592	±	0.0139	0.0451
124		0.0252	±	0.0085	0.0247	174	U	0.0209	±	0.0180	0.0756
125	U	0.0025	±	0.0158	0.0593	175		0.0658	±	0.0126	0.0164
126	U	0.0293	±	0.0229	0.0656	176		0.0614	±	0.0159	0.0637
127		0.0711	±	0.0202	0.0727	177	U	0.0480	±	0.0236	0.0853
128	U	0.0114	±	0.0222	0.0517	178		0.0359	±	0.0102	0.0164
129		0.0356	±	0.0113	0.0229	179		0.0552	±	0.0183	0.0702
130		0.0457	±	0.0121	0.0196	180		0.0538	±	0.0166	0.0482
130-DUP[b]	U	0.0000	±	0.0000	0.0725	180-DUP[b]	U	0.0859	±	0.0272	0.0769
131	U	0.0458	±	0.0452	0.1405	181[c]	U	0.0167	±	0.0203	0.0699
132		0.0334	±	0.0100	0.0290	182[c]	U	0.0767	±	0.0319	0.0729
133		0.0230	±	0.0082	0.0300	183[c]		0.0875	±	0.0213	0.0781
134	U	0.0293	±	0.0293	0.1225	Average background		0.06030 (pCi/m²/s)			
135		0.0408	±	0.0100	0.0318						
136		0.0674	±	0.0163	0.0514						
137	U	0.0264	±	0.0177	0.0782						
138	U	0.0214	±	0.0397	0.1307						
139	U	0.0198	±	0.0092	0.0518						
140		0.0310	±	0.0116	0.0299						
140-DUP[b]	U	0.0305	±	0.0175	0.0720						
141	U	-0.0051	±	0.0387	0.1223						
142		0.0266	±	0.0078	0.0160						
143		0.0363	±	0.0140	0.0572						
144		0.0739	±	0.0225	0.0730						
145		0.0185	±	0.0083	0.0306						
146	U	0.0185	±	0.0216	0.0570						
147	U	0.0324	±	0.0164	0.0682						
148	U	0.0408	±	0.0211	0.1226						
149	U	0.0119	±	0.0164	0.0630						
150	U	0.0299	±	0.0128	0.0653						
150-DUP[b]		0.0441	±	0.0132	0.0537						

IWCS	Value	Units
Average[e]	0.1576	(pCi/m²/s)
High[f]	19.2784	(pCi/m²/s)
Low	-0.0146	(pCi/m²/s)

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

a Radon-222 flux was performed on July 12, 2018

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. Data Qualifier: U - no analyte was detected (Non-Detect)
J - indicates a estimated value when relative percent difference > 30% and Z-score > 1 96 between the primary finding and duplicate (-DUP)

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

f. Highest detectable finding

Indicates location was re-sampled Results on T

Table 6B

2018 Limited Radon Flux Monitoring Results[a]

Niagara Falls Storage Site

NFSS Sample ID	Qualifier[d]	Radon-222 Flux (pCi/m²/s)			MDA	Comment
62		0.0633	±	0.0226	0.0370	Original Sample (Duplicate Original)
62-DUP		0.0778	±	0.0248	0.0183	Laboratory Duplicate
62S		0.0684	±	0.0337	0.0218	South of location #62
62N	U	0.0125	±	0.0201	0.0437	North of location #62
62E		0.0414	±	0.0175	0.0241	East of location #62
62W	U	-0.0299	±	0.0849	0.0898	West of location #62
61		0.0476	±	0.0183	0.0332	
65	U	0.0269	±	0.0162	0.0318	
64	U	0.0228	±	0.0156	0.0264	
66	U	0.0442	±	0.0616	0.0893	
46	U	0.0039	±	0.0249	0.0428	
47		0.0790	±	0.0349	0.0218	Original Sample (Duplicate Original)
47-DUP		0.0499	±	0.0314	0.0528	Laboratory Duplicate
48		0.0180	±	0.0101	0.0107	
63		0.0506	±	0.0204	0.0290	
Control	U	0.0202	±	0.0180	0.0450	Not opened
62NW	U	0.0265	±	0.0226	0.0480	North East of location #62
62SW	U	0.0040	±	0.0190	0.0497	South West of location #62
62SE		0.0492	±	0.0170	0.0113	South East of location #62
181[c]	U	0.0611	±	0.0615	0.0902	
182[c]		0.0884	±	0.0242	0.0274	
183[c]	U	0.0250	±	0.0364	0.0424	
Average background		0.05819 (pCi/m²/s)				

IWCS	Value	Units
Average[e]	0.0387	(pCi/m²/s)
High[f]	0.0884	(pCi/m²/s)
Low	-0.0299	(pCi/m²/s)

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

a. Radon-222 flux was performed on OCT 9-10, 2018 (24 hour exposure).

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. Data Qualifier: U - no analyte was detected (Non-Detect).

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

f. Highest detectable finding.

Table 7
2018 Surface water Field Parameter Measurements
Niagara Falls Storage Site

SURFACE WATER

Surface Water	Date	Temperature (°F[a])	pH	ORP[f] (mV[g])	Spec. Cond.[b] (mS/cm[c])	Turbidity (NTU[h])	DO[d] (mg/L[e])
SWSD025[1,4]	2/2/2018	36.3	6.40	213	1.67	26.2	NR
SWSD009[4]	4/23/2018	67.7	8.19	140	1.74	88.5	9.29
SWSD010	4/23/2018	49.2	6.45	251	1.13	41.7	5.81
SWSD011	4/23/2018	44.5	7.54	203	0.84	43.0	8.91
SWSD021[4]	4/23/2018	49.2	7.58	188	0.81	90.7	7.22
SWSD022	4/23/2018	47.2	6.62	241	0.81	11.4	7.94
SWSD023	4/23/2018	61.2	7.57	69	1.18	13.5	6.12
SWSD025[1]	4/23/2018	44.1	6.75	242	0.93	24.2	8.82
WDD2[4]	4/23/2018	65.5	8.50	159	0.61	36.1	7.89
WDD3[4]	4/23/2018	65.4	8.45	155	0.59	34.4	8.99
SWSD025[2,3]	4/15/2018	44.6	6.87	201.0	0.53	42.0	8.80
SWSD025[2,3]	5/22/2018	70.0	7.00	212.0	0.53	48.2	7.49
SWSD025[2,3]	6/18/2018	54.2	7.81	221.0	1.03	18.4	9.34
SWSD025[2,3]	8/14/2018	74.9	7.64	195.0	0.96	24.4	5.82
SWSD025[1]	8/1/18	71.4	7.07	-26.0	1.74	45.2	2.77
SWSD009	10/24/2018	49.5	7.73	89.0	1.75	55.6	7.56
SWSD010[4]	10/24/2018	46.5	7.39	61.0	1.40	28.7	4.45
SWSD011	10/24/2018	46.3	7.68	216.0	1.38	23.5	6.13
SWSD021[4]	10/24/2018	56.9	7.07	210.0	0.81	18.5	3.84
SWSD022	10/24/2018	44.5	7.43	-3.0	1.46	103.0	6.21
SWSD023	10/25/2018	54.4	7.20	69.0	1.26	48.0	4.43
SWSD025[1]	10/24/2018	45.8	7.16	196.0	1.40	31.4	6.53
WDD2	10/25/2018	46.4	7.63	124.0	0.74	12.3	6.90
WDD3	10/25/2018	49.8	7.71	148.0	0.76	9.5	5.50

a. °F - Degrees Fahrenheit.
b. Spec. Cond. - Specific conductance.
c. mS/cm - millisiemens/centimeter.
d. DO - Dissolved oxygen.
e. mg/L - milligrams per liter.
f. ORP - Oxidation-Reduction potential.
g. mV - milliVolts.
h. NTU - Nephelometric turbidity units.

NR - Not Reported
*Parameter not taken/meter malfunction
[1] NYSDOH requested sampling location for quarterly sampling.
[2] Rain Event -sample taken by autosampler.
[3]Water quality parameters taken after the sample has been retrieved.
[4]Primary sample will have an accompanying filtered sample (-F).
[5]Location was dry (no water to sample).

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

Location Identifier		SWSD009	SWSD009	SWSD009	SWSD009	SWSD010
Field Sample Identifier		SWSD009	SWSD009-D	SWSD009	SWSD009-D	SWSD010
Sample Matrix		Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
Depth Interval (ft)		-	-	-	-	-
Date of Sample		04/23/18	04/23/18	10/24/18	10/24/18	04/23/18
Parameter	Units		Field Duplicate		Field Duplicate	
RADIONUCLIDES						
RADIUM-226	*PCi/L*	0.0324 U	0.0142 U	0.356 U	0.671 J	0 U
TOTAL URANIUM	*ug/L*	7.53	6.54	6.66	6.62	10.9
RADIONUCLIDES (FILTERED)						
RADIUM-226	*PCi/L*	-0.094 U	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed
TOTAL URANIUM	*ug/L*	7.2	Not Analyzed	6.52	Not Analyzed	Not Analyzed
RADIONUCLIDES (GAMMA SPEC)						
RADIUM-226	*PCi/L*	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed

The flags shown were assigned during chemistry validation.

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

NOTE: Detection limits shown are MDL.

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

Location Identifier		SWSD010	SWSD011	SWSD011	SWSD021	SWSD021
Field Sample Identifier		SWSD010	SWSD011	SWSD011	SWSD021	SWSD021
Sample Matrix		Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
Depth Interval (ft)		-	-	-	-	-
Date of Sample		10/24/18	04/23/18	10/24/18	04/23/18	10/24/18
Parameter	Units					
RADIONUCLIDES						
RADIUM-226	*PCi/L*	0.385 U	0.268 U	0.278 U	-0.09 U	0.575 J
TOTAL URANIUM	*ug/L*	6.04	13.7	7.2	12.3	10.3
RADIONUCLIDES (FILTERED)						
RADIUM-226	*PCi/L*	Not Analyzed	Not Analyzed	Not Analyzed	0.175 J	Not Analyzed
TOTAL URANIUM	*ug/L*	Not Analyzed	Not Analyzed	Not Analyzed	12	Not Analyzed
RADIONUCLIDES (GAMMA SPEC)						
RADIUM-226	*PCi/L*	Not Analyzed	Not Analyzed	Not Analyzed	236.87	Not Analyzed

The flags shown were assigned during chemistry validation.

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

NOTE: Detection limits shown are MDL.

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

Location Identifier		SWSD022	SWSD022	SWSD023	SWSD023	SWSD025
Field Sample Identifier		SWSD022	SWSD022	SWSD023	SWSD023	SWSD025
Sample Matrix		Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
Depth Interval (ft)		-	-	-	-	-
Date of Sample		04/23/18	10/24/18	04/23/18	10/25/18	02/07/18
Parameter	Units					
RADIONUCLIDES						
RADIUM-226	*PCi/L*	0 U	0.631 J	0.284 U	0.204 U	0.139 B
TOTAL URANIUM	*ug/L*	18.6	4.95	6.93	2	23.8
RADIONUCLIDES (FILTERED)						
RADIUM-226	*PCi/L*	Not Analyzed	-0.279 U	Not Analyzed	Not Analyzed	Not Analyzed
TOTAL URANIUM	*ug/L*	Not Analyzed	4.75	Not Analyzed	Not Analyzed	Not Analyzed
RADIONUCLIDES (GAMMA SPEC)						
RADIUM-226	*PCi/L*	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed

The flags shown were assigned during chemistry validation.

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

NOTE: 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	SWSD025-R	SWSD025-R	SWSD025
Sample Matrix		Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
Depth Interval (ft)		-	-	-	-	-
Date of Sample		04/15/18	04/23/18	05/22/18	06/18/18	08/01/18
Parameter	Units					
RADIONUCLIDES						
RADIUM-226	*PCI/L*	0 U	0.0885 U	0 U	0.167 B	0.258 U
TOTAL URANIUM	*ug/L*	7.01	17	3.44	10.4	18.1
RADIONUCLIDES (FILTERED)						
RADIUM-226	*PCI/L*	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed
TOTAL URANIUM	*ug/L*	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed
RADIONUCLIDES (GAMMA SPEC)						
RADIUM-226	*PCI/L*	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed

The flags shown were assigned during chemistry validation.

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

NOTE: Detection limits shown are MDL.

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

Location Identifier		SWSD025	SWSD025	WDD2	WDD2	WDD3
Field Sample Identifier		SWSD025-R	SWSD025	WDD2	WDD2	WDD3
Sample Matrix		Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
Depth Interval (ft)		-	-	-	-	-
Date of Sample		08/14/18	10/24/18	04/23/18	10/25/18	04/23/18
Parameter	Units					
RADIONUCLIDES						
RADIUM-226	*PCi/L*	0.306 U	0.262 U	-0.093 U	0.155 U	0.232 U
TOTAL URANIUM	*ug/L*	14.2	4.94	3.15	2.12	3.34
RADIONUCLIDES (FILTERED)						
RADIUM-226	*PCi/L*	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed
TOTAL URANIUM	*ug/L*	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed
RADIONUCLIDES (GAMMA SPEC)						
RADIUM-226	*PCi/L*	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed

The flags shown were assigned during chemistry validation.

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

NOTE: Detection limits shown are MDL.

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

Location Identifier		WDD3
Field Sample Identifier		WDD3
Sample Matrix		Surface Water
Depth Interval (ft)		-
Date of Sample		10/25/18
Parameter	**Units**	
RADIONUCLIDES		
RADIUM-226	*PCI/L*	0.274 U
TOTAL URANIUM	*ug/L*	2.67
RADIONUCLIDES (FILTERED)		
RADIUM-226	*PCI/L*	Not Analyzed
TOTAL URANIUM	*ug/L*	Not Analyzed
RADIONUCLIDES (GAMMA SPEC)		
RADIUM-226	*PCI/L*	Not Analyzed

The flags shown were assigned during chemistry validation.

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

NOTE: Detection limits shown are MDL.

TABLE 9
SEDIMENT ANALYTICAL RESULTS - RADIONUCLIDES
NIAGARA FALLS STORAGE SITE

Location Identifier		SWSD009	SWSD009	SWSD009	SWSD009	SWSD010
Field Sample Identifier		SWSD009	SWSD009-D	SWSD009	SWSD009-D	SWSD010
Sample Matrix		Sediment	Sediment	Sediment	Sediment	Sediment
Depth Interval (ft)		-	-	-	-	-
Date of Sample		04/25/18	04/25/18	10/29/18	10/29/18	04/24/18
Parameter	Units		Field Duplicate		Field Duplicate	
RADIONUCLIDES						
RADIUM-226	*PCI/G*	0.823	0.99	0.994	0.777	1.271
URANIUM-234	*PCI/G*	1.17	0.904 B	0.977	1.09	1.94
URANIUM-235	*PCI/G*	0.173	0.18	0.047	0.055 U	0.148
URANIUM-238	*PCI/G*	1.12	1.15	0.802	0.969	1.59

The flags shown were assigned during chemistry validation.

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

NOTE: Detection limits shown are MDL.

TABLE 9
SEDIMENT ANALYTICAL RESULTS - RADIONUCLIDES
NIAGARA FALLS STORAGE SITE

Location Identifier		SWSD010	SWSD011	SWSD011	SWSD021	SWSD021
Field Sample Identifier		SWSD010	SWSD011	SWSD011	SWSD021	SWSD021
Sample Matrix		Sediment	Sediment	Sediment	Sediment	Sediment
Depth Interval (ft)		-	-	-	-	-
Date of Sample		10/29/18	04/24/18	10/26/18	04/24/18	10/29/18
Parameter	Units					
RADIONUCLIDES						
RADIUM-226	PCI/G	1.385	2.046	1.653	1.146	1.452
URANIUM-234	PCI/G	2.78	1.47	1.83	0.88 B	0.807
URANIUM-235	PCI/G	0.162	0.102	0.127	0.085	0.122
URANIUM-238	PCI/G	2.51	1.54	1.62	1.1	0.925

The flags shown were assigned during chemistry validation.

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

NOTE: Detection limits shown are MDL.

TABLE 9
SEDIMENT ANALYTICAL RESULTS - RADIONUCLIDES
NIAGARA FALLS STORAGE SITE

Location Identifier		SWSD022	SWSD022	SWSD023	SWSD023	SWSD025
Field Sample Identifier		SWSD022	SWSD022	SWSD023	SWSD023	SWSD025
Sample Matrix		Sediment	Sediment	Sediment	Sediment	Sediment
Depth Interval (ft)		-	-	-	-	-
Date of Sample		04/24/18	10/26/18	04/25/18	10/29/18	02/07/18
Parameter	Units					
RADIONUCLIDES						
RADIUM-226	PCI/G	1.909	1.681	0.977	1.012	1.989
URANIUM-234	PCI/G	2.63	1.71	1.06	0.902	2.15
URANIUM-235	PCI/G	0.164	0.092	0.076	0.067 J	0.108
URANIUM-238	PCI/G	2.2	1.65	1.09	0.805	1.96

The flags shown were assigned during chemistry validation.

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

NOTE: Detection limits shown are MDL.

TABLE 9
SEDIMENT ANALYTICAL RESULTS - RADIONUCLIDES
NIAGARA FALLS STORAGE SITE

Location Identifier		SWSD025	SWSD025	SWSD025	WDD2	WDD2
Field Sample Identifier		SWSD025	SWSD025	SWSD025	WDD2	WDD2
Sample Matrix		Sediment	Sediment	Sediment	Sediment	Sediment
Depth Interval (ft)		-	-	-	-	-
Date of Sample		04/24/18	08/01/18	10/26/18	04/24/18	10/26/18
Parameter	Units					
RADIONUCLIDES						
RADIUM-226	PCI/G	1.231	1.739	1.397	1.251	1.442
URANIUM-234	PCI/G	2.3	1.52	2.13	1.84	1.2
URANIUM-235	PCI/G	0.241	0.254	0.131	0.169	0.094
URANIUM-238	PCI/G	2.21	1.36	2.02	1.62	1

The flags shown were assigned during chemistry validation.

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

NOTE: Detection limits shown are MDL.

TABLE 9
SEDIMENT ANALYTICAL RESULTS - RADIONUCLIDES
NIAGARA FALLS STORAGE SITE

Location Identifier		WDD3	WDD3
Field Sample Identifier		WDD3	WDD3
Sample Matrix		Sediment	Sediment
Depth Interval (ft)		-	-
Date of Sample		04/24/18	10/26/18
Parameter	Units		
RADIONUCLIDES			
RADIUM-226	PCI/G	1.378	1.149
URANIUM-234	PCI/G	1.46	1.13
URANIUM-235	PCI/G	0.168	0.079
URANIUM-238	PCI/G	1.42	0.897

The flags shown were assigned during chemistry validation.

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

NOTE: Detection limits shown are MDL.

TABLE 10
2018 GROUNDWATER LEVELS

Well No.	Reference Elevation (ft)	1st Quarter (2/7/18)		2nd Quarter (4/17/18)		3rd Quarter (7/30/18)		4th Quarter (10/26/18)	
		Depth to Water (ft)	Groundwater Elevation (ft)	Depth to Water (ft)	Groundwater Elevation (ft)	Depth to Water (ft)	Groundwater Elevation (ft)	Depth to Water (ft)	Groundwater Elevation (ft)
UPPER WATER BEARING ZONE WELLS									
505	317.80	5.75	312.05	2.96	314.84	16.60	301.20	13.71	304.09
201A	321.47	4.45	317.02	3.58	317.89	7.69	313.78	5.39	316.08
203A	321.87	4.38	317.49	2.95	318.92	8.20	313.67	5.75	316.12
213A	321.37	4.74	316.63	3.68	317.69	8.30	313.07	10.52	310.85
215A	320.26	4.70	315.56	2.41	317.85	12.70	307.56	12.88	307.38
302A	320.53	4.20	316.33	3.50	317.03	10.60	309.93	7.25	313.28
303A	321.83	3.48	318.35	3.47	318.36	8.20	313.63	7.52	314.31
404A	323.73	5.90	317.83	4.52	319.21	10.44	313.29	11.57	312.16
411A	322.05	3.84	318.21	3.50	318.55	13.83	308.22	13.45	308.60
415A	321.27	3.99	317.28	2.10	319.17	9.55	311.72	12.72	308.55
603A	320.57	2.00	318.57	1.82	318.75	8.55	312.02	10.68	309.89
606A	321.49	3.60	317.89	1.52	319.97	8.65	312.84	6.95	314.54
808A	319.27	2.55	316.72	1.85	317.42	9.19	310.08	13.26	306.01
810A	318.44	4.79	313.65	2.36	316.08	15.98	302.46	16.33	302.11
816A	320.62	2.00	318.62	1.39	319.23	2.49	318.13	2.11	318.51
A42	319.70	4.85	314.85	4.54	315.16	7.36	312.34	7.34	312.36
A43	320.50	4.94	315.56	4.40	316.10	7.00	313.50	6.83	313.67
A45	321.70	7.93	313.77	7.62	314.08	10.62	311.08	8.90	312.80
A50	321.30	8.83	312.47	8.75	312.55	12.43	308.87	10.90	310.40
A51	321.20	6.84	314.36	7.12	314.08	10.67	310.53	9.13	312.07
A52	321.10	5.41	315.69	5.00	316.10	9.23	311.87	7.07	314.03
B02W2OS	322.00	2.85	319.15	2.45	319.55	6.05	315.95	4.34	317.66
BH49A	320.65	2.50	318.15	2.39	318.26	7.19	313.46	6.98	313.67
MW313	320.88	3.90	316.98	3.33	317.55	9.59	311.29	13.32	307.56
MW314	318.94	2.81	316.13	2.15	316.79	10.20	308.74	12.41	306.53
MW422	321.36	21.00	300.36	16.71	304.65	17.75	303.61	dry	---
MW423	322.39	5.42	316.97	4.18	318.21	11.22	311.17	14.25	308.14
MW424	320.93	3.00	317.93	2.49	318.44	9.21	311.72	7.72	313.21
MW860	320.06	5.36	314.70	5.55	314.51	7.98	312.08	7.95	312.11
MW862	319.62	4.59	315.03	4.38	315.24	8.60	311.02	6.84	312.78
MW921	319.88	6.58	313.30	4.75	315.13	15.05	304.83	18.20	301.68
MW922	318.56	2.71	315.85	2.25	316.31	9.58	308.98	12.05	306.51
MW923	319.53	7.05	312.48	3.64	315.89	15.98	303.55	20.98	298.55
MW930	323.16	5.29	317.87	3.45	319.71	11.73	311.43	13.47	309.69
MW934	322.20	3.56	318.64	3.15	319.05	11.08	311.12	13.44	308.76
MW935	319.33	3.79	315.54	2.97	316.36	8.45	310.88	7.71	311.62
MW936	320.64	2.40	318.24	2.09	318.55	6.22	314.42	5.87	314.77
MW938	319.54	3.73	315.81	3.19	316.35	9.88	309.66	11.73	307.81
MW941	318.98	3.01	315.97	3.00	315.98	5.81	313.17	5.06	313.92
MW943	321.60	2.92	318.68	2.61	318.99	6.82	314.78	7.97	313.63
MW944	318.64	4.40	314.24	3.48	315.16	14.43	304.21	15.45	303.19
MW945	320.24	5.50	314.74	4.79	315.45	14.49	305.75	17.50	302.74
MW946	319.65	5.31	314.34	2.25	317.40	10.66	308.99	14.64	305.01
MW947	322.53	dry	---	19.79	302.74	18.65	303.88	21.09	301.44
MW948	321.04	2.79	318.25	2.65	318.39	8.53	312.51	10.94	310.10
MW950	322.03	3.70	318.33	3.33	318.70	7.48	314.55	9.17	312.86
MW951	320.84	4.92	315.92	2.56	318.28	6.92	313.92	6.75	314.09
MW952	320.16	frozen	---	3.35	316.81	8.29	311.87	6.91	313.25
MW953	319.94	3.93	316.01	3.29	316.65	9.30	310.64	9.23	310.71
MW954	319.85	4.29	315.56	3.48	316.37	9.25	310.60	7.85	312.00
MW955	320.09	4.33	315.76	3.33	316.76	7.90	312.19	6.74	313.35
MW956	323.13	6.26	316.87	5.95	317.18	8.30	314.83	9.90	313.23
MW957	324.48	6.59	317.89	6.00	318.48	10.67	313.81	10.87	313.61
MW958	319.77	3.70	316.07	3.20	316.57	8.61	311.16	10.29	309.48
MW959	320.56	4.35	316.21	3.73	316.83	8.10	312.46	8.30	312.26
MW960	321.02	4.45	316.57	3.20	317.82	7.13	313.89	7.07	313.95
OW01B	321.49	2.98	318.51	2.90	318.59	6.54	314.95	6.82	314.67
OW02B	321.55	2.89	318.66	2.62	318.93	5.01	316.54	5.00	316.55
OW03B	321.55	3.99	317.56	4.00	317.55	5.71	315.84	4.94	316.61
OW04B	320.17	3.03	317.14	2.80	317.37	5.90	314.27	4.15	316.02
OW05B	319.68	3.50	316.18	3.06	316.62	8.35	311.33	9.22	310.46

TABLE 10
2018 GROUNDWATER LEVELS

Well No.	Reference Elevation (ft)	1st Quarter (2/7/18)		2nd Quarter (4/17/18)		3rd Quarter (7/30/18)		4th Quarter (10/26/18)	
		Depth to Water (ft)	Groundwater Elevation (ft)	Depth to Water (ft)	Groundwater Elevation (ft)	Depth to Water (ft)	Groundwater Elevation (ft)	Depth to Water (ft)	Groundwater Elevation (ft)
OW06B	322.28	4.05	318.23	3.82	318.46	5.90	316.38	6.54	315.74
OW07B	319.69	4.20	315.49	3.50	316.19	8.45	311.24	9.38	310.31
OW08B	318.97	3.92	315.05	2.26	316.71	9.20	309.77	9.91	309.06
OW09B	318.82	2.70	316.12	1.83	316.99	8.40	310.42	11.09	307.73
OW10B	320.13	2.27	317.86	1.79	318.34	7.47	312.66	8.02	312.11
OW11B	319.09	2.68	316.41	1.79	317.30	6.73	312.36	5.69	313.40
OW12B	319.09	4.13	314.96	3.16	315.93	9.88	309.21	11.18	307.91
OW13B	321.09	2.53	318.56	2.00	319.09	7.46	313.63	8.90	312.19
OW14B	320.73	2.55	318.18	2.16	318.57	7.65	313.08	6.34	314.39
OW15B	320.12	3.01	317.11	1.63	318.49	8.15	311.97	7.94	312.18
OW16B	320.06	2.60	317.46	1.90	318.16	6.61	313.45	5.83	314.23
OW17B	320.29	2.20	318.09	2.04	318.25	5.55	314.74	5.12	315.17
OW18B	320.76	3.54	317.22	2.74	318.02	6.11	314.65	5.37	315.39

TABLE 10
2018 GROUNDWATER LEVELS

Well No.	Reference Elevation (ft)	1st Quarter (2/7/18)		2nd Quarter (4/17/18)		3rd Quarter (7/30/18)		4th Quarter (10/26/18)	
		Depth to Water (ft)	Groundwater Elevation (ft)	Depth to Water (ft)	Groundwater Elevation (ft)	Depth to Water (ft)	Groundwater Elevation (ft)	Depth to Water (ft)	Groundwater Elevation (ft)
LOWER WATER BEARING ZONE WELLS									
A23A	321.90	8.77	313.13	7.94	313.96	8.55	313.35	10.95	310.95
A54	320.70	6.91	313.79	6.00	314.70	6.68	314.02	9.03	311.67
A55	320.60	6.64	313.96	5.80	314.80	6.47	314.13	8.84	311.76
A56	322.30	10.10	312.20	9.15	313.15	9.99	312.31	12.45	309.85
A57	321.40	3.85	317.55	7.86	313.54	10.25	311.15	12.83	308.57
B02W19D	319.90	4.90	315.00	4.11	315.79	4.66	315.24	6.96	312.94
B02W20D	322.00	7.00	315.00	5.75	316.25	6.45	315.55	8.85	313.15
BH12	320.85	6.75	314.10	5.90	314.95	6.25	314.60	8.66	312.19
BH15	320.16	6.19	313.97	1.23	318.93	5.81	314.35	8.29	311.87
BH48	322.04	8.25	313.79	6.75	315.29	8.02	314.02	10.30	311.74
BH49	320.23	8.22	312.01	7.24	312.99	8.19	312.04	10.82	309.41
BH05	321.32	8.71	312.61	7.69	313.63	8.60	312.72	10.92	310.40
BH50	319.25	7.40	311.85	5.70	313.55	8.49	310.76	11.79	307.46
BH51	321.24	7.40	313.84	6.38	314.86	7.02	314.22	9.70	311.54
BH57	322.84	8.29	314.55	7.31	315.53	7.66	315.18	10.19	312.65
BH59	321.45	7.49	313.96	6.71	314.74	7.48	313.97	9.91	311.54
BH60	322.32	6.80	315.52	5.92	316.40	6.55	315.77	8.95	313.37
BH61	318.50	8.63	309.87	7.20	311.30	9.30	309.20	12.66	305.84
BH62	318.60	8.70	309.90	7.25	311.35	8.41	310.19	11.68	306.92
BH63	323.01	8.12	314.89	7.19	315.82	7.92	315.09	10.49	312.52
BH64	319.32	3.31	316.01	2.70	316.62	8.57	310.75	7.70	311.62
BH70	321.29	7.80	313.49	6.98	314.31	7.64	313.65	9.68	311.61
MW228	320.85	4.44	316.41	4.05	316.80	7.03	313.82	8.79	312.06
MW229	320.61	6.57	314.04	5.79	314.82	6.34	314.27	8.51	312.10
MW861	319.92	7.36	312.56	6.40	313.52	7.12	312.80	9.69	310.23
MW863	319.61	6.06	313.55	5.23	314.38	5.95	313.66	5.01	314.60
MW949	320.96	8.05	312.91	6.92	314.04	8.25	312.71	11.20	309.76
OW02A	321.50	8.77	312.73	7.70	313.80	8.59	312.91	11.21	310.29
OW03A	321.67	8.61	313.06	7.60	314.07	8.49	313.18	10.85	310.82
OW04A	320.52	7.64	312.88	6.65	313.87	7.52	313.00	9.98	310.54
OW05A	319.59	6.75	312.84	5.75	313.84	6.68	312.91	9.37	310.22
OW06A	322.34	8.30	314.04	7.49	314.85	8.22	314.12	10.72	311.62
OW07A	319.77	5.82	313.95	4.98	314.79	5.74	314.03	8.10	311.67
OW08A	318.91	5.58	313.33	4.66	314.25	8.42	310.49	7.94	310.97
OW09A	318.66	4.87	313.79	4.01	314.65	4.72	313.94	7.05	311.61
OW10A	320.01	6.00	314.01	5.21	314.80	6.00	314.01	8.21	311.80
OW11A	319.05	4.74	314.31	4.02	315.03	4.68	314.37	6.83	312.22
OW12A	320.42	6.15	314.27	5.39	315.03	6.04	314.38	8.40	312.02
OW13A	321.54	7.52	314.02	6.68	314.86	7.45	314.09	10.01	311.53
OW14A	320.52	7.96	312.56	6.89	313.63	7.75	312.77	10.43	310.09
OW15A	320.30	8.04	312.26	6.95	313.35	7.75	312.55	10.42	309.88
OW16A	320.63	7.65	312.98	6.67	313.96	7.38	313.25	9.92	310.71
OW17A	320.31	6.78	313.53	5.76	314.55	6.59	313.72	8.96	311.35
OW18A	321.09	6.70	314.39	5.75	315.34	6.54	314.55	8.92	312.17

NOTES:
OW01A has been decommissioned

Table 11
2018 Groundwater Field Parameter Measurements
Niagara Falls Storage Site

Well ID	Date	Temperature (°F[a])	pH	ORP[f] (mV[g])	Spec Cond[b] (mS/cm[c])	Turbidity (NTU[h])	DO[d] (mg/L[e])
OW04A[1]	2/7/2018	48 0	8 28	183	1 26	8 3	5 55
OW04B[1]	2/7/2018	43 4	7 04	7	1 75	49 5	4 96
505	4/17/2018	43 6	6 67	-68	6 48	0 0	2 25
302A	5/1/2018	56 4	7 14	-51	2 17	0 0	0 79
411A	4/17/2018	43 9	7 04	-22	2 52	1 8	3 01
A42	5/2/2018	59 1	6 95	-15	1 31	2 1	0 60
A43	4/30/2018	53 40	6 99	41	2 08	4 6	1 68
A45	4/30/2018	51 6	7 03	62	2 05	7 0	2 22
A50	4/30/2018	56 5	7 32	53	1 69	0 0	1 88
A55	4/30/2018	54 4	12 56	-226	5 90	16 6	0 78
BH49	4/25/2018	52 9	9 12	-25	1 00	2 6	4 02
BH49A	4/25/2018	49 6	7 53	179	1 63	0 6	3 23
MW862	4/28/2018	50 4	7 00	188	1 94	3 8	2 11
MW863	4/27/2018	53 3	4 88	137	1 96	9 0	3 90
MW921	4/26/2018	49 8	7 05	204	4 60	0 0	7 77
MW934	4/18/2018	46 3	6 85	55	4 45	10 8	1 63
MW935	4/27/2018	54 9	7 38	-52	1 69	0 0	1 96
MW938	4/27/2018	54 1	7 16	-63	3 09	0 0	1 66
MW943	5/1/2018	61 3	7 37	183	2 07	1 2	2 04
MW944	4/26/2018	49 9	6 99	198	1 27	0 0	2 92
MW945	4/26/2018	54 4	6 90	215	3 07	0 9	4 39
MW946	4/18/2018	43 7	7 16	-1	7 00	5 4	6 21
MW947[2]	4/30/2018	grab sample collected					
MW948	4/18/2018	44 5	7 02	208	4 44	0 3	2 94
MW949	4/18/2018	46 7	7 70	-253	3 16	3 0	2 37
MW950	5/1/2018	57 5	7 03	202	3 29	0 0	2 64
MW951	5/1/2018	57 6	6 84	113	1 75	18 9	0 16
MW952	5/1/2018	53 3	7 07	208	1 33	45 3	2 29
MW953	5/1/2018	59 6	7 14	204	1 31	19 2	0 82
MW954	4/30/2018	58 7	7 26	193	2 48	0 0	2 49
MW955	4/30/2018	56 6	7 15	225	1 74	5 6	3 95
MW956	5/2/2018	60 9	7 25	135	2 21	3 3	1 48
MW957	4/30/2018	54 8	7 10	203	2 04	10 1	3 37
MW958	5/1/2018	59 0	7 10	200	1 41	0 0	5 00
MW959	5/1/2018	67 1	7 14	183	2 04	0 0	1 85
MW960	5/1/2018	66 4	6 62	189	1 34	5 9	0 51
OW03A	4/18/2018	50 3	7 38	244	2 10	0 0	8 18
OW03B	4/18/2018	48 4	7 58	227	1 89	0 3	4 92
OW04A	4/19/2018	49 2	8 61	86	1 25	7 5	4 36
OW04B	4/19/2018	46 3	7 32	-8	1 67	8 4	0 63
OW05A	4/27/2018	56 2	7 71	-89	1 32	25 4	2 56
OW05B	4/27/2018	52 5	7 46	186	1 62	5 5	2 12
OW06A	5/1/2018	56 2	7 74	-70	1 97	0 0	2 85
OW06B	5/1/2018	57 0	7 32	-16	1 94	0 0	1 17
OW07A	4/27/2018	56 3	7 71	8	1 98	0 0	1 86
OW07B	4/27/2018	55 3	7 44	189	1 87	0 2	2 68
OW11A	5/1/2018	55 0	7 76	102	1 53	0 4	3 05
OW11B	5/1/2018	53 3	7 28	-73	1 66	0 0	3 46
OW12A	4/27/2018	57 7	7 37	-6	1 97	0 0	1 81
OW12B	4/27/2018	50 5	7 64	179	1 09	2 5	0 74
OW13A	4/18/2018	48 7	7 33	-78	2 26	0 0	4 07
OW13B	4/18/2018	46 0	7 19	73	2 86	7 4	0 32
OW15A	4/17/2018	48 9	7 56	-79	2 40	1 4	0 79
OW15B	no sample collected - turbid						
OW17A	4/17/2018	49 8	7 57	-78	2 27	0 0	1 01
OW17B	4/17/2018	46 7	7 53	215	1 42	0 0	2 54
OW18B	4/19/2018	46 3	7 57	230	1 85	2 5	4 47
OW04A[1]	8/1/2018	73 4	7 88	12	1 20	10 9	0 53
OW04B[1]	8/1/2018	73 1	6 78	-66	1 55	4 8	0 37

Table 11
2018 Groundwater Field Parameter Measurements
Niagara Falls Storage Site

Well ID	Date	Temperature (°F[a])	pH	ORP[f] (mV[g])	Spec Cond[b] (mS/cm[c])	Turbidity (NTU[h])	DO[d] (mg/L[e])
505	10/23/2018	grab sample collected					
302A	10/25/2018	57 7	6 88	-2	4 84	0 1	2 37
411A	10/23/2018	56 3	6 82	-176	3 42	4 5	1 92
A42	10/25/2018	54 0	6 83	-148	1 49	1 5	0 50
A43	10/25/2018	57 7	6 76	-234	2 25	0 0	0 34
A45	10/25/2018	54 3	6 82	-26	2 05	0 5	0 15
A50	10/25/2018	53 4	7 06	83	1 82	0 6	0 41
A55	10/25/2018	54 1	12 42	-260	5 84	0 9	0 57
BH49	10/25/2018	53 6	8 17	-130	1 52	1 1	1 10
BH49A	10/25/2018	55 3	7 14	52	1 78	1 9	0 49
MW862	10/26/2018	56 8	6 78	43	1 89	0 7	0 50
MW863	10/26/2018	54 4	7 39	0	2 03	1 5	0 37
MW921[2]	10/23/2018	**-Insufficient volume see substitute well MW922**					
MW922	10/23/2018	57 4	6 99	109	4 80	0 0	2 30
MW934	10/23/2018	55 0	6 85	-150	4 32	5 0	1 32
MW935	10/23/2018	57 6	7 28	-24	1 48	0 4	5 13
MW938	10/23/2018	57 3	6 99	-164	2 87	1 0	0 29
MW943	10/26/2018	57 4	6 87	51	1 78	2 5	0 66
MW944	10/23/2018	**-Insufficient volume - see MW922**					
MW945[2]	10/23/2018	**-Insufficient volume - see MW922**					
MW946[2]	10/23/2018	**-Insufficient volume - see 808A**					
808A	10/24/2018	53 4	6 95	-67	6 170	7 1	2 20
MW947[2]	10/24/2018	**-Insufficient volume - see MW423**					
MW423	10/24/2018	51 5	6 98	-177	2 070	10 1	1 98
MW948	10/23/2018	56 4	6 94	60	4 48	7 6	2 72
MW949	10/23/2018	53 9	7 94	-298	3 17	1 5	2 11
MW950	10/25/2018	56 2	6 87	-91	4 27	13 4	2 39
MW951	10/29/2018	53 5	6 79	-69	2 26	2 7	0 93
MW952	10/23/2018	57 6	7 13	29	1 31	230 0	2 78
MW953	10/23/2018	56 9	7 09	-50	1 50	1 6	3 67
MW954	10/23/2018	55 5	7 57	26	1 51	4 2	5 48
MW955	10/23/2018	59 3	7 30	62	1 84	18 7	2 24
MW956	10/23/2018	55 5	6 97	-62	2 31	2 4	1 97
MW957	10/23/2018	57 1	6 91	113	2 13	5 7	5 08
MW958	10/29/2018	55 3	7 03	95	1 40	0 1	2 49
MW959	10/29/2018	52 8	7 03	-41	2 23	3 1	1 61
MW960	10/26/2018	55 7	6 81	19	1 44	3 4	1 53
OW03A	10/25/2018	54 3	7 29	-34	2 04	0 4	0 82
OW03B	10/25/2018	54 7	7 42	159	1 96	2 5	3 84
OW04A	10/26/2018	53 9	7 90	-140	1 40	23 5	0 28
OW04B	10/26/2018	56 2	7 03	-49	1 77	0 8	0 75
OW05A	10/25/2018	56 2	7 67	-90	1 39	21 6	0 76
OW05B	10/25/2018	58 1	7 12	-33	1 67	0 0	0 57
OW06A	10/19/2018	51 7	8 22	156	1 75	0 1	1 67
OW06B	10/26/2018	56 3	7 02	-140	1 87	1 6	1 11
OW07A	10/24/2018	51 7	8 32	161	2 26	0 9	0 72
OW07B	10/24/2018	54 8	7 22	246	2 17	7 2	1 24
OW11A	10/23/2018	56 0	7 87	-29	1 53	0 3	1 15
OW11B	10/22/2018	56 7	6 83	71	1 81	0 0	0 94
OW12A	10/23/2018	56 0	7 44	-60	1 81	8 2	0 51
OW12B	10/23/2018	57 9	7 22	100	1 23	0 0	2 07
OW13A	10/24/2018	54 1	7 33	-111	2 15	11 5	0 30
OW13B	10/24/2018	56 0	6 99	-7	2 93	18 7	0 86
OW15A	10/24/2018	54 3	7 54	-107	2 37	5 5	0 46
OW15B	10/28/2018	57 5	7 16	92	1 15	11 4	2 82
OW17A	10/24/2018	54 1	7 63	-65	2 88	0 0	1 38
OW17B	10/24/2018	56 0	7 34	166	1 62	0 0	0 63
OW18B	10/24/2018	56 6	7 29	89	1 81	0 8	2 44

a °F - Degrees Fahrenheit
b Spec Cond - Specific conductance
c mS/cm - millisiemens/centimeter
d DO - Dissolved oxygen
e mg/L - milligrams per liter
f ORP - Oxidation-Reduction potential
g mV - milliVolts
h NTU - Nephelometric turbidity units

[1] Quarterly sampling
[2] Insufficient well volume and/or dry
[3] Grab sample

TABLE 12
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 :			05/01/18	10/25/18	04/17/18	10/23/18	04/17/18
Parameter	**Units**	**Criteria[1]**					
MISCELLANEOUS							
ALKALINITY, BICARBONATE (As CaCO3)	*MG/L*	-	360	410 J	830	740	990
ALKALINITY, CARBONATE (As CaCO3)	*MG/L*	-	20 U	R	4.534 U	20 U	4.534 U
ALKALINITY, HYDROXIDE (AS CACO3)	*MG/L*	-	20 U	R	4.534 U	20 U	4.534 U
ALKALINITY, TOTAL	*MG/L*	500	360	410 J	830	740	990
BROMIDE	*MG/L*	2	0.32	0.66	0.23 J	6 U	3.4
CHLORIDE (AS CL)	*MG/L*	250	91	230	23	34	280
DISSOLVED SOLIDS, TOTAL	*MG/L*	1000	1,790	4,090 J	2,060	2,980 H	6,280
FLUORIDE	*MG/L*	1.5	0.32 J	8 U	0.66	0.58	0.46 J
NITROGEN, NITRATE (AS N)	*MG/L*	10	0.37	0.04 J	0.15 U	0.15 U	0.056 J
PHOSPHORUS, TOTAL ORTHOPHOSPHATE (AS PO4)	*MG/L*	-	0.022	0.0044 UJ	0.02	0.0056 J	0.031
SULFATE	*MG/L*	250	730	2,700	830	1,700	3,600

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.

Only detected analytical results are reported.

NOTE: The detection limits shown are MDL.

TABLE 12
GROUNDWATER ANALYTICAL RESULTS - WATER QUALITY PARAMETERS
NIAGARA FALLS STORAGE SITE

Location Identifier :			808A	A42	A42	A43	A43
Field Sample Identifier :			808A	A42	A42	A43	A43
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			10/25/18	05/02/18	10/25/18	04/30/18	10/25/18
Parameter	**Units**	**Criteria[1]**					
MISCELLANEOUS							
ALKALINITY, BICARBONATE (As CaCO3)	*MG/L*	-	570 J	370	370 J	520	610 J
ALKALINITY, CARBONATE (As CaCO3)	*MG/L*	-	R	20 U	R	20 U	R
ALKALINITY, HYDROXIDE (AS CACO3)	*MG/L*	-	R	20 U	R	20 U	R
ALKALINITY, TOTAL	*MG/L*	500	570 J	370	370 J	520	610 J
BROMIDE	*MG/L*	2	2.3	0.33	0.21	0.15 U	0.53
CHLORIDE (AS CL)	*MG/L*	250	270	31 J	39	27	26
DISSOLVED SOLIDS, TOTAL	*MG/L*	1000	5,060 J	1,070	1,120	1,700	1,730
FLUORIDE	*MG/L*	1.5	0.39 J	0.25 U	0.34	0.25 J	0.44
NITROGEN, NITRATE (AS N)	*MG/L*	10	0.15 UJ	0.15 UJ	0.035 UJ	0.085 J	0.068 J
PHOSPHORUS, TOTAL ORTHOPHOSPHATE (AS PO4)	*MG/L*	-	0.0053 J	0.01 U	0.0044 UJ	0.022	0.0044 UJ
SULFATE	*MG/L*	250	0.25 U	340	400	690	750

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.

Only detected analytical results are reported.

NOTE: The detection limits shown are MDL.

TABLE 12
GROUNDWATER ANALYTICAL RESULTS - WATER QUALITY PARAMETERS
NIAGARA FALLS STORAGE SITE

Location Identifier :			A45	A45	A50	A50	A55
Field Sample Identifier :			A45	A45	A50	A50	A55
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			04/30/18	10/25/18	04/30/18	10/25/18	04/30/18
Parameter	**Units**	**Criteria[1]**					
MISCELLANEOUS							
ALKALINITY, BICARBONATE (As CaCO3)	*MG/L*	-	440	450 J	460	450 J	20 U
ALKALINITY, CARBONATE (As CaCO3)	*MG/L*	-	20 U	R	20 U	R	49
ALKALINITY, HYDROXIDE (AS CACO3)	*MG/L*	-	20 U	R	20 U	R	940
ALKALINITY, TOTAL	*MG/L*	500	440	450 J	460	450 J	990
BROMIDE	*MG/L*	2	0.15 U	0.22	0.15 U	0.33	0.15 U
CHLORIDE (AS CL)	*MG/L*	250	56	60	23	22	71
DISSOLVED SOLIDS, TOTAL	*MG/L*	1000	1,670	1,750	1,360	1,340	2,440
FLUORIDE	*MG/L*	1.5	0.25 U	0.28	0.34 J	0.52	0.25 U
NITROGEN, NITRATE (AS N)	*MG/L*	10	0.26	0.035 UJ	0.036 J	0.035 UJ	0.14 J
PHOSPHORUS, TOTAL ORTHOPHOSPHATE (AS PO4)	*MG/L*	-	0.032	0.0044 UJ	0.015	0.0044 J	0.013
SULFATE	*MG/L*	250	700	820	570	620	810

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.

Only detected analytical results are reported.

NOTE: The detection limits shown are MDL.

TABLE 12
GROUNDWATER ANALYTICAL RESULTS - WATER QUALITY PARAMETERS
NIAGARA FALLS STORAGE SITE

Location Identifier :			A55	BH49	BH49	BH49A	BH49A
Field Sample Identifier :			A55	BH49	BH49	BH49A	BH49A
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			10/25/18	04/25/18	10/25/18	04/25/18	10/25/18
Parameter	**Units**	**Criteria[1]**					
MISCELLANEOUS							
ALKALINITY, BICARBONATE (As CaCO3)	*MG/L*	-	8.6 UJ	31	68 J	340 J	360 J
ALKALINITY, CARBONATE (As CaCO3)	*MG/L*	-	43 J	28	R	4.534 UJ	R
ALKALINITY, HYDROXIDE (AS CACO3)	*MG/L*	-	810 J	4.534 U	R	4.534 U	R
ALKALINITY, TOTAL	*MG/L*	500	850 J	59	68 J	340 J	360 J
BROMIDE	*MG/L*	2	0.45	0.055 U	0.24	0.055 U	0.23
CHLORIDE (AS CL)	*MG/L*	250	74	28	30	39	39
DISSOLVED SOLIDS, TOTAL	*MG/L*	1000	2,290 J	836	910	1,250	1,280
FLUORIDE	*MG/L*	1.5	1.6 U	0.25 U	1.6 U	0.08 UJ	1.6 U
NITROGEN, NITRATE (AS N)	*MG/L*	10	0.077 J	0.035 UJ	0.34 J	0.15 U	0.035 UJ
PHOSPHORUS, TOTAL ORTHOPHOSPHATE (AS PO4)	*MG/L*	-	0.0044 UJ	0.01 UJ	0.0072 J	0.01 U	0.0082 J
SULFATE	*MG/L*	250	1,000	450	520	590	570

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.

Only detected analytical results are reported.

NOTE: The detection limits shown are MDL.

TABLE 12
GROUNDWATER ANALYTICAL RESULTS - WATER QUALITY PARAMETERS
NIAGARA FALLS STORAGE SITE

Location Identifier :			MW423	MW862	MW862	MW863	MW863
Field Sample Identifier :			MW423	MW862	MW862	MW863	MW863
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			10/25/18	04/27/18	10/26/18	04/27/18	10/26/18
Parameter	**Units**	**Criteria[1]**					
MISCELLANEOUS							
ALKALINITY, BICARBONATE (As CaCO3)	*MG/L*	-	600 J	590	650 J	200	250 J
ALKALINITY, CARBONATE (As CaCO3)	*MG/L*	-	R	20 U	R	20 U	R
ALKALINITY, HYDROXIDE (AS CACO3)	*MG/L*	-	R	20 U	R	20 U	R
ALKALINITY, TOTAL	*MG/L*	500	600 J	590	650 J	200	250 J
BROMIDE	*MG/L*	2	0.17 J	0.56	0.39	0.47	0.36
CHLORIDE (AS CL)	*MG/L*	250	9.2	70	64	30	30
DISSOLVED SOLIDS, TOTAL	*MG/L*	1000	1,320	1,360	1,300	1,660	1,700
FLUORIDE	*MG/L*	1.5	0.62	0.26 J	0.46 J	0.23 J	0.43 J
NITROGEN, NITRATE (AS N)	*MG/L*	10	0.15 UJ	0.15 U	0.43 J	0.48	0.35 J
PHOSPHORUS, TOTAL ORTHOPHOSPHATE (AS PO4)	*MG/L*	-	0.017 J	0.076	0.016 J	0.087	0.0091 J
SULFATE	*MG/L*	250	430	390	380	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.

Only detected analytical results are reported.

NOTE: The detection limits shown are MDL.

TABLE 12
GROUNDWATER ANALYTICAL RESULTS - WATER QUALITY PARAMETERS
NIAGARA FALLS STORAGE SITE

Location Identifier :			MW921	MW922	MW934	MW934	MW935
Field Sample Identifier :			MW921	MW922	MW934	MW934	MW935
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			04/26/18	10/23/18	04/18/18	10/23/18	04/27/18
Parameter	**Units**	**Criteria[1]**					
MISCELLANEOUS							
ALKALINITY, BICARBONATE (As CaCO3)	*MG/L*	-	710	380	540	730	450
ALKALINITY, CARBONATE (As CaCO3)	*MG/L*	-	20 U	20 U	20 U	20 U	20 U
ALKALINITY, HYDROXIDE (AS CACO3)	*MG/L*	-	20 U	20 U	20 U	20 U	20 U
ALKALINITY, TOTAL	*MG/L*	500	710	380	540	730	450
BROMIDE	*MG/L*	2	2.7 J	6 U	0.68	6 U	0.15 U
CHLORIDE (AS CL)	*MG/L*	250	230	28	69	61	4
DISSOLVED SOLIDS, TOTAL	*MG/L*	1000	4,440	4,460 H	4,040	3,760 H	902
FLUORIDE	*MG/L*	1.5	0.38 J	0.16 J	0.46 J	0.34 J	0.55
NITROGEN, NITRATE (AS N)	*MG/L*	10	0.15 U	0.45	0.15 U	0.041 J	0.15 U
PHOSPHORUS, TOTAL ORTHOPHOSPHATE (AS PO4)	*MG/L*	-	0.011	0.0066 J	0.026	0.0044 J	0.11
SULFATE	*MG/L*	250	2,600	3,400	2,400	2,400	260

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.

Only detected analytical results are reported.

NOTE: The detection limits shown are MDL.

TABLE 12
GROUNDWATER ANALYTICAL RESULTS - WATER QUALITY PARAMETERS
NIAGARA FALLS STORAGE SITE

Location Identifier :			MW935	MW938	MW938	MW943	MW943
Field Sample Identifier :			MW935	MW938	MW938	MW943	MW943
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			10/23/18	04/27/18	10/23/18	05/01/18	10/26/18
Parameter	**Units**	**Criteria[1]**					
MISCELLANEOUS							
ALKALINITY, BICARBONATE (As CaCO3)	*MG/L*	-	500	640	670	500	400 J
ALKALINITY, CARBONATE (As CaCO3)	*MG/L*	-	20 U	20 U	20 U	20 U	R
ALKALINITY, HYDROXIDE (AS CACO3)	*MG/L*	-	20 U	20 U	20 U	20 U	R
ALKALINITY, TOTAL	*MG/L*	500	500	640	670	500	400 J
BROMIDE	*MG/L*	2	1.5 U	0.28	6 U	0.15 U	0.2 J
CHLORIDE (AS CL)	*MG/L*	250	5.8	22	30	68	70
DISSOLVED SOLIDS, TOTAL	*MG/L*	1000	1,150	2,530	2,800 H	1,570	1,320
FLUORIDE	*MG/L*	1.5	0.76	0.25 J	0.25 U	0.4 J	0.74
NITROGEN, NITRATE (AS N)	*MG/L*	10	0.72	0.15 U	0.15 U	0.15 U	0.15 UJ
PHOSPHORUS, TOTAL ORTHOPHOSPHATE (AS PO4)	*MG/L*	-	0.0094 J	0.11	0.01 UJ	0.032	0.0063 J
SULFATE	*MG/L*	250	390	1,300	1,700	660	510

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.

Only detected analytical results are reported.

NOTE: The detection limits shown are MDL.

TABLE 12
GROUNDWATER ANALYTICAL RESULTS - WATER QUALITY PARAMETERS
NIAGARA FALLS STORAGE SITE

Location Identifier :			MW944	MW945	MW946	MW947	MW948
Field Sample Identifier :			MW944	MW945	MW946	MW947	MW948
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			04/26/18	04/26/18	04/18/18	04/30/18	04/18/18
Parameter	**Units**	**Criteria[1]**					
MISCELLANEOUS							
ALKALINITY, BICARBONATE (As CaCO3)	*MG/L*	-	510	590	130	750	490
ALKALINITY, CARBONATE (As CaCO3)	*MG/L*	-	20 U	20 U	20 U	20 U	20 U
ALKALINITY, HYDROXIDE (AS CACO3)	*MG/L*	-	20 U	20 U	20 U	20 U	20 U
ALKALINITY, TOTAL	*MG/L*	500	510	590	130	750	490
BROMIDE	*MG/L*	2	0.17 J	2.2	2.3	0.15 U	0.73
CHLORIDE (AS CL)	*MG/L*	250	6.2	170	280	28	94
DISSOLVED SOLIDS, TOTAL	*MG/L*	1000	881	3,160	6,780	2,520	4,180
FLUORIDE	*MG/L*	1.5	0.25 U	0.37 J	0.39 J	0.25 U	0.47 J
NITROGEN, NITRATE (AS N)	*MG/L*	10	0.15 U	0.15 U	0.36	0.34	0.15 U
PHOSPHORUS, TOTAL ORTHOPHOSPHATE (AS PO4)	*MG/L*	-	0.01 U	0.019	0.2	0.077	0.036
SULFATE	*MG/L*	250	220	1,400	4,200	1,200	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.

Only detected analytical results are reported.

NOTE: The detection limits shown are MDL.

TABLE 12
GROUNDWATER ANALYTICAL RESULTS - WATER QUALITY PARAMETERS
NIAGARA FALLS STORAGE SITE

Location Identifier :			MW948	MW949	MW949	MW950	MW950
Field Sample Identifier :			MW948	MW949	MW949	EWN-MW950	MW950
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			10/23/18	04/18/18	10/23/18	02/13/18	05/01/18
Parameter	**Units**	**Criteria[1]**					
MISCELLANEOUS							
ALKALINITY, BICARBONATE (As CaCO3)	*MG/L*	-	560	200	97	530	400
ALKALINITY, CARBONATE (As CaCO3)	*MG/L*	-	20 U	20 U	20 U	4.534 U	20 U
ALKALINITY, HYDROXIDE (AS CACO3)	*MG/L*	-	20 U	20 U	20 U	4.534 U	20 U
ALKALINITY, TOTAL	*MG/L*	500	560	200	97	530	400
BROMIDE	*MG/L*	2	6 U	0.83	6 U	0.62	0.15 U
CHLORIDE (AS CL)	*MG/L*	250	92	87	98	62	54
DISSOLVED SOLIDS, TOTAL	*MG/L*	1000	3,560 H	2,810	2,970 H	2,930	2,970
FLUORIDE	*MG/L*	1.5	0.19 J	0.36 J	0.25 U	0.5	0.25 U
NITROGEN, NITRATE (AS N)	*MG/L*	10	0.057 J	0.06 J	0.15 U	0.092 J	0.15 U
PHOSPHORUS, TOTAL ORTHOPHOSPHATE (AS PO4)	*MG/L*	-	0.0088 J	0.038	0.0056 J	0.031	0.01
SULFATE	*MG/L*	250	2,800	1,700	1,900	1,700	1,600

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.

Only detected analytical results are reported.

NOTE: The detection limits shown are MDL.

TABLE 12
GROUNDWATER ANALYTICAL RESULTS - WATER QUALITY PARAMETERS
NIAGARA FALLS STORAGE SITE

Location Identifier :			MW950	MW950	MW951	MW951	MW951
Field Sample Identifier :			EWN-MW950	MW950	EWN-MW951	MW951	MW951-D
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			07/30/18	10/25/18	02/13/18	05/01/18	05/01/18
Parameter	Units	Criteria[1]					Field Duplicate
MISCELLANEOUS							
ALKALINITY, BICARBONATE (As CaCO3)	MG/L	-	490	490 J	560	250 J	520 J
ALKALINITY, CARBONATE (As CaCO3)	MG/L	-	20 U	R	4.534 U	20 U	20 U
ALKALINITY, HYDROXIDE (AS CACO3)	MG/L	-	20 U	R	4.534 U	20 U	20 U
ALKALINITY, TOTAL	MG/L	500	490	490 J	560	250 J	520 J
BROMIDE	MG/L	2	0.53	0.52	0.3	0.15 U	0.15 U
CHLORIDE (AS CL)	MG/L	250	58	69	79	77	76
DISSOLVED SOLIDS, TOTAL	MG/L	1000	3,190	3,680 J	1,370	1,440	1,450
FLUORIDE	MG/L	1.5	0.4 J	0.25	0.41 J	0.28 J	0.28 J
NITROGEN, NITRATE (AS N)	MG/L	10	0.15 UJ	0.05 J	0.17 J	0.5 J	0.17 J
PHOSPHORUS, TOTAL ORTHOPHOSPHATE (AS PO4)	MG/L	-	0.017	0.005 J	0.044	0.01 U	0.01 U
SULFATE	MG/L	250	1,600	2,500	480	480	470

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.

Only detected analytical results are reported.

NOTE: The detection limits shown are MDL.

TABLE 12
GROUNDWATER ANALYTICAL RESULTS - WATER QUALITY PARAMETERS
NIAGARA FALLS STORAGE SITE

Location Identifier :			MW951	MW951	MW951	MW952	MW952
Field Sample Identifier :			EWN-MW951	MW951	MW951-D	MW952	MW952
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			07/31/18	10/29/18	10/29/18	05/01/18	10/23/18
Parameter	Units	Criteria[1]			Field Duplicate		
MISCELLANEOUS							
ALKALINITY, BICARBONATE (As CaCO3)	MG/L	-	500	560 J	540 J	310	310 J
ALKALINITY, CARBONATE (As CaCO3)	MG/L	-	20 U	R	20 UJ	20 U	R
ALKALINITY, HYDROXIDE (AS CACO3)	MG/L	-	20 U	R	20 UJ	20 U	R
ALKALINITY, TOTAL	MG/L	500	500	560 J	540 J	310	310 J
BROMIDE	MG/L	2	0.2 J	0.18 J	0.19 J	0.16 J	3 U
CHLORIDE (AS CL)	MG/L	250	82	78	84	25	21
DISSOLVED SOLIDS, TOTAL	MG/L	1000	1,590	1,500	1,490	1,220	1,250
FLUORIDE	MG/L	1.5	0.43 J	0.56	0.57	0.29 J	0.7
NITROGEN, NITRATE (AS N)	MG/L	10	0.15 U	0.15 UJ	0.15 UJ	0.064 J	0.99
PHOSPHORUS, TOTAL ORTHOPHOSPHATE (AS PO4)	MG/L	-	0.01 U	0.0044 J	0.01 UJ	1	0.013 J
SULFATE	MG/L	250	480	510	530	550	590

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.

Only detected analytical results are reported.

NOTE: The detection limits shown are MDL.

TABLE 12
GROUNDWATER ANALYTICAL RESULTS - WATER QUALITY PARAMETERS
NIAGARA FALLS STORAGE SITE

Location Identifier :			MW953	MW953	MW954	MW954	MW955
Field Sample Identifier :			MW953	MW953	MW954	MW954	MW955
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			05/01/18	10/23/18	04/30/18	10/23/18	04/30/18
Parameter	**Units**	**Criteria[1]**					
MISCELLANEOUS							
ALKALINITY, BICARBONATE (As CaCO3)	*MG/L*	-	340	310	400	290	430
ALKALINITY, CARBONATE (As CaCO3)	*MG/L*	-	20 U	20 U	20 U	20 U	20 U
ALKALINITY, HYDROXIDE (AS CACO3)	*MG/L*	-	20 U	20 U	20 U	20 U	20 U
ALKALINITY, TOTAL	*MG/L*	500	340	310	400	290	430
BROMIDE	*MG/L*	2	0.15 U	1.5 U	0.15 U	1.5 U	0.21 J
CHLORIDE (AS CL)	*MG/L*	250	9.7 J	17	33	17	22
DISSOLVED SOLIDS, TOTAL	*MG/L*	1000	1,260	1,270	2,070	1,130	1,330
FLUORIDE	*MG/L*	1.5	0.52	0.75	0.35 J	0.86	0.37 J
NITROGEN, NITRATE (AS N)	*MG/L*	10	0.15 U	1	0.07 J	1.9	0.77
PHOSPHORUS, TOTAL ORTHOPHOSPHATE (AS PO4)	*MG/L*	-	0.15	0.029 J	0.026	0.011 J	0.046
SULFATE	*MG/L*	250	610	590	1,100	530	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.

Only detected analytical results are reported.

NOTE: The detection limits shown are MDL.

TABLE 12
GROUNDWATER ANALYTICAL RESULTS - WATER QUALITY PARAMETERS
NIAGARA FALLS STORAGE SITE

Location Identifier :			MW955	MW956	MW956	MW956	MW956
Field Sample Identifier :			MW955	EWN-MW956	MW956	EWN-MW956	EWN-MW956-D
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			10/23/18	02/13/18	05/02/18	07/31/18	07/31/18
Parameter	Units	Criteria[1]					Field Duplicate
MISCELLANEOUS							
ALKALINITY, BICARBONATE (As CaCO3)	MG/L	-	390 J	610	490	460	480
ALKALINITY, CARBONATE (As CaCO3)	MG/L	-	R	4.534 U	20 U	20 U	20 U
ALKALINITY, HYDROXIDE (AS CACO3)	MG/L	-	R	4.534 U	20 U	20 U	20 U
ALKALINITY, TOTAL	MG/L	500	390 J	610	490	460	480
BROMIDE	MG/L	2	1.5 U	0.51	0.43	0.43	0.42
CHLORIDE (AS CL)	MG/L	250	20	42	41 J	34	34
DISSOLVED SOLIDS, TOTAL	MG/L	1000	1,380	1,840	1,980	1,960	1,920
FLUORIDE	MG/L	1.5	0.25 U	0.46 J	0.33 J	0.41 J	0.39 J
NITROGEN, NITRATE (AS N)	MG/L	10	0.15 U	0.51	2.1 J	0.16 J	0.24 J
PHOSPHORUS, TOTAL ORTHOPHOSPHATE (AS PO4)	MG/L	-	0.0082 J	0.057	0.018	0.036	0.034
SULFATE	MG/L	250	640	880	830	810	790

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.

Only detected analytical results are reported.

NOTE: The detection limits shown are MDL.

TABLE 12
GROUNDWATER ANALYTICAL RESULTS - WATER QUALITY PARAMETERS
NIAGARA FALLS STORAGE SITE

Location Identifier :			MW956	MW957	MW957	MW957	MW957
Field Sample Identifier :			MW956	EWN-MW957	MW957	EWN-MW957	MW957
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			10/23/18	02/13/18	04/30/18	07/31/18	10/23/18
Parameter	**Units**	**Criteria[1]**					
MISCELLANEOUS							
ALKALINITY, BICARBONATE (As CaCO3)	*MG/L*	-	480 J	620	620	540	530 J
ALKALINITY, CARBONATE (As CaCO3)	*MG/L*	-	R	4.534 U	20 U	20 U	R
ALKALINITY, HYDROXIDE (AS CACO3)	*MG/L*	-	R	4.534 U	20 U	20 U	R
ALKALINITY, TOTAL	*MG/L*	500	480 J	620	620	540	530 J
BROMIDE	*MG/L*	2	6 U	0.33	0.28	0.37	3 U
CHLORIDE (AS CL)	*MG/L*	250	32	12	12	18	13
DISSOLVED SOLIDS, TOTAL	*MG/L*	1000	1,700	1,630	1,680	1,980	1,780
FLUORIDE	*MG/L*	1.5	0.56	0.6	0.46 J	0.5 J	0.73
NITROGEN, NITRATE (AS N)	*MG/L*	10	0.051 J	1.5	0.15 U	0.036 J	0.1 J
PHOSPHORUS, TOTAL ORTHOPHOSPHATE (AS PO4)	*MG/L*	-	0.0075 J	0.22	0.07	0.056	0.0085 J
SULFATE	*MG/L*	250	860	710	710	780	810

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.

Only detected analytical results are reported.

NOTE: The detection limits shown are MDL.

TABLE 12
GROUNDWATER ANALYTICAL RESULTS - WATER QUALITY PARAMETERS
NIAGARA FALLS STORAGE SITE

Location Identifier :			MW958	MW958	MW958	MW958	MW959
Field Sample Identifier :			EWN-MW958	MW958	EWN-MW958	MW958	EWN-MW959
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			02/13/18	05/01/18	07/31/18	11/06/18	02/13/18
Parameter	**Units**	**Criteria[1]**					
MISCELLANEOUS							
ALKALINITY, BICARBONATE (As CaCO3)	*MG/L*	-	480	450	430	400 J	550
ALKALINITY, CARBONATE (As CaCO3)	*MG/L*	-	4.534 U	20 U	20 U	R	4.534 U
ALKALINITY, HYDROXIDE (AS CACO3)	*MG/L*	-	4.534 U	20 U	20 U	R	4.534 U
ALKALINITY, TOTAL	*MG/L*	500	480	450	430	400 J	550
BROMIDE	*MG/L*	2	0.15 U	0.14 J	0.16 J	0.13 J	0.36
CHLORIDE (AS CL)	*MG/L*	250	38	33	32	33	48
DISSOLVED SOLIDS, TOTAL	*MG/L*	1000	862	866	903	921	1,600
FLUORIDE	*MG/L*	1.5	0.43 J	0.32 J	0.5	0.52	0.47 J
NITROGEN, NITRATE (AS N)	*MG/L*	10	0.23 J	0.13 J	0.049 J	0.15 UJ	0.14 J
PHOSPHORUS, TOTAL ORTHOPHOSPHATE (AS PO4)	*MG/L*	-	0.055	0.041	0.05	0.0091 J	0.078
SULFATE	*MG/L*	250	220	210	210	270	710

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.

Only detected analytical results are reported.

NOTE: The detection limits shown are MDL.

TABLE 12
GROUNDWATER ANALYTICAL RESULTS - WATER QUALITY PARAMETERS
NIAGARA FALLS STORAGE SITE

Location Identifier :			MW959	MW959	MW959	MW960	MW960
Field Sample Identifier :			MW959	EWN-MW959	MW959	MW960	MW960
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			05/01/18	07/31/18	10/29/18	05/01/18	10/26/18
Parameter	**Units**	**Criteria[1]**					
MISCELLANEOUS							
ALKALINITY, BICARBONATE (As CaCO3)	*MG/L*	-	440	450	480 J	460	460 J
ALKALINITY, CARBONATE (As CaCO3)	*MG/L*	-	20 U	20 U	R	20 U	R
ALKALINITY, HYDROXIDE (AS CACO3)	*MG/L*	-	20 U	20 U	R	20 U	R
ALKALINITY, TOTAL	*MG/L*	500	440	450	480 J	460	460 J
BROMIDE	*MG/L*	2	0.34	0.38	0.32	0.15 U	0.15 U
CHLORIDE (AS CL)	*MG/L*	250	52	43	40	41	43
DISSOLVED SOLIDS, TOTAL	*MG/L*	1000	1,680	1,710	1,510 H	1,040	966
FLUORIDE	*MG/L*	1.5	0.3 J	0.5	0.59	0.25 U	0.45 J
NITROGEN, NITRATE (AS N)	*MG/L*	10	0.26	0.35	0.13 J	0.09 J	0.04 J
PHOSPHORUS, TOTAL ORTHOPHOSPHATE (AS PO4)	*MG/L*	-	0.057	0.016	0.025 J	0.01 U	0.01 UJ
SULFATE	*MG/L*	250	680	670	720	260	240

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.

Only detected analytical results are reported.

NOTE: The detection limits shown are MDL.

TABLE 12
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 :			04/18/18	10/25/18	04/18/18	10/25/18	02/07/18
Parameter	**Units**	**Criteria[1]**					
MISCELLANEOUS							
ALKALINITY, BICARBONATE (As CaCO3)	*MG/L*	-	760	460 J	470	460 J	180
ALKALINITY, CARBONATE (As CaCO3)	*MG/L*	-	20 U	R	20 U	R	29
ALKALINITY, HYDROXIDE (AS CACO3)	*MG/L*	-	20 U	R	20 U	R	4.534 U
ALKALINITY, TOTAL	*MG/L*	500	760	500 J	470	460 J	210
BROMIDE	*MG/L*	2	0.35	0.27	0.23 J	0.18	0.4
CHLORIDE (AS CL)	*MG/L*	250	30	28	29	30	29
DISSOLVED SOLIDS, TOTAL	*MG/L*	1000	1,540	1,610	1,480	1,410	949
FLUORIDE	*MG/L*	1.5	0.4 J	1.6 U	0.4 J	1.6 U	0.47 J
NITROGEN, NITRATE (AS N)	*MG/L*	10	0.17 J	0.048 J	0.046 J	0.17 J	0.23 J
PHOSPHORUS, TOTAL ORTHOPHOSPHATE (AS PO4)	*MG/L*	-	0.079	0.0098 J	0.03	0.0098 J	0.01 UJ
SULFATE	*MG/L*	250	670	780	630	630	440

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.

Only detected analytical results are reported.

NOTE: The detection limits shown are MDL.

TABLE 12
GROUNDWATER ANALYTICAL RESULTS - WATER QUALITY PARAMETERS
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 :			04/19/18	08/01/18	10/26/18	02/07/18	04/19/18
Parameter	**Units**	**Criteria[1]**					
MISCELLANEOUS							
ALKALINITY, BICARBONATE (As CaCO3)	*MG/L*	-	140	140	170 J	350	310
ALKALINITY, CARBONATE (As CaCO3)	*MG/L*	-	39	20 U	R	4.534 U	4.534 U
ALKALINITY, HYDROXIDE (AS CACO3)	*MG/L*	-	4.534 U	20 U	R	4.534 U	4.534 U
ALKALINITY, TOTAL	*MG/L*	500	180	150	170 J	350	310
BROMIDE	*MG/L*	2	0.39	0.43	0.34	0.15 U	0.11 J
CHLORIDE (AS CL)	*MG/L*	250	28	28	29	85	74 J
DISSOLVED SOLIDS, TOTAL	*MG/L*	1000	930	1,020	956	1,260	1,290
FLUORIDE	*MG/L*	1.5	0.34 J	0.33 J	0.46 J	0.64	0.46 J
NITROGEN, NITRATE (AS N)	*MG/L*	10	0.19 J	0.15 U	0.15 UJ	0.086 J	0.15 UJ
PHOSPHORUS, TOTAL ORTHOPHOSPHATE (AS PO4)	*MG/L*	-	0.033	0.048	0.01 J	0.083 J	0.092
SULFATE	*MG/L*	250	460	450	490	520	540

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.

Only detected analytical results are reported.

NOTE: The detection limits shown are MDL.

TABLE 12
GROUNDWATER ANALYTICAL RESULTS - WATER QUALITY PARAMETERS
NIAGARA FALLS STORAGE SITE

Location Identifier :			OW04B	OW04B	OW04B	OW04B	OW05A
Field Sample Identifier :			OW04B-D	OW04B	OW04B	OW04B-D	OW05A
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			04/19/18	08/01/18	10/26/18	10/26/18	04/27/18
Parameter	**Units**	**Criteria[1]**	Field Duplicate			Field Duplicate	
MISCELLANEOUS							
ALKALINITY, BICARBONATE (As CaCO3)	*MG/L*	-	320	300	340 J	310 J	260
ALKALINITY, CARBONATE (As CaCO3)	*MG/L*	-	4.534 U	20 U	R	20 UJ	20 U
ALKALINITY, HYDROXIDE (AS CACO3)	*MG/L*	-	4.534 U	20 U	R	20 UJ	20 U
ALKALINITY, TOTAL	*MG/L*	500	320	300	340 J	310 J	260
BROMIDE	*MG/L*	2	0.18 J	0.1 J	0.15 UJ	0.1 J	0.48
CHLORIDE (AS CL)	*MG/L*	250	14 J	73	65	73	37
DISSOLVED SOLIDS, TOTAL	*MG/L*	1000	1,260	1,410	1,220	1,300	953
FLUORIDE	*MG/L*	1.5	0.49 J	0.54	0.7	0.72	0.29 J
NITROGEN, NITRATE (AS N)	*MG/L*	10	0.42 J	0.15 U	0.15 UJ	0.15 UJ	0.15 U
PHOSPHORUS, TOTAL ORTHOPHOSPHATE (AS PO4)	*MG/L*	-	0.088	0.088	0.0063 J	0.0075 J	0.15
SULFATE	*MG/L*	250	530	480	470	540	440

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.

Only detected analytical results are reported.

NOTE: The detection limits shown are MDL.

TABLE 12
GROUNDWATER ANALYTICAL RESULTS - WATER QUALITY PARAMETERS
NIAGARA FALLS STORAGE SITE

Location Identifier :			OW05A	OW05B	OW05B	OW06A	OW06A
Field Sample Identifier :			OW05A	OW05B	OW05B	OW06A	OW06A
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			10/25/18	04/27/18	10/25/18	05/01/18	10/29/18
Parameter	**Units**	**Criteria[1]**					
MISCELLANEOUS							
ALKALINITY, BICARBONATE (As CaCO3)	*MG/L*	-	270 J	370	400 J	260	190 J
ALKALINITY, CARBONATE (As CaCO3)	*MG/L*	-	R	20 U	R	20 U	R
ALKALINITY, HYDROXIDE (AS CACO3)	*MG/L*	-	R	20 U	R	20 U	R
ALKALINITY, TOTAL	*MG/L*	500	270 J	370	400 J	260	210 J
BROMIDE	*MG/L*	2	0.35	0.14 J	0.062	0.44	0.26
CHLORIDE (AS CL)	*MG/L*	250	37	12	15	38	28
DISSOLVED SOLIDS, TOTAL	*MG/L*	1000	991	1,270	1,260	1,540	1,290 H
FLUORIDE	*MG/L*	1.5	0.63	0.51	1.6 U	0.25 U	0.42 J
NITROGEN, NITRATE (AS N)	*MG/L*	10	0.035 UJ	0.054 J	0.17 J	0.068 J	0.15 J
PHOSPHORUS, TOTAL ORTHOPHOSPHATE (AS PO4)	*MG/L*	-	0.011 J	0.12	0.011 J	0.036	0.0066 J
SULFATE	*MG/L*	250	430	580	620	730	720

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.

Only detected analytical results are reported.

NOTE: The detection limits shown are MDL.

TABLE 12
GROUNDWATER ANALYTICAL RESULTS - WATER QUALITY PARAMETERS
NIAGARA FALLS STORAGE SITE

Location Identifier :			OW06B	OW06B	OW07A	OW07A	OW07B
Field Sample Identifier :			OW06B	OW06B	OW07A	OW07A	EWN-OW07B
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			05/01/18	10/26/18	04/27/18	10/24/18	02/13/18
Parameter	**Units**	**Criteria[1]**					
MISCELLANEOUS							
ALKALINITY, BICARBONATE (As CaCO3)	*MG/L*	-	500	500 J	170	140 J	450
ALKALINITY, CARBONATE (As CaCO3)	*MG/L*	-	20 U	R	20 U	R	4.534 U
ALKALINITY, HYDROXIDE (AS CACO3)	*MG/L*	-	20 U	R	20 U	R	4.534 U
ALKALINITY, TOTAL	*MG/L*	500	500	500 J	170	140 J	450
BROMIDE	*MG/L*	2	0.32	0.21 J	0.66	0.44	0.29
CHLORIDE (AS CL)	*MG/L*	250	58	64	43	39	26
DISSOLVED SOLIDS, TOTAL	*MG/L*	1000	1,360	1,250	1,720	1,710	1,560
FLUORIDE	*MG/L*	1.5	0.26 J	0.51	1.9	0.42 J	0.41 J
NITROGEN, NITRATE (AS N)	*MG/L*	10	0.15 U	0.15 UJ	0.1 J	0.18 J	0.21 J
PHOSPHORUS, TOTAL ORTHOPHOSPHATE (AS PO4)	*MG/L*	-	0.011	0.0056 J	0.097	0.005 J	0.12
SULFATE	*MG/L*	250	430	450	960	980	790

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.

Only detected analytical results are reported.

NOTE: The detection limits shown are MDL.

TABLE 12
GROUNDWATER ANALYTICAL RESULTS - WATER QUALITY PARAMETERS
NIAGARA FALLS STORAGE SITE

Location Identifier :			OW07B	OW07B	OW07B	OW11A	OW11A
Field Sample Identifier :			OW07B	EWN-OW07B	OW07B	OW11A	OW11A
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			04/27/18	07/31/18	10/24/18	05/01/18	10/23/18
Parameter	**Units**	**Criteria[1]**					
MISCELLANEOUS							
ALKALINITY, BICARBONATE (As CaCO3)	*MG/L*	-	400	390	400 J	290	230
ALKALINITY, CARBONATE (As CaCO3)	*MG/L*	-	20 U	20 U	R	20 U	20 U
ALKALINITY, HYDROXIDE (AS CACO3)	*MG/L*	-	20 U	20 U	R	20 U	20 U
ALKALINITY, TOTAL	*MG/L*	500	400	390	400 J	290	230
BROMIDE	*MG/L*	2	0.25	0.25	0.2 J	0.15 U	1.5 U
CHLORIDE (AS CL)	*MG/L*	250	24	21	20	24	23
DISSOLVED SOLIDS, TOTAL	*MG/L*	1000	1,600	1,680	1,540	1,120	1,130
FLUORIDE	*MG/L*	1.5	0.3 J	0.42 J	0.53	0.25 U	0.56
NITROGEN, NITRATE (AS N)	*MG/L*	10	0.15 U	0.04 J	0.15 J	0.22 J	0.12 J
PHOSPHORUS, TOTAL ORTHOPHOSPHATE (AS PO4)	*MG/L*	-	0.09	0.086	0.0063 J	0.024	0.0098 J
SULFATE	*MG/L*	250	770	700	720	530	570

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.

Only detected analytical results are reported.

NOTE: The detection limits shown are MDL.

TABLE 12
GROUNDWATER ANALYTICAL RESULTS - WATER QUALITY PARAMETERS
NIAGARA FALLS STORAGE SITE

Location Identifier :			OW11B	OW11B	OW12A	OW12A	OW12B
Field Sample Identifier :			OW11B	OW11B	OW12A	OW12A	OW12B
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			05/01/18	10/23/18	04/27/18	10/23/18	04/27/18
Parameter	**Units**	**Criteria[1]**					
MISCELLANEOUS							
ALKALINITY, BICARBONATE (As CaCO3)	*MG/L*	-	300	330	200	220	260
ALKALINITY, CARBONATE (As CaCO3)	*MG/L*	-	20 U	20 U	20 U	20 U	20 U
ALKALINITY, HYDROXIDE (AS CACO3)	*MG/L*	-	20 U	20 U	20 U	20 U	20 U
ALKALINITY, TOTAL	*MG/L*	500	300	330	200	220	260
BROMIDE	*MG/L*	2	0.15 U	1.5 U	0.35	3 U	0.15 U
CHLORIDE (AS CL)	*MG/L*	250	28	39	23	20	5.9
DISSOLVED SOLIDS, TOTAL	*MG/L*	1000	1,280	1,350	1,440	1,440	779
FLUORIDE	*MG/L*	1.5	0.16 J	0.52	0.3 J	0.25 U	0.39 J
NITROGEN, NITRATE (AS N)	*MG/L*	10	0.15 U	0.069 J	0.15 U	0.15 U	1.4
PHOSPHORUS, TOTAL ORTHOPHOSPHATE (AS PO4)	*MG/L*	-	0.01 U	0.005 J	0.054	0.01 UJ	0.1
SULFATE	*MG/L*	250	590	630	760	790	290

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.

Only detected analytical results are reported.

NOTE: The detection limits shown are MDL.

TABLE 12
GROUNDWATER ANALYTICAL RESULTS - WATER QUALITY PARAMETERS
NIAGARA FALLS STORAGE SITE

Location Identifier :			OW12B	OW13A	OW13A	OW13B	OW13B
Field Sample Identifier :			OW12B	OW13A	OW13A	EWN-OW13B	OW13B
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			10/23/18	04/18/18	10/24/18	02/13/18	04/18/18
Parameter	**Units**	**Criteria[1]**					
MISCELLANEOUS							
ALKALINITY, BICARBONATE (As CaCO3)	*MG/L*	-	320	520	190 J	560	530
ALKALINITY, CARBONATE (As CaCO3)	*MG/L*	-	20 U	20 U	R	4.534 U	20 U
ALKALINITY, HYDROXIDE (AS CACO3)	*MG/L*	-	20 U	20 U	R	4.534 U	20 U
ALKALINITY, TOTAL	*MG/L*	500	320	520	190 J	560	530
BROMIDE	*MG/L*	2	1.5 U	0.52	0.46	0.43	0.44
CHLORIDE (AS CL)	*MG/L*	250	5.1	41	41	55	47
DISSOLVED SOLIDS, TOTAL	*MG/L*	1000	937	1,730	1,790	2,620	2,500
FLUORIDE	*MG/L*	1.5	0.77	0.35 J	0.48 J	0.42 J	0.49 J
NITROGEN, NITRATE (AS N)	*MG/L*	10	0.66	0.15 U	0.15 UJ	0.065 J	0.18 J
PHOSPHORUS, TOTAL ORTHOPHOSPHATE (AS PO4)	*MG/L*	-	0.0079 J	0.019	0.01 UJ	0.11	0.029
SULFATE	*MG/L*	250	410	970	970	1,500	1,400

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.

Only detected analytical results are reported.

NOTE: The detection limits shown are MDL.

TABLE 12
GROUNDWATER ANALYTICAL RESULTS - WATER QUALITY PARAMETERS
NIAGARA FALLS STORAGE SITE

Location Identifier :			OW13B	OW13B	OW15A	OW15A	OW15B
Field Sample Identifier :			EWN-OW13B	OW13B	OW15A	OW15A	OW15B
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			07/31/18	10/24/18	04/17/18	10/24/18	10/24/18
Parameter	**Units**	**Criteria[1]**					
MISCELLANEOUS							
ALKALINITY, BICARBONATE (As CaCO3)	*MG/L*	-	410	480 J	96	87 J	370 J
ALKALINITY, CARBONATE (As CaCO3)	*MG/L*	-	20 U	R	4.534 U	R	R
ALKALINITY, HYDROXIDE (AS CACO3)	*MG/L*	-	20 U	R	4.534 U	R	R
ALKALINITY, TOTAL	*MG/L*	500	410	480 J	96	87 J	370 J
BROMIDE	*MG/L*	2	0.32	0.28	0.11 J	0.69	0.15 U
CHLORIDE (AS CL)	*MG/L*	250	41	48	7.8	65	4.6
DISSOLVED SOLIDS, TOTAL	*MG/L*	1000	2,470	2,380 J	1,940	1,840	908
FLUORIDE	*MG/L*	1.5	0.36 J	0.44 J	0.52	0.52	0.68
NITROGEN, NITRATE (AS N)	*MG/L*	10	0.15 U	0.15 UJ	0.046 J	0.15 UJ	0.24 J
PHOSPHORUS, TOTAL ORTHOPHOSPHATE (AS PO4)	*MG/L*	-	0.028	0.01 UJ	0.01 U	0.01 UJ	0.0098 J
SULFATE	*MG/L*	250	1,200	1,400	1,500 J	1,100	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.

Only detected analytical results are reported.

NOTE: The detection limits shown are MDL.

TABLE 12
GROUNDWATER ANALYTICAL RESULTS - WATER QUALITY PARAMETERS
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 :			04/17/18	10/24/18	04/17/18	10/24/18	04/19/18
Parameter	**Units**	**Criteria[1]**					
MISCELLANEOUS							
ALKALINITY, BICARBONATE (As CaCO3)	*MG/L*	-	100	67 J	420	410 J	500
ALKALINITY, CARBONATE (As CaCO3)	*MG/L*	-	4.534 U	R	4.534 U	R	4.534 U
ALKALINITY, HYDROXIDE (AS CACO3)	*MG/L*	-	4.534 U	R	4.534 U	R	4.534 U
ALKALINITY, TOTAL	*MG/L*	500	100	67 J	420	410 J	500
BROMIDE	*MG/L*	2	0.78	0.45	0.37	0.15 U	0.15 U
CHLORIDE (AS CL)	*MG/L*	250	31	47	31	8.3	12
DISSOLVED SOLIDS, TOTAL	*MG/L*	1000	1,760	2,920 J	986	964	1,310
FLUORIDE	*MG/L*	1.5	0.43 J	0.45 J	0.4 J	0.59	0.36 J
NITROGEN, NITRATE (AS N)	*MG/L*	10	0.15 U	0.15 UJ	0.2 J	0.15 UJ	0.55
PHOSPHORUS, TOTAL ORTHOPHOSPHATE (AS PO4)	*MG/L*	-	0.012	0.01 UJ	0.017	0.0094 J	0.031
SULFATE	*MG/L*	250	1,100	2,100	380	370	590

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.

Only detected analytical results are reported.

NOTE: The detection limits shown are MDL.

TABLE 12
GROUNDWATER ANALYTICAL RESULTS - WATER QUALITY PARAMETERS
NIAGARA FALLS STORAGE SITE

Location Identifier :			OW18B
Field Sample Identifier :			OW18B
Sample Type :			Groundwater
Sample Depth Interval (ft) :			-
Date of Sample :			10/24/18
Parameter	**Units**	**Criteria[1]**	
MISCELLANEOUS			
ALKALINITY, BICARBONATE (As CaCO3)	*MG/L*	-	490 J
ALKALINITY, CARBONATE (As CaCO3)	*MG/L*	-	R
ALKALINITY, HYDROXIDE (AS CACO3)	*MG/L*	-	R
ALKALINITY, TOTAL	*MG/L*	500	490 J
BROMIDE	*MG/L*	2	0.11 J
CHLORIDE (AS CL)	*MG/L*	250	9.8
DISSOLVED SOLIDS, TOTAL	*MG/L*	1000	1,240
FLUORIDE	*MG/L*	1.5	0.64
NITROGEN, NITRATE (AS N)	*MG/L*	10	2.2 J
PHOSPHORUS, TOTAL ORTHOPHOSPHATE (AS PO4)	*MG/L*	-	0.01 UJ
SULFATE	*MG/L*	250	470

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.

Only detected analytical results are reported.

NOTE: The detection limits shown are MDL.

TABLE 13
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 :			05/01/18	10/25/18	04/17/18	10/23/18	04/17/18
Parameter	**Units**	**Criteria[1]**					
RADIONUCLIDES							
RADIUM-226	*PCI/L*	3	0.404 J	0.668 U	0.161 U	0.446 U	0.49 J
TOTAL URANIUM	*ug/L*	30	26.5	64.3	7.03	9	34.4
RADIONUCLIDES (FILTERED)							
RADIUM-226	*PCI/L*	3	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed
TOTAL URANIUM	*ug/L*	30	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed

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 13
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 :			10/23/18	10/25/18	05/02/18	10/25/18	10/25/18
Parameter	**Units**	**Criteria[1]**					
RADIONUCLIDES							
RADIUM-226	*PCI/L*	3	0.68 J	0 U	0.433 J	0.725 J	0.485 U
TOTAL URANIUM	*ug/L*	30	30.9	44	37.4	42.2	30.7
RADIONUCLIDES (FILTERED)							
RADIUM-226	*PCI/L*	3	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed
TOTAL URANIUM	*ug/L*	30	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed

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 13
GROUNDWATER ANALYTICAL RESULTS - RADIONUCLIDES
NIAGARA FALLS STORAGE SITE

Location Identifier :			A45	A45	A50	A50	A55
Field Sample Identifier :			A45	A45	A50	A50	A55
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			04/30/18	10/25/18	04/30/18	10/25/18	04/30/18
Parameter	**Units**	**Criteria[1]**					
RADIONUCLIDES							
RADIUM-226	*PCI/L*	3	0.47 J	0.306 U	0.653	0.983	0.775
TOTAL URANIUM	*ug/L*	30	42.2	27.2	14.6	16.7	0.178 J
RADIONUCLIDES (FILTERED)							
RADIUM-226	*PCI/L*	3	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed
TOTAL URANIUM	*ug/L*	30	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed

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 13
GROUNDWATER ANALYTICAL RESULTS - RADIONUCLIDES
NIAGARA FALLS STORAGE SITE

Location Identifier :			A55	BH49	BH49	BH49A	BH49A
Field Sample Identifier :			A55	BH49	BH49	BH49A	BH49A
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			10/25/18	04/25/18	10/25/18	04/25/18	10/25/18
Parameter	**Units**	**Criteria[1]**					
RADIONUCLIDES							
RADIUM-226	*PCI/L*	3	0.282 U	0 U	0.242 U	0.0136 U	0.286 U
TOTAL URANIUM	*ug/L*	30	0.226 J	0.638	0.742	20.6	18.4
RADIONUCLIDES (FILTERED)							
RADIUM-226	*PCI/L*	3	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed
TOTAL URANIUM	*ug/L*	30	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed

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 13
GROUNDWATER ANALYTICAL RESULTS - RADIONUCLIDES
NIAGARA FALLS STORAGE SITE

Location Identifier :			MW423	MW862	MW862	MW863	MW863
Field Sample Identifier :			MW423	MW862	MW862	MW863	MW863
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			10/25/18	04/27/18	10/26/18	04/27/18	10/26/18
Parameter	**Units**	**Criteria[1]**					
RADIONUCLIDES							
RADIUM-226	*PCI/L*	3	-0.065 U	0 U	0.106 U	0.235 J	0.767 J
TOTAL URANIUM	*ug/L*	30	23.9	24.8	21.6	2.97	3.16
RADIONUCLIDES (FILTERED)							
RADIUM-226	*PCI/L*	3	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed
TOTAL URANIUM	*ug/L*	30	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed

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 13
GROUNDWATER ANALYTICAL RESULTS - RADIONUCLIDES
NIAGARA FALLS STORAGE SITE

Location Identifier :			MW921	MW922	MW934	MW934	MW935
Field Sample Identifier :			MW921	MW922	MW934	MW934	MW935
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			04/26/18	10/23/18	04/18/18	10/23/18	04/27/18
Parameter	**Units**	**Criteria[1]**					
RADIONUCLIDES							
RADIUM-226	*PCI/L*	3	0 U	0.184 U	0 U	0.601 J	0.181 U
TOTAL URANIUM	*ug/L*	30	36.5	27.6	37.3	27	15.4
RADIONUCLIDES (FILTERED)							
RADIUM-226	*PCI/L*	3	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed
TOTAL URANIUM	*ug/L*	30	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed

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 13
GROUNDWATER ANALYTICAL RESULTS - RADIONUCLIDES
NIAGARA FALLS STORAGE SITE

Location Identifier :			MW935	MW938	MW938	MW943	MW943
Field Sample Identifier :			MW935	MW938	MW938	MW943	MW943
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			10/23/18	04/27/18	10/23/18	05/01/18	10/26/18
Parameter	**Units**	**Criteria[1]**					
RADIONUCLIDES							
RADIUM-226	*PCI/L*	3	0.201 U	0.624	0.202 U	0.137 U	0.507 J
TOTAL URANIUM	*ug/L*	30	10.2	34.7	24.4	18.3	19.9
RADIONUCLIDES (FILTERED)							
RADIUM-226	*PCI/L*	3	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed
TOTAL URANIUM	*ug/L*	30	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed

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 13
GROUNDWATER ANALYTICAL RESULTS - RADIONUCLIDES
NIAGARA FALLS STORAGE SITE

Location Identifier :			MW944	MW945	MW946	MW947	MW948
Field Sample Identifier :			MW944	MW945	MW946	MW947	MW948
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			04/26/18	04/26/18	04/18/18	04/30/18	04/18/18
Parameter	**Units**	**Criteria[1]**					
RADIONUCLIDES							
RADIUM-226	*PCI/L*	3	0.385 J	-0.159 U	0.241	0.781	0.0839 U
TOTAL URANIUM	*ug/L*	30	5.87	21.2	38.7	31.8	26.6
RADIONUCLIDES (FILTERED)							
RADIUM-226	*PCI/L*	3	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed
TOTAL URANIUM	*ug/L*	30	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed

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 13
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 :			10/23/18	04/18/18	10/23/18	05/01/18	10/25/18
Parameter	**Units**	**Criteria[1]**					
RADIONUCLIDES							
RADIUM-226	*PCI/L*	3	0.118 U	0.238 J	0.764	0.34 J	0.183 U
TOTAL URANIUM	*ug/L*	30	29.1	1.14	0.506	28.3	35.1
RADIONUCLIDES (FILTERED)							
RADIUM-226	*PCI/L*	3	Not Analyzed	Not Analyzed	Not Analyzed	0.315 J	Not Analyzed
TOTAL URANIUM	*ug/L*	30	Not Analyzed	Not Analyzed	Not Analyzed	32.6	36

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 13
GROUNDWATER ANALYTICAL RESULTS - RADIONUCLIDES
NIAGARA FALLS STORAGE SITE

Location Identifier :			MW951	MW951	MW951	MW951	MW952
Field Sample Identifier :			MW951	MW951-D	MW951	MW951-D	MW952
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			05/01/18	05/01/18	10/29/18	10/29/18	05/01/18
Parameter	Units	Criteria[1]		Field Duplicate		Field Duplicate	
RADIONUCLIDES							
RADIUM-226	*PCI/L*	3	0 U	0.317	0.457 J	0.348 U	0.268
TOTAL URANIUM	*ug/L*	30	2,988	2,940	3,124	2,941	157
RADIONUCLIDES (FILTERED)							
RADIUM-226	*PCI/L*	3	0.594	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed
TOTAL URANIUM	*ug/L*	30	2,879	Not Analyzed	2,861	Not Analyzed	Not Analyzed

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 13
GROUNDWATER ANALYTICAL RESULTS - RADIONUCLIDES
NIAGARA FALLS STORAGE SITE

Location Identifier :			MW952	MW953	MW953	MW954	MW954
Field Sample Identifier :			MW952	MW953	MW953	MW954	MW954
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			10/23/18	05/01/18	10/23/18	04/30/18	10/23/18
Parameter	**Units**	**Criteria[1]**					
RADIONUCLIDES							
RADIUM-226	*PCI/L*	3	0.067 U	0.303 J	0.282 U	0.354 J	0.149 U
TOTAL URANIUM	*ug/L*	30	126	8,927	4,359	711	508
RADIONUCLIDES (FILTERED)							
RADIUM-226	*PCI/L*	3	Not Analyzed	Not Analyzed	0.321 U	Not Analyzed	Not Analyzed
TOTAL URANIUM	*ug/L*	30	Not Analyzed	Not Analyzed	3,884	Not Analyzed	Not Analyzed

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 13
GROUNDWATER ANALYTICAL RESULTS - RADIONUCLIDES
NIAGARA FALLS STORAGE SITE

Location Identifier :			MW955	MW955	MW956	MW956	MW957
Field Sample Identifier :			MW955	MW955	MW956	MW956	MW957
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			04/30/18	10/23/18	05/02/18	10/23/18	04/30/18
Parameter	**Units**	**Criteria[1]**					
RADIONUCLIDES							
RADIUM-226	*PCI/L*	3	0.133 U	0.723	0.134 U	0.36 U	0.351
TOTAL URANIUM	*ug/L*	30	33.8	32.8	68.5	47.5	1,258
RADIONUCLIDES (FILTERED)							
RADIUM-226	*PCI/L*	3	Not Analyzed	Not Analyzed	0.315	Not Analyzed	0.211 J
TOTAL URANIUM	*ug/L*	30	Not Analyzed	Not Analyzed	70.6	35.5	1,459

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 13
GROUNDWATER ANALYTICAL RESULTS - RADIONUCLIDES
NIAGARA FALLS STORAGE SITE

Location Identifier :			MW957	MW958	MW958	MW958	MW959
Field Sample Identifier :			MW957	MW958	MW958	MW958	MW959
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			10/23/18	05/01/18	10/29/18	11/06/18	05/01/18
Parameter	**Units**	**Criteria[1]**					
RADIONUCLIDES							
RADIUM-226	*PCI/L*	3	0.319 U	0.473 J	0.384 U	Not Analyzed	0.328 J
TOTAL URANIUM	*ug/L*	30	2,634	323	122	Not Analyzed	178
RADIONUCLIDES (FILTERED)							
RADIUM-226	*PCI/L*	3	Not Analyzed	0.0652 U	Not Analyzed	Not Analyzed	0.318 J
TOTAL URANIUM	*ug/L*	30	2,141	281	Not Analyzed	94	186

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 13
GROUNDWATER ANALYTICAL RESULTS - RADIONUCLIDES
NIAGARA FALLS STORAGE SITE

Location Identifier :			MW959	MW960	MW960	OW03A	OW03A
Field Sample Identifier :			MW959	MW960	MW960	OW03A	OW03A
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			10/29/18	05/01/18	10/26/18	04/18/18	10/25/18
Parameter	**Units**	**Criteria[1]**					
RADIONUCLIDES							
RADIUM-226	*PCI/L*	3	0.118 U	0.213 U	0.363 U	0.227	0.255 U
TOTAL URANIUM	*ug/L*	30	88.5	1,126	1,060	10.9	10.1
RADIONUCLIDES (FILTERED)							
RADIUM-226	*PCI/L*	3	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed
TOTAL URANIUM	*ug/L*	30	87.7	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed

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 13
GROUNDWATER ANALYTICAL RESULTS - RADIONUCLIDES
NIAGARA FALLS STORAGE SITE

Location Identifier :			OW03B	OW03B	OW04A	OW04A	OW04A
Field Sample Identifier :			OW03B	OW03B	OW04A	OW04A	OW04A
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			04/18/18	10/25/18	02/07/18	04/19/18	08/01/18
Parameter	**Units**	**Criteria[1]**					
RADIONUCLIDES							
RADIUM-226	*PCI/L*	3	0.582 J	0.179 U	0.705 J	0.253 U	Not Analyzed
TOTAL URANIUM	*ug/L*	30	17.1	17.2	3.68	3.17	2.66
RADIONUCLIDES (FILTERED)							
RADIUM-226	*PCI/L*	3	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed
TOTAL URANIUM	*ug/L*	30	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed

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 13
GROUNDWATER ANALYTICAL RESULTS - RADIONUCLIDES
NIAGARA FALLS STORAGE SITE

Location Identifier :			OW04A	OW04B	OW04B	OW04B	OW04B
Field Sample Identifier :			OW04A	OW04B	OW04B	OW04B-D	OW04B
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			10/26/18	02/07/18	04/19/18	04/19/18	08/01/18
Parameter	**Units**	**Criteria[1]**				Field Duplicate	
RADIONUCLIDES							
RADIUM-226	*PCI/L*	3	0.421 U	0.341 B	0.0825 J	0.332 U	Not Analyzed
TOTAL URANIUM	*ug/L*	30	2.9	36.4	42.2	38.6	29.5
RADIONUCLIDES (FILTERED)							
RADIUM-226	*PCI/L*	3	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed
TOTAL URANIUM	*ug/L*	30	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed

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 13
GROUNDWATER ANALYTICAL RESULTS - RADIONUCLIDES
NIAGARA FALLS STORAGE SITE

Location Identifier :			OW04B	OW04B	OW05A	OW05A	OW05B
Field Sample Identifier :			OW04B	OW04B-D	OW05A	OW05A	OW05B
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			10/26/18	10/26/18	04/27/18	10/25/18	04/27/18
Parameter	**Units**	**Criteria[1]**		Field Duplicate			
RADIONUCLIDES							
RADIUM-226	*PCI/L*	3	0.623	0.167 U	0.237 J	0.251 U	0.247 U
TOTAL URANIUM	*ug/L*	30	33.6	33.9	2.14	1.79	16.3
RADIONUCLIDES (FILTERED)							
RADIUM-226	*PCI/L*	3	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed
TOTAL URANIUM	*ug/L*	30	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed

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 13
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 :			10/25/18	05/01/18	10/29/18	05/01/18	10/26/18
Parameter	**Units**	**Criteria[1]**					
RADIONUCLIDES							
RADIUM-226	*PCI/L*	3	0.624 J	0.135 U	0.477 U	0.339 J	0.597 J
TOTAL URANIUM	*ug/L*	30	13.8	1.45	1.28	18	15.7
RADIONUCLIDES (FILTERED)							
RADIUM-226	*PCI/L*	3	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed
TOTAL URANIUM	*ug/L*	30	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed

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 13
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 :			04/27/18	10/24/18	04/27/18	10/24/18	05/01/18
Parameter	**Units**	**Criteria[1]**					
RADIONUCLIDES							
RADIUM-226	*PCI/L*	3	0.777	0.859 J	0.466 J	0.45 U	0.127 U
TOTAL URANIUM	*ug/L*	30	1.57	1.4	21.7	17.4	1.58
RADIONUCLIDES (FILTERED)							
RADIUM-226	*PCI/L*	3	Not Analyzed	Not Analyzed	0.734	Not Analyzed	Not Analyzed
TOTAL URANIUM	*ug/L*	30	Not Analyzed	Not Analyzed	22.2	18.1	Not Analyzed

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 13
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 :			10/23/18	05/01/18	10/23/18	04/27/18	10/23/18
Parameter	**Units**	**Criteria[1]**					
RADIONUCLIDES							
RADIUM-226	*PCI/L*	3	0.323 U	0.128 U	0.619	0.345 J	0.834 J
TOTAL URANIUM	*ug/L*	30	2.46	309	156	3.44	3.46
RADIONUCLIDES (FILTERED)							
RADIUM-226	*PCI/L*	3	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed
TOTAL URANIUM	*ug/L*	30	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed

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 13
GROUNDWATER ANALYTICAL RESULTS - RADIONUCLIDES
NIAGARA FALLS STORAGE SITE

Location Identifier :			OW12B	OW12B	OW13A	OW13A	OW13A
Field Sample Identifier :			OW12B	OW12B	OW13A	OW13A-D	OW13A
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			04/27/18	10/23/18	04/18/18	04/18/18	10/24/18
Parameter	Units	Criteria[1]				Field Duplicate	
RADIONUCLIDES							
RADIUM-226	*PCI/L*	3	0.114 U	-0.069 U	-0.185 U	0.705 J	0.668 J
TOTAL URANIUM	*ug/L*	30	58.1	35.2	2.19	2.25	2.36
RADIONUCLIDES (FILTERED)							
RADIUM-226	*PCI/L*	3	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed
TOTAL URANIUM	*ug/L*	30	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed

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 13
GROUNDWATER ANALYTICAL RESULTS - RADIONUCLIDES
NIAGARA FALLS STORAGE SITE

Location Identifier :			OW13B	OW13B	OW15A	OW15A	OW15B
Field Sample Identifier :			OW13B	OW13B	OW15A	OW15A	OW15B
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			04/18/18	10/24/18	04/17/18	10/24/18	10/24/18
Parameter	**Units**	**Criteria[1]**					
RADIONUCLIDES							
RADIUM-226	*PCI/L*	3	0.235 U	0 U	0.268 J	0.6 J	0.548 J
TOTAL URANIUM	*ug/L*	30	23.9	32.1	0.337	0.472 J	9.74
RADIONUCLIDES (FILTERED)							
RADIUM-226	*PCI/L*	3	0.471 J	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed
TOTAL URANIUM	*ug/L*	30	24.3	30.6	Not Analyzed	Not Analyzed	Not Analyzed

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 13
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 :			04/17/18	10/24/18	04/17/18	10/24/18	04/19/18
Parameter	**Units**	**Criteria[1]**					
RADIONUCLIDES							
RADIUM-226	*PCI/L*	3	0.324 J	0.733 J	0.269 U	0.252 U	0.0886 U
TOTAL URANIUM	*ug/L*	30	1.16	1.08	4.83	6.39	13
RADIONUCLIDES (FILTERED)							
RADIUM-226	*PCI/L*	3	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed
TOTAL URANIUM	*ug/L*	30	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed

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 13
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 :			10/24/18
Parameter	**Units**	**Criteria[1]**	
RADIONUCLIDES			
RADIUM-226	*PCI/L*	3	0.771 J
TOTAL URANIUM	*ug/L*	30	11.6
RADIONUCLIDES (FILTERED)			
RADIUM-226	*PCI/L*	3	Not Analyzed
TOTAL URANIUM	*ug/L*	30	Not Analyzed

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 - 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 :			04/17/18	10/23/18	10/25/18	04/18/18	10/23/18
Parameter	**Units**	**Criteria[1]**					
VOLATILE ORGANIC ANALYSES							
1,1,1,2-TETRACHLOROETHANE	UG/L	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
1,1,2,2-TETRACHLOROETHANE	UG/L	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	UG/L	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
1,1,2-TRICHLOROETHANE	UG/L	1	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
1,1-DICHLOROETHANE	UG/L	5	1 U	1 U	1 U	1 U	1 U
1,1-DICHLOROETHENE	UG/L	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
1,1-DICHLOROPROPENE	UG/L	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
1,2,3-TRICHLOROBENZENE	UG/L	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
1,2,3-TRICHLOROPROPANE	UG/L	0.04	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
1,2,4-TRICHLOROBENZENE	UG/L	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
1,2,4-TRIMETHYLBENZENE	UG/L	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
1,2-DIBROMO-3-CHLOROPROPANE	UG/L	0.04	2 U	2 U	2 U	2 U	2 U
1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	UG/L	0.006	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
1,2-DICHLOROBENZENE	UG/L	3	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
1,2-DICHLOROETHANE	UG/L	0.6	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
1,2-DICHLOROPROPANE	UG/L	1	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
1,3,5-TRIMETHYLBENZENE (MESITYLENE)	UG/L	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
1,3-DICHLOROBENZENE	UG/L	3	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
1,3-DICHLOROPROPANE	UG/L	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 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 14
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 :			04/17/18	10/23/18	10/25/18	04/18/18	10/23/18
Parameter	**Units**	**Criteria[1]**					
VOLATILE ORGANIC ANALYSES							
1,4-DICHLOROBENZENE	*UG/L*	3	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
2,2-DICHLOROPROPANE	*UG/L*	5	1 U	1 U	1 U	1 U	1 U
2-CHLOROTOLUENE	*UG/L*	-	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
2-HEXANONE	*UG/L*	50	1 U	1 U	1 U	1 U	1 U
4-CHLOROTOLUENE	*UG/L*	-	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
ACETONE	*UG/L*	50	0.6 U	2.5 J	4.6 J	0.6 U	R
BENZENE	*UG/L*	1	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
BROMOBENZENE	*UG/L*	-	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
BROMOCHLOROMETHANE	*UG/L*	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
BROMODICHLOROMETHANE	*UG/L*	50	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
BROMOFORM	*UG/L*	50	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
BROMOMETHANE	*UG/L*	5	1 U	1 U	1 U	1 U	1 U
CARBON DISULFIDE	*UG/L*	60	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
CARBON TETRACHLORIDE	*UG/L*	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
CHLOROBENZENE	*UG/L*	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
CHLOROETHANE	*UG/L*	5	1 U	1 U	1 U	1 U	1 U
CHLOROFORM	*UG/L*	7	0.6 U	0.6 U	0.6 U	1.5	0.6 U
CHLOROMETHANE	*UG/L*	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
CIS-1,2-DICHLOROETHYLENE	*UG/L*	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 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 14
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 :			04/17/18	10/23/18	10/25/18	04/18/18	10/23/18
Parameter	**Units**	**Criteria[1]**					
VOLATILE ORGANIC ANALYSES							
CIS-1,3-DICHLOROPROPENE	*UG/L*	0.4	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
DIBROMOCHLOROMETHANE	*UG/L*	50	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
DIBROMOMETHANE	*UG/L*	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
DICHLORODIFLUOROMETHANE	*UG/L*	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
ETHYLBENZENE	*UG/L*	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
HEXACHLOROBUTADIENE	*UG/L*	0.5	1 U	1 U	1 U	1 U	1 U
ISOPROPYLBENZENE (CUMENE)	*UG/L*	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
M+P-XYLENE	*UG/L*	5	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U
METHYL ETHYL KETONE (2-BUTANONE)	*UG/L*	50	5 U	5 U	5 U	5 U	5 U
METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	*UG/L*	-	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
METHYLENE CHLORIDE	*UG/L*	5	0.6 U	0.4 J	1 J	0.6 U	0.6 U
NAPHTHALENE	*UG/L*	10	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
N-BUTYLBENZENE	*UG/L*	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
N-PROPYLBENZENE	*UG/L*	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
O-XYLENE (1,2-DIMETHYLBENZENE)	*UG/L*	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
P-CYMENE (P-ISOPROPYLTOLUENE)	*UG/L*	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
SEC-BUTYLBENZENE	*UG/L*	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
STYRENE	*UG/L*	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
T-BUTYLBENZENE	*UG/L*	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 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 14
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 :			04/17/18	10/23/18	10/25/18	04/18/18	10/23/18
Parameter	**Units**	**Criteria[1]**					
VOLATILE ORGANIC ANALYSES							
TERT-BUTYL METHYL ETHER	*UG/L*	10	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
TETRACHLOROETHYLENE(PCE)	*UG/L*	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
TOLUENE	*UG/L*	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
TOTAL 1,2-DICHLOROETHENE	*UG/L*	5	1 U	1 U	1 U	1 U	1 U
TRANS-1,2-DICHLOROETHENE	*UG/L*	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
TRANS-1,3-DICHLOROPROPENE	*UG/L*	0.4	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
TRICHLOROETHANE	*UG/L*	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
TRICHLOROETHYLENE (TCE)	*UG/L*	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
TRICHLOROFLUOROMETHANE	*UG/L*	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
VINYL CHLORIDE	*UG/L*	2	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
XYLENES, TOTAL	*UG/L*	-	1.8 U	1.8 U	1.8 U	1.8 U	1.8 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 14
GROUNDWATER ANALYTICAL RESULTS - VOLATILES
NIAGARA FALLS STORAGE SITE

Location Identifier :			MW947	MW948	MW948	MW948	MW949
Field Sample Identifier :			MW947	MW948	MW948	MW948-D	MW949
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			04/30/18	04/18/18	10/23/18	10/23/18	04/18/18
Parameter	Units	Criteria[1]				Field Duplicate	
VOLATILE ORGANIC ANALYSES							
1,1,1,2-TETRACHLOROETHANE	UG/L	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
1,1,2,2-TETRACHLOROETHANE	UG/L	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	UG/L	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
1,1,2-TRICHLOROETHANE	UG/L	1	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
1,1-DICHLOROETHANE	UG/L	5	1 U	1 U	1 U	1 U	1 U
1,1-DICHLOROETHENE	UG/L	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
1,1-DICHLOROPROPENE	UG/L	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
1,2,3-TRICHLOROBENZENE	UG/L	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
1,2,3-TRICHLOROPROPANE	UG/L	0.04	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
1,2,4-TRICHLOROBENZENE	UG/L	5	0.6 U	0.52 J	0.6 U	0.6 U	0.6 U
1,2,4-TRIMETHYLBENZENE	UG/L	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
1,2-DIBROMO-3-CHLOROPROPANE	UG/L	0.04	2 U	2 U	2 U	2 U	2 U
1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	UG/L	0.006	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
1,2-DICHLOROBENZENE	UG/L	3	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
1,2-DICHLOROETHANE	UG/L	0.6	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
1,2-DICHLOROPROPANE	UG/L	1	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
1,3,5-TRIMETHYLBENZENE (MESITYLENE)	UG/L	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
1,3-DICHLOROBENZENE	UG/L	3	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
1,3-DICHLOROPROPANE	UG/L	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 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 14
GROUNDWATER ANALYTICAL RESULTS - VOLATILES
NIAGARA FALLS STORAGE SITE

Location Identifier :			MW947	MW948	MW948	MW948	MW949
Field Sample Identifier :			MW947	MW948	MW948	MW948-D	MW949
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			04/30/18	04/18/18	10/23/18	10/23/18	04/18/18
Parameter	Units	Criteria[1]				Field Duplicate	
VOLATILE ORGANIC ANALYSES							
1,4-DICHLOROBENZENE	UG/L	3	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
2,2-DICHLOROPROPANE	UG/L	5	1 U	1 U	1 U	1 U	1 U
2-CHLOROTOLUENE	UG/L	-	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
2-HEXANONE	UG/L	50	1 U	1 U	1 U	1 U	1 U
4-CHLOROTOLUENE	UG/L	-	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
ACETONE	UG/L	50	2 J	0.6 U	R	1.4 J	0.6 U
BENZENE	UG/L	1	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
BROMOBENZENE	UG/L	-	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
BROMOCHLOROMETHANE	UG/L	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
BROMODICHLOROMETHANE	UG/L	50	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
BROMOFORM	UG/L	50	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
BROMOMETHANE	UG/L	5	1 U	1 U	1 U	1 U	1 U
CARBON DISULFIDE	UG/L	60	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
CARBON TETRACHLORIDE	UG/L	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
CHLOROBENZENE	UG/L	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
CHLOROETHANE	UG/L	5	1 U	1 U	1 U	1 U	1 U
CHLOROFORM	UG/L	7	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
CHLOROMETHANE	UG/L	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
CIS-1,2-DICHLOROETHYLENE	UG/L	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 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 14
GROUNDWATER ANALYTICAL RESULTS - VOLATILES
NIAGARA FALLS STORAGE SITE

Location Identifier :			MW947	MW948	MW948	MW948	MW949
Field Sample Identifier :			MW947	MW948	MW948	MW948-D	MW949
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			04/30/18	04/18/18	10/23/18	10/23/18	04/18/18
Parameter	Units	Criteria[1]				Field Duplicate	
VOLATILE ORGANIC ANALYSES							
CIS-1,3-DICHLOROPROPENE	UG/L	0.4	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
DIBROMOCHLOROMETHANE	UG/L	50	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
DIBROMOMETHANE	UG/L	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
DICHLORODIFLUOROMETHANE	UG/L	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
ETHYLBENZENE	UG/L	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
HEXACHLOROBUTADIENE	UG/L	0.5	1 U	1 U	1 U	1 U	1 U
ISOPROPYLBENZENE (CUMENE)	UG/L	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
M+P-XYLENE	UG/L	5	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U
METHYL ETHYL KETONE (2-BUTANONE)	UG/L	50	5 U	5 U	5 U	5 U	5 U
METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	UG/L	-	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
METHYLENE CHLORIDE	UG/L	5	0.6 U	0.6 U	0.6 J	0.79 J	0.6 U
NAPHTHALENE	UG/L	10	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
N-BUTYLBENZENE	UG/L	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
N-PROPYLBENZENE	UG/L	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
O-XYLENE (1,2-DIMETHYLBENZENE)	UG/L	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
P-CYMENE (P-ISOPROPYLTOLUENE)	UG/L	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
SEC-BUTYLBENZENE	UG/L	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
STYRENE	UG/L	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
T-BUTYLBENZENE	UG/L	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 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 14
GROUNDWATER ANALYTICAL RESULTS - VOLATILES
NIAGARA FALLS STORAGE SITE

Location Identifier :			MW947	MW948	MW948	MW948	MW949
Field Sample Identifier :			MW947	MW948	MW948	MW948-D	MW949
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			04/30/18	04/18/18	10/23/18	10/23/18	04/18/18
Parameter	Units	Criteria[1]				Field Duplicate	
VOLATILE ORGANIC ANALYSES							
TERT-BUTYL METHYL ETHER	UG/L	10	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
TETRACHLOROETHYLENE(PCE)	UG/L	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
TOLUENE	UG/L	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
TOTAL 1,2-DICHLOROETHENE	UG/L	5	1 U	1 U	1 U	1 U	1 U
TRANS-1,2-DICHLOROETHENE	UG/L	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
TRANS-1,3-DICHLOROPROPENE	UG/L	0.4	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
TRICHLOROETHANE	UG/L	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
TRICHLOROETHYLENE (TCE)	UG/L	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
TRICHLOROFLUOROMETHANE	UG/L	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
VINYL CHLORIDE	UG/L	2	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
XYLENES, TOTAL	UG/L	-	1.8 U	1.8 U	1.8 U	1.8 U	1.8 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 14
GROUNDWATER ANALYTICAL RESULTS - VOLATILES
NIAGARA FALLS STORAGE SITE

Location Identifier :			MW949	MW949
Field Sample Identifier :			MW949-D	MW949
Sample Type :			Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-
Date of Sample :			04/18/18	10/23/18
Parameter	Units	Criteria[1]	Field Duplicate	
VOLATILE ORGANIC ANALYSES				
1,1,1,2-TETRACHLOROETHANE	UG/L	5	0.6 U	0.6 U
1,1,2,2-TETRACHLOROETHANE	UG/L	5	0.6 U	0.6 U
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	UG/L	5	0.6 U	0.6 U
1,1,2-TRICHLOROETHANE	UG/L	1	0.6 U	0.6 U
1,1-DICHLOROETHANE	UG/L	5	1 U	1 U
1,1-DICHLOROETHENE	UG/L	5	0.6 U	0.6 U
1,1-DICHLOROPROPENE	UG/L	5	0.6 U	0.6 U
1,2,3-TRICHLOROBENZENE	UG/L	5	0.6 U	0.6 U
1,2,3-TRICHLOROPROPANE	UG/L	0.04	0.6 U	0.6 U
1,2,4-TRICHLOROBENZENE	UG/L	5	0.6 U	0.6 U
1,2,4-TRIMETHYLBENZENE	UG/L	5	0.6 U	0.6 U
1,2-DIBROMO-3-CHLOROPROPANE	UG/L	0.04	2 U	2 U
1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	UG/L	0.006	0.6 U	0.6 U
1,2-DICHLOROBENZENE	UG/L	3	0.6 U	0.6 U
1,2-DICHLOROETHANE	UG/L	0.6	0.6 U	0.6 U
1,2-DICHLOROPROPANE	UG/L	1	0.6 U	0.6 U
1,3,5-TRIMETHYLBENZENE (MESITYLENE)	UG/L	5	0.6 U	0.6 U
1,3-DICHLOROBENZENE	UG/L	3	0.6 U	0.6 U
1,3-DICHLOROPROPANE	UG/L	5	0.6 U	0.6 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 14
GROUNDWATER ANALYTICAL RESULTS - VOLATILES
NIAGARA FALLS STORAGE SITE

Location Identifier :			MW949	MW949
Field Sample Identifier :			MW949-D	MW949
Sample Type :			Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-
Date of Sample :			04/18/18	10/23/18
Parameter	Units	Criteria[1]	Field Duplicate	
VOLATILE ORGANIC ANALYSES				
1,4-DICHLOROBENZENE	UG/L	3	0.6 U	0.6 U
2,2-DICHLOROPROPANE	UG/L	5	1 U	1 U
2-CHLOROTOLUENE	UG/L	-	0.6 U	0.6 U
2-HEXANONE	UG/L	50	1 U	1 U
4-CHLOROTOLUENE	UG/L	-	0.6 U	0.6 U
ACETONE	UG/L	50	0.6 U	0.86 J
BENZENE	UG/L	1	0.6 U	0.6 U
BROMOBENZENE	UG/L	-	0.6 U	0.6 U
BROMOCHLOROMETHANE	UG/L	5	0.6 U	0.6 U
BROMODICHLOROMETHANE	UG/L	50	0.6 U	0.6 U
BROMOFORM	UG/L	50	0.6 U	0.6 U
BROMOMETHANE	UG/L	5	1 U	1 U
CARBON DISULFIDE	UG/L	60	0.6 U	0.6 U
CARBON TETRACHLORIDE	UG/L	5	0.6 U	0.6 U
CHLOROBENZENE	UG/L	5	0.6 U	0.6 U
CHLOROETHANE	UG/L	5	1 U	1 U
CHLOROFORM	UG/L	7	0.6 U	0.6 U
CHLOROMETHANE	UG/L	5	0.6 U	0.6 U
CIS-1,2-DICHLOROETHYLENE	UG/L	5	0.6 U	0.6 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 14
GROUNDWATER ANALYTICAL RESULTS - VOLATILES
NIAGARA FALLS STORAGE SITE

Location Identifier :			MW949	MW949
Field Sample Identifier :			MW949-D	MW949
Sample Type :			Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-
Date of Sample :			04/18/18	10/23/18
Parameter	**Units**	**Criteria[1]**	Field Duplicate	
VOLATILE ORGANIC ANALYSES				
CIS-1,3-DICHLOROPROPENE	*UG/L*	0.4	0.6 U	0.6 U
DIBROMOCHLOROMETHANE	*UG/L*	50	0.6 U	0.6 U
DIBROMOMETHANE	*UG/L*	5	0.6 U	0.6 U
DICHLORODIFLUOROMETHANE	*UG/L*	5	0.6 U	0.6 U
ETHYLBENZENE	*UG/L*	5	0.6 U	0.6 U
HEXACHLOROBUTADIENE	*UG/L*	0.5	1 U	1 U
ISOPROPYLBENZENE (CUMENE)	*UG/L*	5	0.6 U	0.6 U
M+P-XYLENE	*UG/L*	5	1.2 U	1.2 U
METHYL ETHYL KETONE (2-BUTANONE)	*UG/L*	50	5 U	5 U
METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	*UG/L*	-	0.6 U	0.6 U
METHYLENE CHLORIDE	*UG/L*	5	0.6 U	0.6 U
NAPHTHALENE	*UG/L*	10	0.6 U	0.6 U
N-BUTYLBENZENE	*UG/L*	5	0.6 U	0.6 U
N-PROPYLBENZENE	*UG/L*	5	0.6 U	0.6 U
O-XYLENE (1,2-DIMETHYLBENZENE)	*UG/L*	5	0.6 U	0.6 U
P-CYMENE (P-ISOPROPYLTOLUENE)	*UG/L*	5	0.6 U	0.6 U
SEC-BUTYLBENZENE	*UG/L*	5	0.6 U	0.6 U
STYRENE	*UG/L*	5	0.6 U	0.6 U
T-BUTYLBENZENE	*UG/L*	5	0.6 U	0.6 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 14
GROUNDWATER ANALYTICAL RESULTS - VOLATILES
NIAGARA FALLS STORAGE SITE

Location Identifier :			MW949	MW949
Field Sample Identifier :			MW949-D	MW949
Sample Type :			Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-
Date of Sample :			04/18/18	10/23/18
Parameter	**Units**	**Criteria[1]**	Field Duplicate	
VOLATILE ORGANIC ANALYSES				
TERT-BUTYL METHYL ETHER	*UG/L*	10	0.6 U	0.6 U
TETRACHLOROETHYLENE(PCE)	*UG/L*	5	0.6 U	0.6 U
TOLUENE	*UG/L*	5	0.6 U	0.6 U
TOTAL 1,2-DICHLOROETHENE	*UG/L*	5	1 U	1 U
TRANS-1,2-DICHLOROETHENE	*UG/L*	5	0.6 U	0.6 U
TRANS-1,3-DICHLOROPROPENE	*UG/L*	0.4	0.6 U	0.6 U
TRICHLOROETHANE	*UG/L*	5	0.6 U	0.6 U
TRICHLOROETHYLENE (TCE)	*UG/L*	5	0.6 U	0.6 U
TRICHLOROFLUOROMETHANE	*UG/L*	5	0.6 U	0.6 U
VINYL CHLORIDE	*UG/L*	2	0.6 U	0.6 U
XYLENES, TOTAL	*UG/L*	-	1.8 U	1.8 U

Concentration Exceeds Criteria

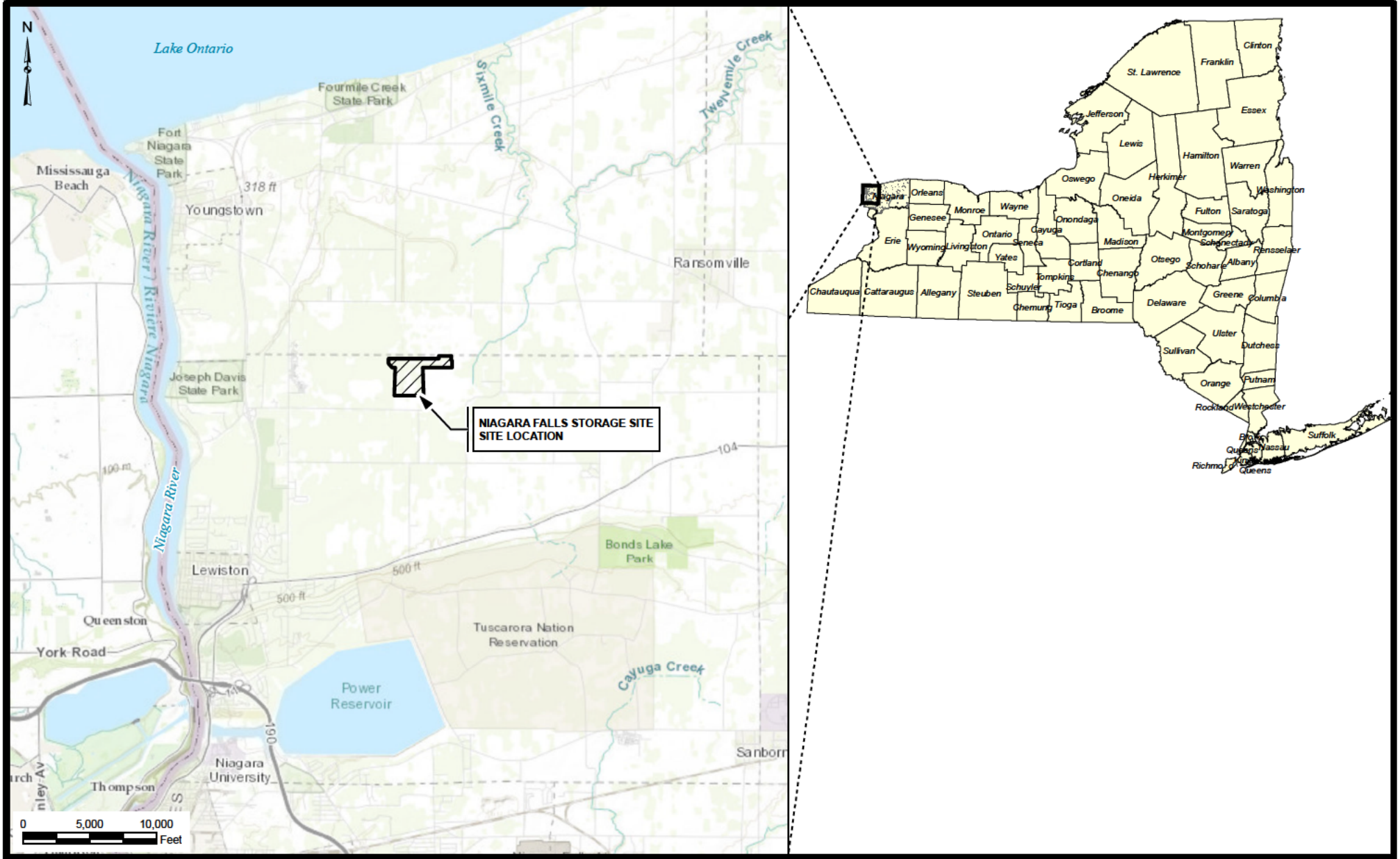
(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

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

Document Path: K:\NFSSP\GIS\ArcMap\Sampling_Locations\2014\020414_SiteLocation.mxd



U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS BUFFALO, NY	SITE LOCATION MAP	
Document Name: 020414_SiteLocation.mxd Drawn By: [redacted] Date Saved Time Saved: 11:01:49 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

LUTTS RD.
CAMPBELL ST.
MACARTHUR ST.
WEST PATROL RD.
WEST DITCH
CENTRAL DITCH
EIGHTH ST.
SEVENTH ST.
SIXTH ST.
CASTLE GARDEN RD.
CAMPBELL ST.

"N" ST.
"N" ST. SOUTH POND
"O" ST.
"O" ST. NORTH POND
"O" ST. SOUTH DITCH
"W" ST.
"X" ST.
"Z" ST.
"R" ST.
SOUTH 16 DITCH
SOUTH 31 DITCH
MODERN DITCH

POND 5
POND 4
POND 3
POND 2
POND 1
NORTH POND
SOUTH POND
434 POND
STOCKPILE
STOCKPILE AREA
IWCS

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

Document Path: K:\NFSSPG\SArcMap\ESP\20131220714_SitePlan.mxd

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

US Army Corps of Engineers, Buffalo District

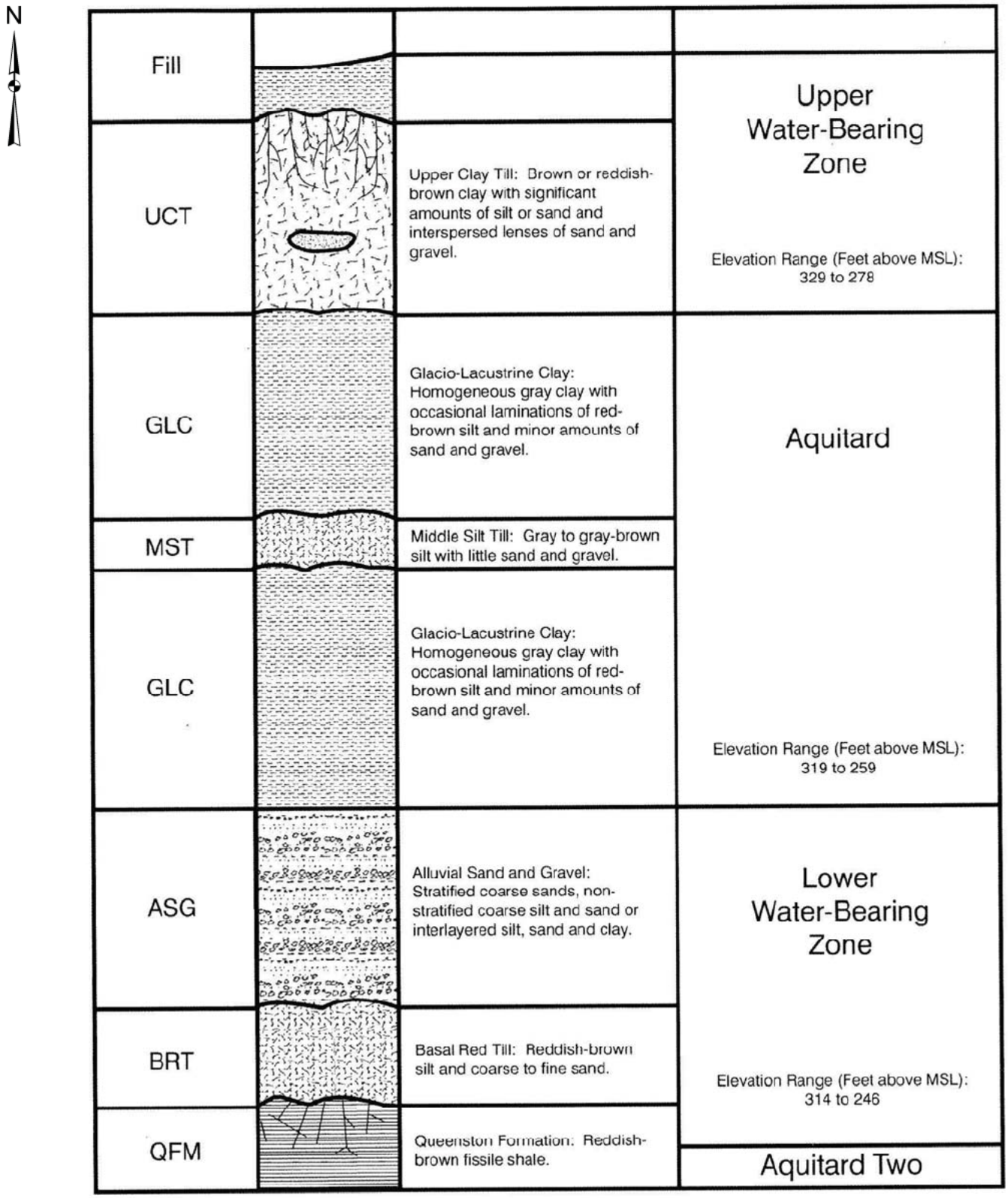
U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
BUFFALO, NY

SITE PLAN

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

NIAGARA FALLS STORAGE SITE
LEWISTON, NEW YORK

FIGURE 2



Document Path: K:\NFSSPVGIS\ArcMap\ESP2011\Figure03_Hydrostratigraphy.mxd

US Army Corps of Engineers
Buffalo District

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

SCHEMATIC OF CONCEPTUALIZED HYDROSTRATIGRAPHY

Name: Figure03_Hydrostratigraphy.mxd
Drawn By: H[redacted]
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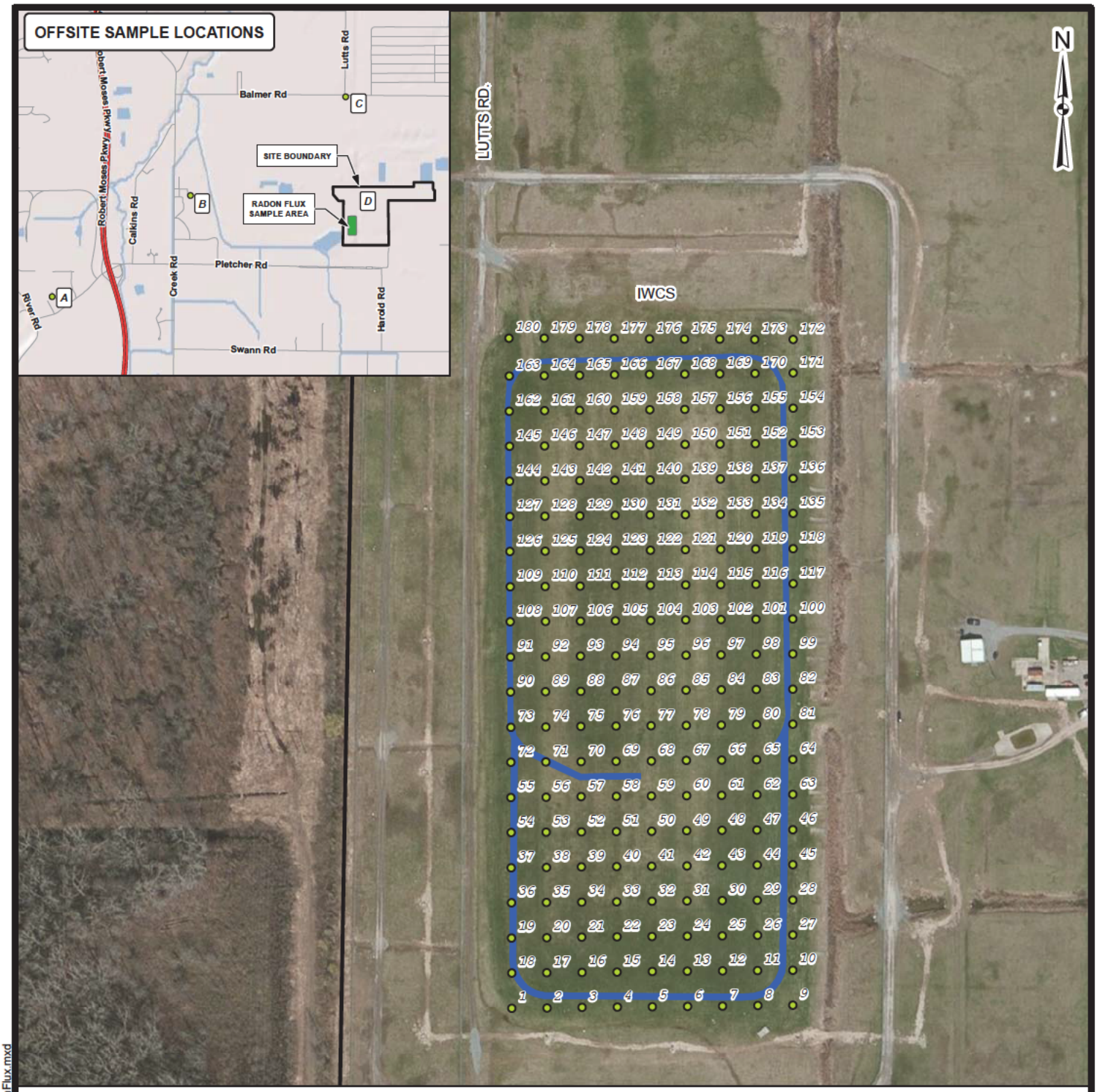
Time Saved: 3:41:57 PM

NIAGARA FALLS STORAGE SITE
LEWISTON, NEW YORK

FIGURE 3



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

US Army Corps of Engineers
Buffalo District

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

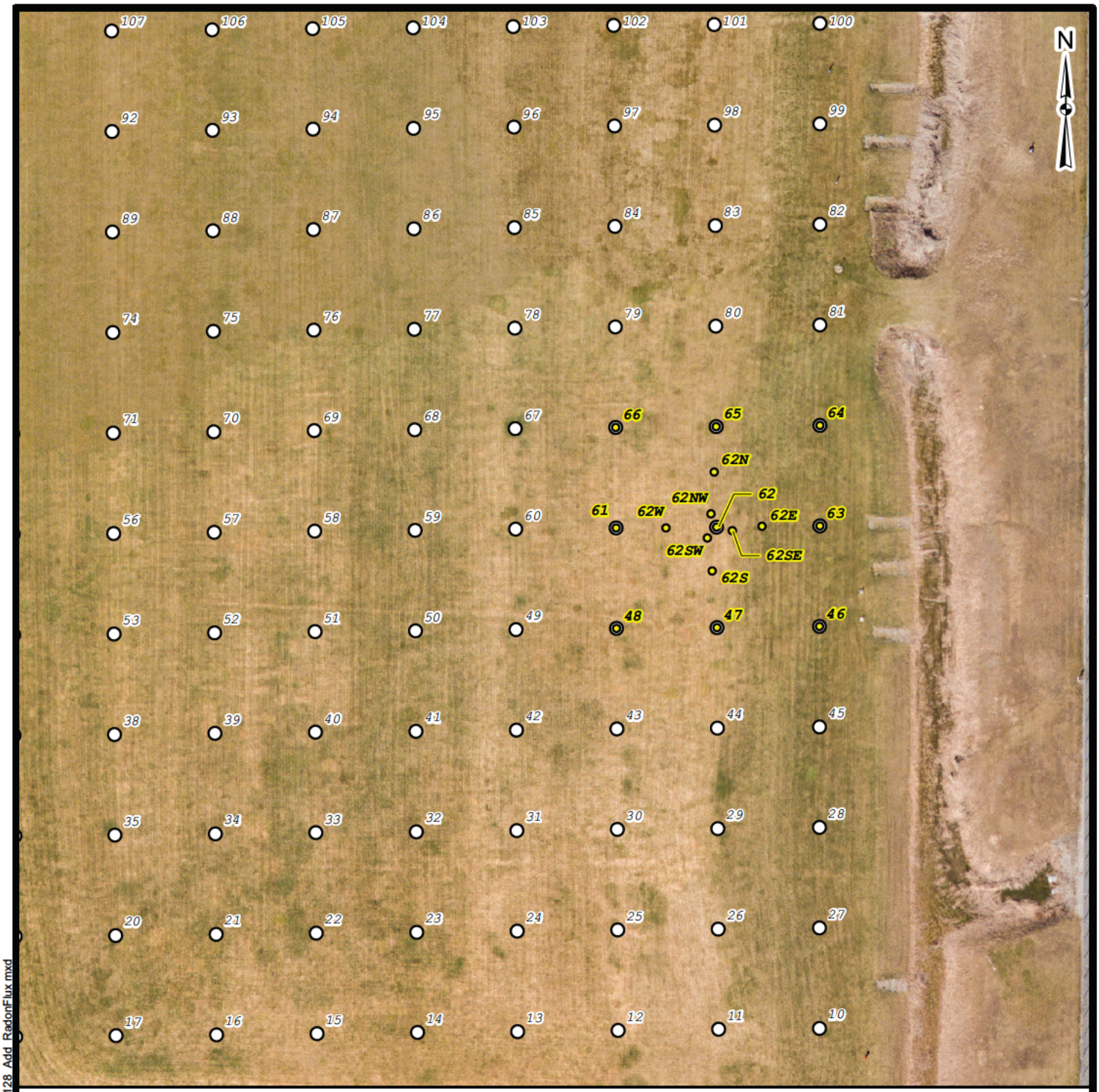
LOCATIONS OF RADON FLUX MEASUREMENTS ON THE IWCS

Name: 220714_ESPRadonFlux.mxd
Drawn By: H[redacted]
Date Saved: 23 Jul 2014
Time Saved: 9:52:36 AM

NIAGARA FALLS STORAGE SITE
LEWISTON, NEW YORK

FIGURE 4

Document Path: K:\NFSSPG\GIS\ArcMapESP\2013\220714_ESPRadonFlux.mxd



Legend

- Radon Flux Samples (Additional/Resample)
- Radon Flux Location
- NFSS Site Boundary

0 35 70 140 Feet

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CORPS OF ENGINEERS
BUFFALO, NY

LOCATION OF ADDITIONAL AND RESAMPLED RADON FLUX LOCATIONS

Name: 181128 Add RadonFlux.mxd
Drawn By: [redacted]
Date Saved: 10 Oct 2019
Time Saved: 9:20:41 AM

NIAGARA FALLS STORAGE SITE
LEWISTON, NEW YORK

FIGURE 4A

Document Path: K:\NFSSP\G S\ArcMap\Sampling Locations\2018\181128 Add RadonFlux.mxd

Legend

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

Notes:
1) If MW921 is dry, MW922 shall be sampled.
2) If MW946 is dry, 808A shall be sampled.
3) If MW947 is dry, MW422 shall be sampled, but if both MW947 and MW422 are dry, MW423 shall be sampled.

0 175 350 700 Feet

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BUFFALO, NY

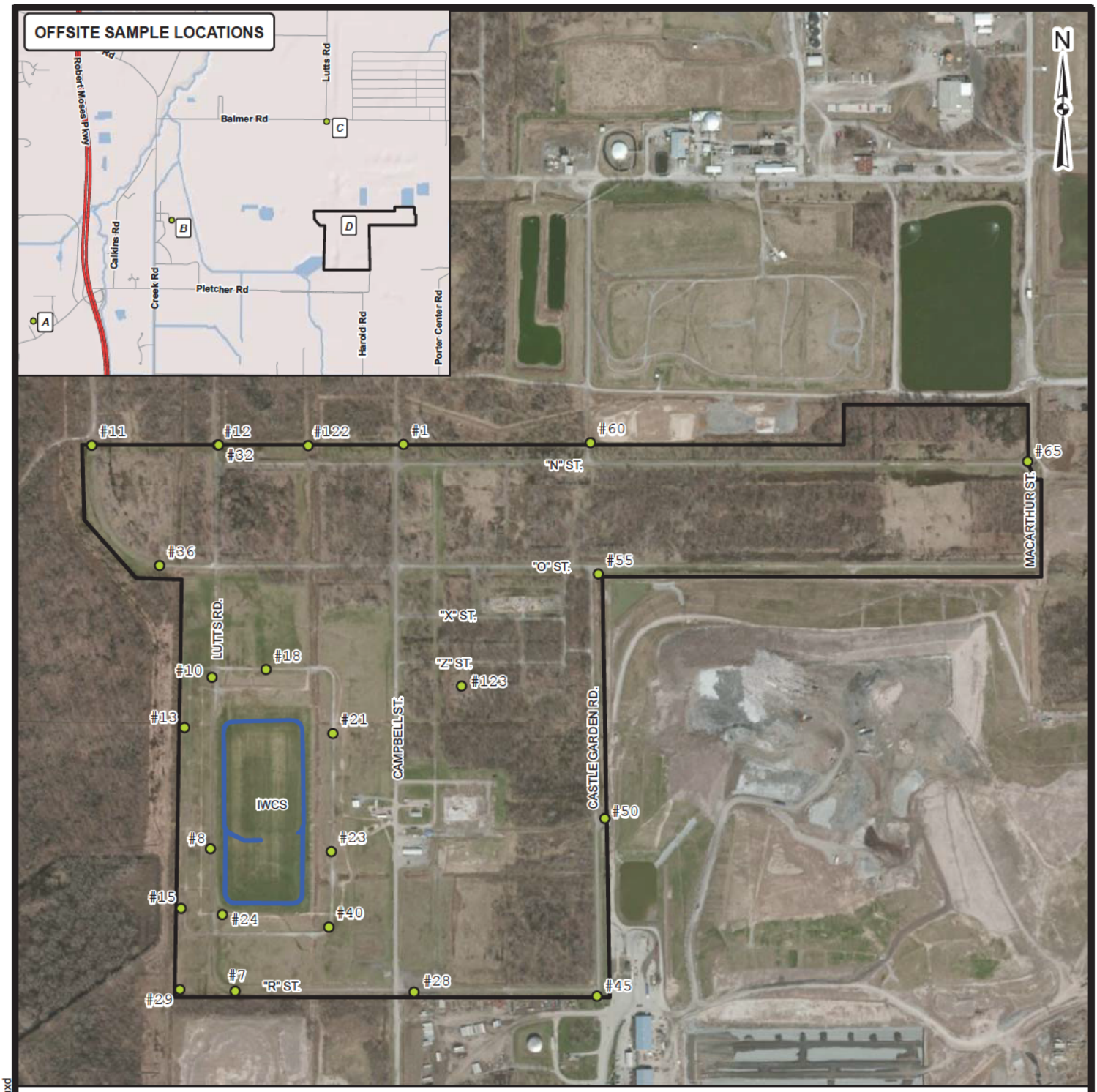
MONITORING WELL LOCATION MAP

Name: 200415_ESPSampleWells_Aerial.mxd
Drawn By: [redacted]
Date Saved: 20 Apr 2015
Time Saved: 3:01:21 PM

NIAGARA FALLS STORAGE SITE
LEWISTON, NEW YORK

FIGURE 5

Document Path: K:\NFSSP\GIS\ArcMap\Sampling Locations\2015\200415_ESPSampleWells_Aerial.mxd



Legend

- OSLDs and 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 OSLDs and RadTrack Detectors.

0 350 700 1,400 Feet

US Army Corps of Engineers
Buffalo District

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

LOCATION OF RADTRACK DETECTORS AND OPTICALLY STIMULATED LUMINESCENCE DOSIMETERS (OSLDs)

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

NIAGARA FALLS STORAGE SITE
LEWISTON, NEW YORK

FIGURE 6

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

Legend

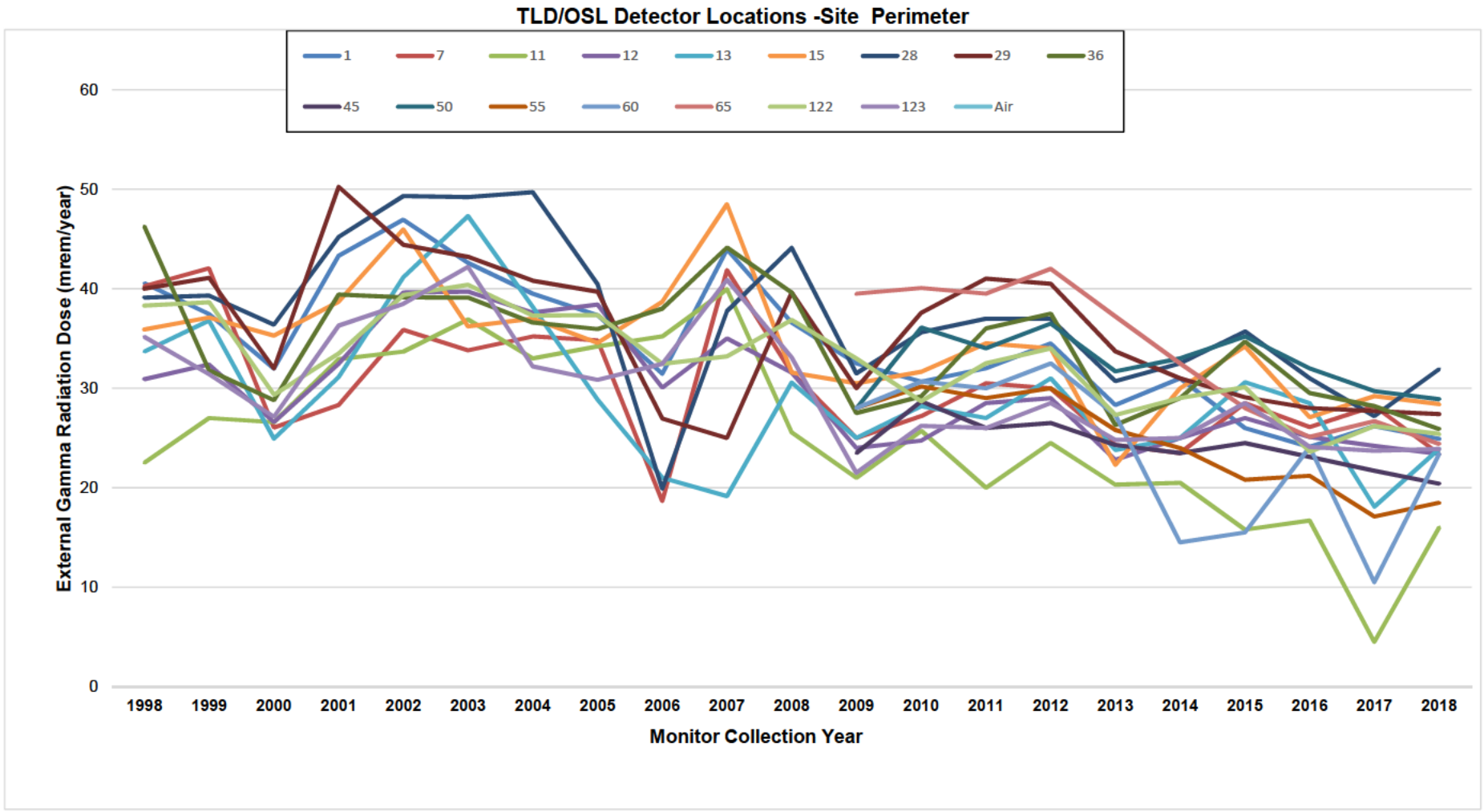
- Surface Water/Sediment Sample Location
- NFSS Site Boundary

0 175 350 700 Feet

US Army Corps of Engineers, Buffalo District — U.S. ARMY ENGINEER DISTRICT, CORPS OF ENGINEERS, BUFFALO, NY	SURFACE WATER/SEDIMENT SAMPLING LOCATION MAP	
Name: 130321_SWaterSed_Aerial.mxd Drawn By: [redacted] Date Saved: 30 Apr 2013 Time Saved: 12:26:07 PM	NIAGARA FALLS STORAGE SITE LEWISTON, NEW YORK	FIGURE 7

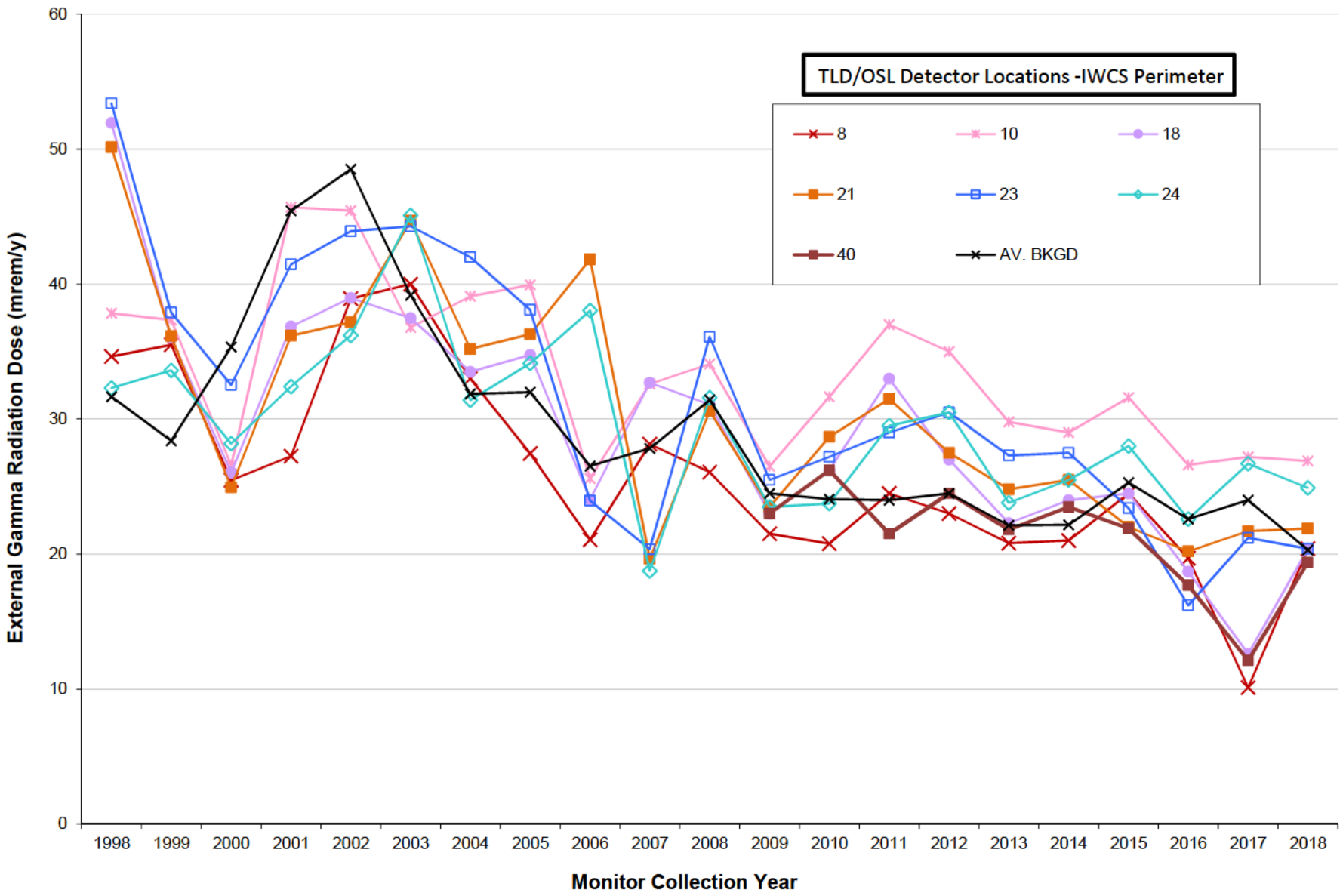
Document Path: K:\NFSSPG\GIS\ArcMap\Sampling_Locations\130321_SWaterSed_Aerial.mxd

FIGURE 8
EXTERNAL GAMMA RADIATION DOSE RATES AT NFSS PERIMETER



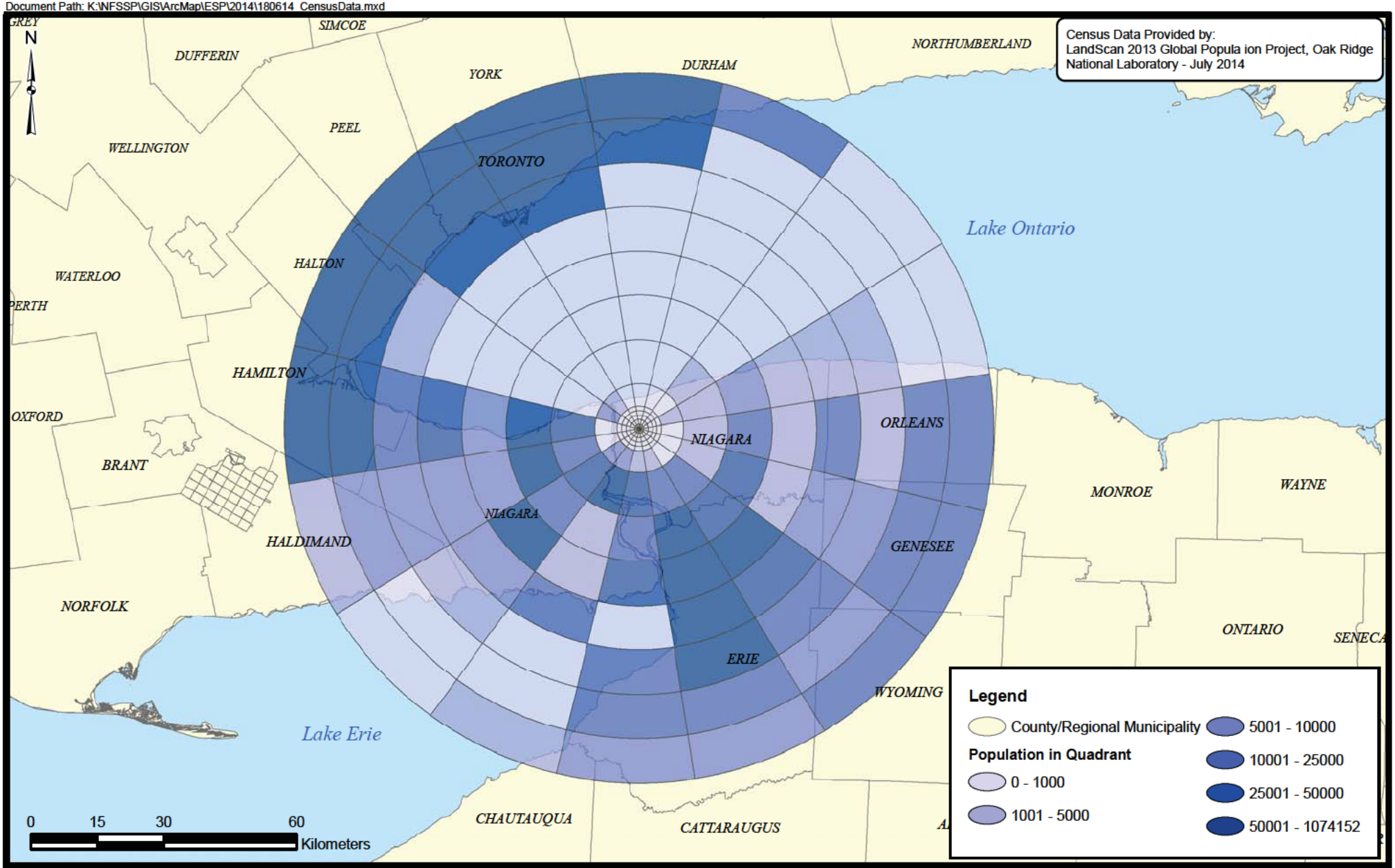
*USDOE limit for external gamma radiation is 100 mrem/year above background but the value for each detector location includes background.
Select 2016 and 2017 OSL results may be biased low as a result of laboratory detection sensitivity.

FIGURE 9
EXTERNAL GAMMA RADIATION DOSE RATES AT IWCS PERIMETER



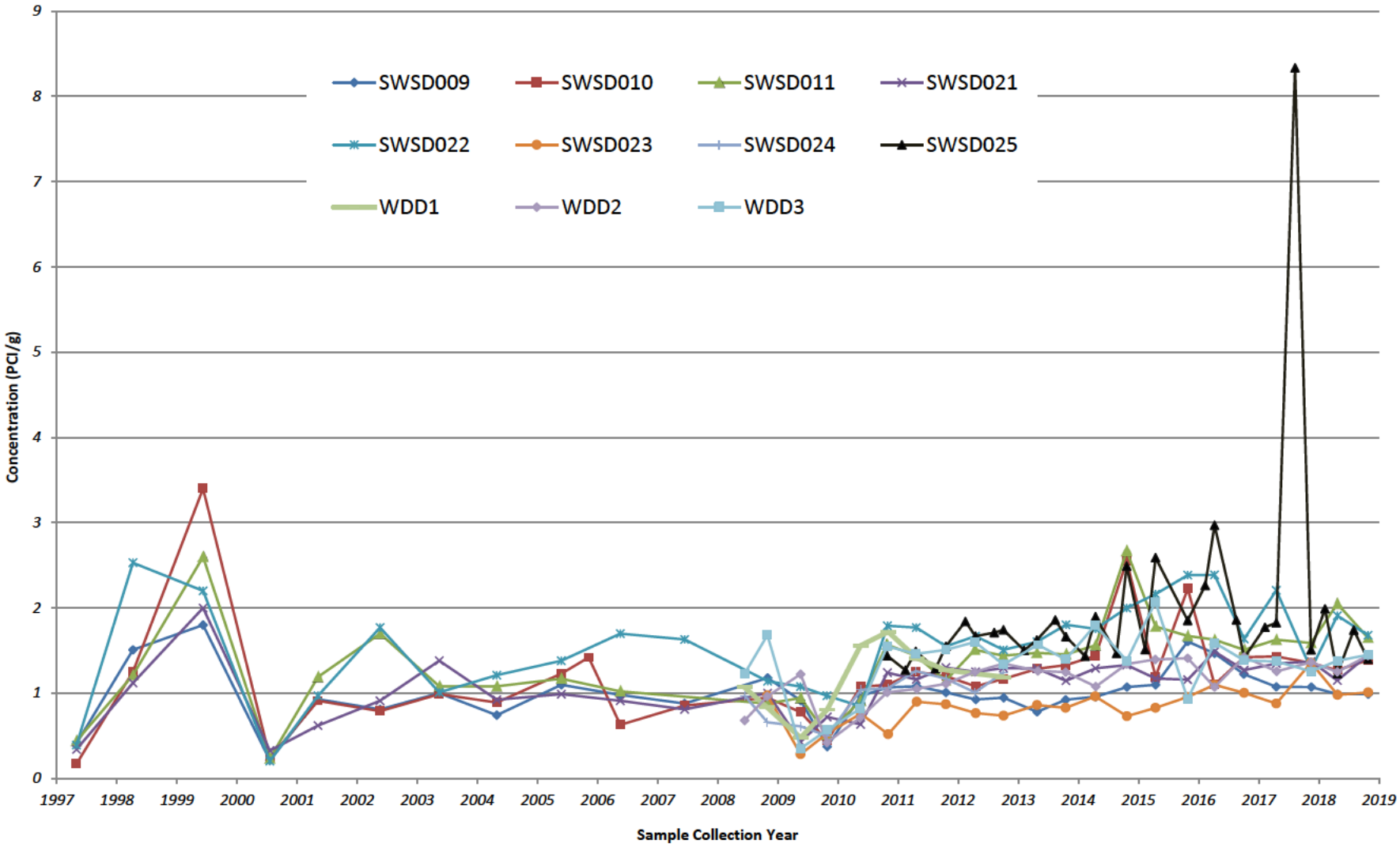
*The USDOE limit for external gamma radiation is 100 mrem/year above background but the value shown for each detector location includes background.
Select 2016 and 2017 OSL results may be biased low as a result of laboratory detection sensitivity.

Document Path: K:\NFSSP\GIS\ArcMap\ESP\2014\180614_CensusData.mxd



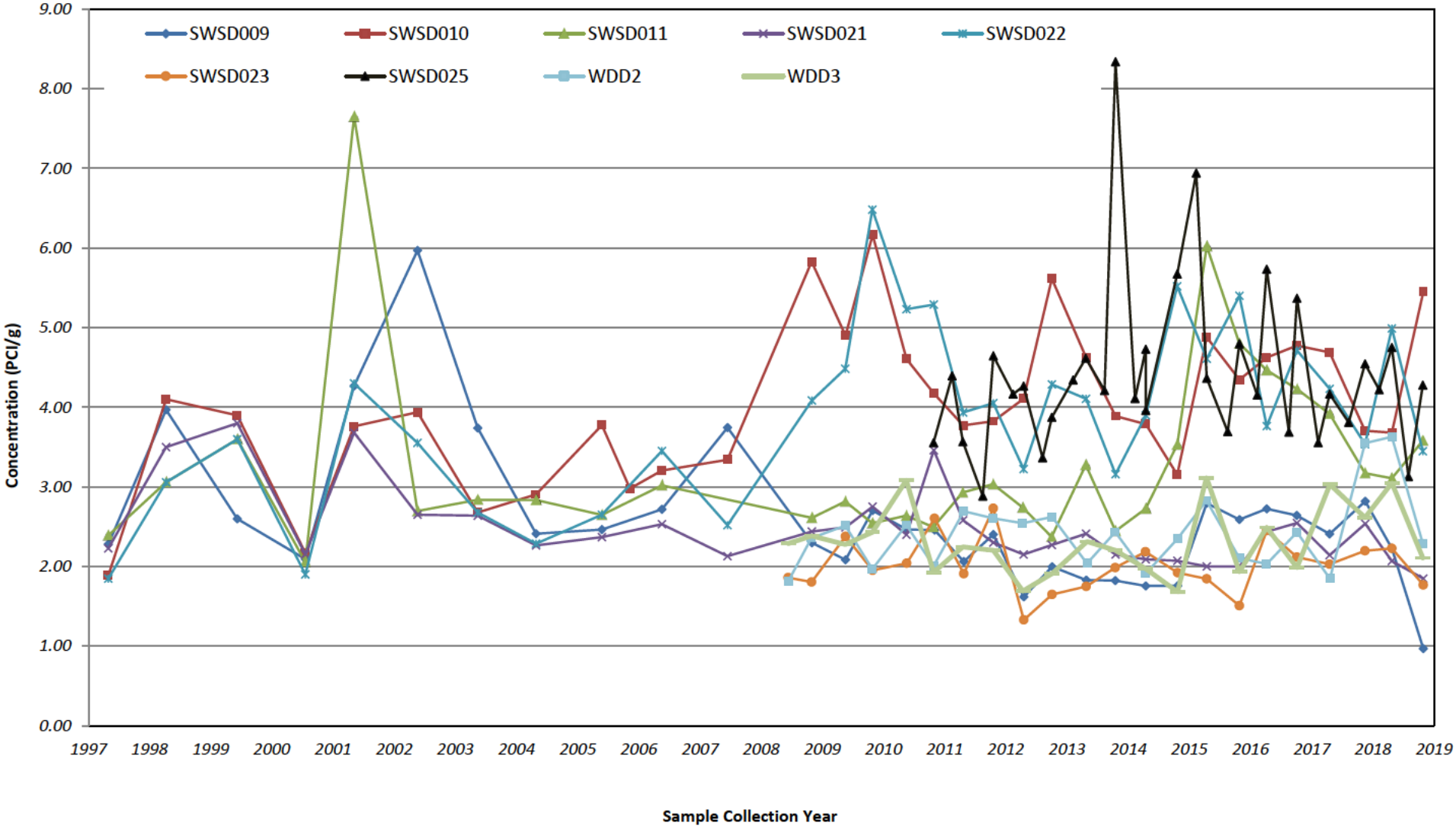
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS BUFFALO, NY	CENSUS DATA	
Document Name: 180614_CensusData.mxd Drawn By: [redacted] Date Saved: 25 Jun 2015 Time Saved: 1:48:47 PM	NIAGARA FALLS STORAGE SITE LEWISTON, NEW YORK	FIGURE 10

FIGURE 11
RADIUM-226 CONCENTRATIONS IN SEDIMENT
1997 - 2018



K \EDMS\Program\NFSS\Printing\EDMS.mdb
Copy of Fig_11_and_12_ESP_Graphs_sed_only_2017.xlsx, Radium-226 (Sediment), 10/16/2019

FIGURE 12
TOTAL URANIUM CONCENTRATIONS IN SEDIMENT
1997 - 2018



K \EDMS\Program\NFSS\Printing\EDMS.mdb
Copy of Fig_11_and_12_ESP_Graphs_sed_only_2017.xlsx, Total Uranium (Sediment), 10/16/2019

Legend

- Monitoring Well (Lower Water Bearing Zone)
- 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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CORPS OF ENGINEERS
BUFFALO, NY

GROUNDWATER ELEVATION MEASUREMENTS FOR THE LOWER WATER BEARING ZONE (APRIL 17, 2018 - SEASONAL HIGH)

Name: 190[redacted]gh.mxd
Drawn By [redacted]
Date Saved: 16 Oct 2019
Time Saved: 10:31:50 AM

NIAGARA FALLS STORAGE SITE
LEWISTON, NEW YORK

FIGURE 13

Document Path: K:\NFSSPG S\ArcMap\ESP\2018\190703_LWBZ_High.mxd

Legend

- Monitoring Well (Upper Water Bearing Zone)
- 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 ELEVATION MEASUREMENTS FOR THE UPPER WATER BEARING ZONE (APRIL 17, 2018 - SEASONAL HIGH)

Name: 190[redacted]High.mxd
Drawn By [redacted]
Date Saved: 16 Oct 2019
Time Saved: 10:39:33 AM

NIAGARA FALLS STORAGE SITE
LEWISTON, NEW YORK

FIGURE 14

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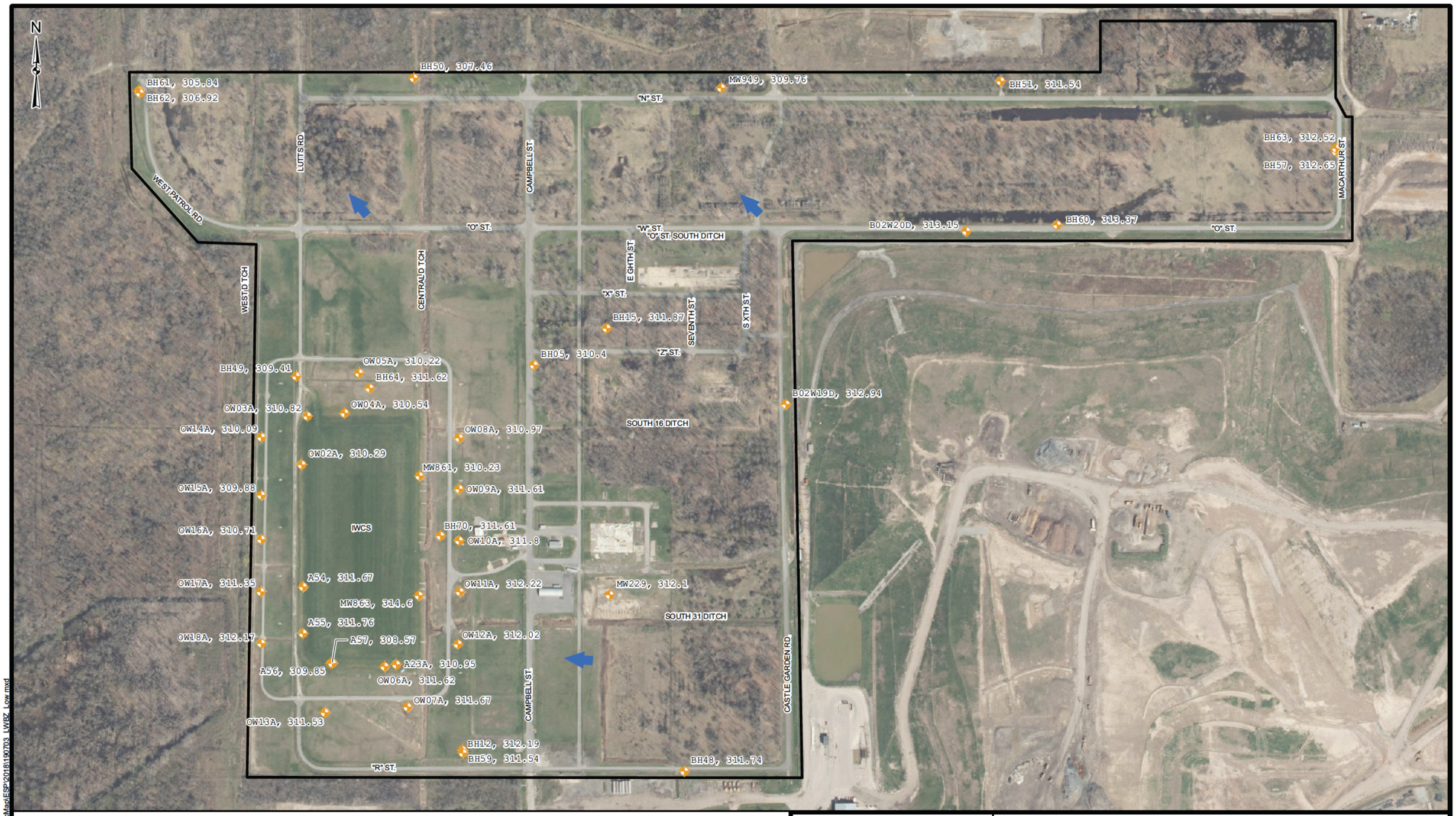


Legend

- Monitoring Well (Lower Water Bearing Zone)
- Groundwater Flow Direction
- NFSS Site Boundary

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

0 175 350 700 Feet

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

US Army Corps of Engineers
Buffalo District

GROUNDWATER ELEVATION MEASUREMENTS FOR THE LOWER WATER BEARING ZONE (OCTOBER 26, 2018 - SEASONAL LOW)

Name: 190703_LWBZ_Low.mxd
Drawn By: [redacted]
Date Saved: 12 Jul 2019
Time Saved: 3:08:16 PM

NIAGARA FALLS STORAGE SITE
LEWISTON, NEW YORK

FIGURE 15

Document Path: K:\NFSSP\GIS\ArcMap\ESP\2018\190703_LWBZ_Low.mxd

Legend

- Monitoring Well (Upper Water Bearing Zone)
- 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 ELEVATION MEASUREMENTS FOR THE UPPER WATER BEARING ZONE (OCTOBER 26, 2018 - SEASONAL LOW)

Name: 190703_UWBZ_Low.mxd
Drawn By: [redacted]
Date Saved: 03 Jul 2019
Time Saved: 11:43:31 AM

NIAGARA FALLS STORAGE SITE
LEWISTON, NEW YORK

FIGURE 16

Document Path: K:\NFSSP\GIS\ArcMap\ESP\2018\190703_UWBZ_Low.mxd

ATTACHMENT A

NON-RADIOLOGICAL ANALYTICAL DATA FOR SURFACE WATER AND SEDIMENT

TABLE A-1
SURFACE WATER ANALYTICAL RESULTS - PAHs
NIAGARA FALLS STORAGE SITE

Location Identifier		SWSD009	SWSD009	SWSD009	SWSD009	SWSD010
Field Sample Identifier		SWSD009	SWSD009-D	SWSD009	SWSD009-D	SWSD010
Sample Matrix		Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
Depth Interval (ft)		-	-	-	-	-
Date of Sample		04/23/18	04/23/18	10/24/18	10/24/18	04/23/18
Parameter	Units		Field Duplicate		Field Duplicate	
SEMI-VOLATILE ORGANIC ANALYSES						
2-METHYLNAPHTHALENE	UG/L	0.93 U	0.93 U	0.0259 J	0.02 UJ	0.95 U
ACENAPHTHENE	UG/L	0.93 U	0.93 U	0.014 U	0.014 U	0.95 U
ACENAPHTHYLENE	UG/L	0.93 U	0.93 U	0.011 U	0.011 U	0.95 U
ANTHRACENE	UG/L	0.93 U	0.93 U	0.0201 J	0.016 U	0.95 U
BENZO(A)ANTHRACENE	UG/L	0.93 U	0.93 U	0.0155 J	0.013 U	0.95 U
BENZO(A)PYRENE	UG/L	2.3 U	2.3 U	0.023 U	0.023 U	2.4 U
BENZO(B)FLUORANTHENE	UG/L	0.93 U	0.93 U	0.0216 J	0.015 J	0.95 U
BENZO(G,H,I)PERYLENE	UG/L	0.93 U	0.93 U	0.021 U	0.021 U	0.95 U
BENZO(K)FLUORANTHENE	UG/L	0.93 U	0.93 U	0.03 U	0.03 U	0.95 U
CHRYSENE	UG/L	0.93 U	0.93 U	0.0147 J	0.012 U	0.95 U
DIBENZ(A,H)ANTHRACENE	UG/L	0.93 U	0.93 U	0.0132 J	0.0094 UJ	0.95 U
FLUORANTHENE	UG/L	0.93 U	0.93 U	0.0301 J	0.026 U	0.95 U
FLUORENE	UG/L	0.93 U	0.93 U	0.015 U	0.015 U	0.95 U
INDENO(1,2,3-C,D)PYRENE	UG/L	0.93 U	0.93 U	0.016 J	0.013 U	0.95 U
NAPHTHALENE	UG/L	0.93 U	0.93 U	0.0234 J	0.0291 J	0.95 U
PHENANTHRENE	UG/L	0.93 U	0.93 U	0.025 U	0.025 U	0.95 U
PYRENE	UG/L	0.93 U	0.93 U	0.024 J	0.0201 J	0.95 U

The flags shown were assigned during chemistry validation.

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

NOTE: Detection limits shown are MDL.

TABLE A-1
SURFACE WATER ANALYTICAL RESULTS - PAHs
NIAGARA FALLS STORAGE SITE

Location Identifier		SWSD010	SWSD011	SWSD011	SWSD021	SWSD021
Field Sample Identifier		SWSD010	SWSD011	SWSD011	SWSD021	SWSD021
Sample Matrix		Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
Depth Interval (ft)		-	-	-	-	-
Date of Sample		10/24/18	04/23/18	10/24/18	04/23/18	10/24/18
Parameter	Units					
SEMI-VOLATILE ORGANIC ANALYSES						
2-METHYLNAPHTHALENE	UG/L	0.0204 J	0.94 U	0.02 U	0.93 U	0.0229 J
ACENAPHTHENE	UG/L	0.015 U	0.94 U	0.015 U	0.93 U	0.014 U
ACENAPHTHYLENE	UG/L	0.012 U	0.94 U	0.012 U	0.93 U	0.011 U
ANTHRACENE	UG/L	0.0242 J	0.94 U	0.017 U	0.93 U	0.016 U
BENZO(A)ANTHRACENE	UG/L	0.0283 J	0.94 U	0.013 U	0.93 U	0.242
BENZO(A)PYRENE	UG/L	0.025 J	2.4 U	0.024 U	2.3 U	0.253
BENZO(B)FLUORANTHENE	UG/L	0.0316 J	0.94 U	0.01 U	0.93 U	0.38
BENZO(G,H,I)PERYLENE	UG/L	0.0286 J	0.94 U	0.022 U	0.93 U	0.164
BENZO(K)FLUORANTHENE	UG/L	0.032 U	0.94 U	0.032 U	0.93 U	0.104
CHRYSENE	UG/L	0.0279 J	0.94 U	0.013 U	0.93 U	0.327
DIBENZ(A,H)ANTHRACENE	UG/L	0.0227 J	0.94 U	0.0098 U	0.93 U	0.036 J
FLUORANTHENE	UG/L	0.0353 J	0.94 U	0.027 U	0.93 U	0.44
FLUORENE	UG/L	0.0156 J	0.94 U	0.015 U	0.93 U	0.015 U
INDENO(1,2,3-C,D)PYRENE	UG/L	0.0296 J	0.94 U	0.013 U	0.93 U	0.144
NAPHTHALENE	UG/L	0.0143 R	0.94 U	0.0089 R	0.93 U	0.0537 J
PHENANTHRENE	UG/L	0.026 U	0.94 U	0.026 U	0.93 U	0.0491 J
PYRENE	UG/L	0.0326 J	0.94 U	0.015 U	0.93 U	0.365

The flags shown were assigned during chemistry validation.

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

NOTE: Detection limits shown are MDL.

TABLE A-1
SURFACE WATER ANALYTICAL RESULTS - PAHs
NIAGARA FALLS STORAGE SITE

Location Identifier		SWSD022	SWSD022	SWSD023	SWSD023	SWSD025
Field Sample Identifier		SWSD022	SWSD022	SWSD023	SWSD023	SWSD025
Sample Matrix		Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
Depth Interval (ft)		-	-	-	-	-
Date of Sample		04/23/18	10/24/18	04/23/18	10/25/18	02/07/18
Parameter	Units					
SEMI-VOLATILE ORGANIC ANALYSES						
2-METHYLNAPHTHALENE	UG/L	0.94 U	0.02 U	0.93 U	0.0324 J	0.93 U
ACENAPHTHENE	UG/L	0.94 U	0.015 U	0.93 U	0.014 U	0.93 U
ACENAPHTHYLENE	UG/L	0.94 U	0.012 U	0.93 U	0.0111 J	0.93 U
ANTHRACENE	UG/L	0.94 U	0.017 U	0.93 U	0.0209 J	0.93 U
BENZO(A)ANTHRACENE	UG/L	0.94 U	0.013 U	0.93 U	0.0217 J	0.93 U
BENZO(A)PYRENE	UG/L	2.4 U	0.024 U	2.3 U	0.023 U	2.3 U
BENZO(B)FLUORANTHENE	UG/L	0.94 U	0.01 U	0.93 U	0.0267 J	0.93 U
BENZO(G,H,I)PERYLENE	UG/L	0.94 U	0.022 U	0.93 U	0.025 J	0.93 U
BENZO(K)FLUORANTHENE	UG/L	0.94 U	0.032 U	0.93 U	0.03 U	0.93 U
CHRYSENE	UG/L	0.94 U	0.013 U	0.93 U	0.0259 J	0.93 U
DIBENZ(A,H)ANTHRACENE	UG/L	0.94 U	0.0098 U	0.93 U	0.0094 U	0.93 U
FLUORANTHENE	UG/L	0.94 U	0.027 U	0.93 U	0.0373 J	0.93 U
FLUORENE	UG/L	0.94 U	0.015 U	0.93 U	0.0157 J	0.93 U
INDENO(1,2,3-C,D)PYRENE	UG/L	0.94 U	0.013 U	0.93 U	0.0193 J	0.93 U
NAPHTHALENE	UG/L	0.94 U	0.0189 J	0.93 U	0.0326 J	0.93 U
PHENANTHRENE	UG/L	0.94 U	0.026 U	0.93 U	0.025 U	0.93 U
PYRENE	UG/L	0.94 U	0.015 U	0.93 U	0.0292 J	0.93 U

The flags shown were assigned during chemistry validation.

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

NOTE: Detection limits shown are MDL.

TABLE A-1
SURFACE WATER ANALYTICAL RESULTS - PAHs
NIAGARA FALLS STORAGE SITE

Location Identifier		SWSD025	SWSD025	SWSD025	WDD2	WDD2
Field Sample Identifier		SWSD025	SWSD025	SWSD025	WDD2	WDD2
Sample Matrix		Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
Depth Interval (ft)		-	-	-	-	-
Date of Sample		04/23/18	08/01/18	10/24/18	04/23/18	10/25/18
Parameter	Units					
SEMI-VOLATILE ORGANIC ANALYSES						
2-METHYLNAPHTHALENE	UG/L	0.94 U	0.93 UJ	0.02 J	0.93 U	0.0324 J
ACENAPHTHENE	UG/L	0.94 U	0.93 UJ	0.015 U	0.93 U	0.014 U
ACENAPHTHYLENE	UG/L	0.94 U	0.93 UJ	0.012 U	0.93 U	0.011 U
ANTHRACENE	UG/L	0.94 U	0.93 UJ	0.017 U	0.93 U	0.016 U
BENZO(A)ANTHRACENE	UG/L	0.94 U	0.93 UJ	0.013 U	0.93 U	0.013 U
BENZO(A)PYRENE	UG/L	2.4 U	2.3 UJ	0.024 U	2.3 U	0.023 U
BENZO(B)FLUORANTHENE	UG/L	0.94 U	0.93 UJ	0.01 U	0.93 U	0.0098 U
BENZO(G,H,I)PERYLENE	UG/L	0.94 U	0.93 UJ	0.022 U	0.93 U	0.021 U
BENZO(K)FLUORANTHENE	UG/L	0.94 U	0.93 UJ	0.032 U	0.93 U	0.03 U
CHRYSENE	UG/L	0.94 U	0.93 UJ	0.013 U	0.93 U	0.012 U
DIBENZ(A,H)ANTHRACENE	UG/L	0.94 U	0.93 UJ	0.0098 U	0.93 U	0.0094 U
FLUORANTHENE	UG/L	0.94 U	0.93 UJ	0.027 U	0.93 U	0.026 U
FLUORENE	UG/L	0.94 U	0.93 UJ	0.015 U	0.93 U	0.0156 J
INDENO(1,2,3-C,D)PYRENE	UG/L	0.94 U	0.93 UJ	0.013 U	0.93 U	0.013 U
NAPHTHALENE	UG/L	0.94 U	0.93 UJ	0.109 B	0.93 U	0.0217 J
PHENANTHRENE	UG/L	0.94 U	0.93 UJ	0.026 U	0.93 U	0.025 U
PYRENE	UG/L	0.94 U	0.93 UJ	0.015 U	0.93 U	0.014 U

The flags shown were assigned during chemistry validation.

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

NOTE: Detection limits shown are MDL.

TABLE A-1
SURFACE WATER ANALYTICAL RESULTS - PAHs
NIAGARA FALLS STORAGE SITE

Location Identifier		WDD3	WDD3
Field Sample Identifier		WDD3	WDD3
Sample Matrix		Surface Water	Surface Water
Depth Interval (ft)		-	-
Date of Sample		04/23/18	10/25/18
Parameter	Units		
SEMI-VOLATILE ORGANIC ANALYSES			
2-METHYLNAPHTHALENE	UG/L	0.93 U	0.0403 J
ACENAPHTHENE	UG/L	0.93 U	0.015 U
ACENAPHTHYLENE	UG/L	0.93 U	0.012 U
ANTHRACENE	UG/L	0.93 U	0.017 U
BENZO(A)ANTHRACENE	UG/L	0.93 U	0.013 U
BENZO(A)PYRENE	UG/L	2.3 U	0.024 U
BENZO(B)FLUORANTHENE	UG/L	0.93 U	0.01 U
BENZO(G,H,I)PERYLENE	UG/L	0.93 U	0.022 U
BENZO(K)FLUORANTHENE	UG/L	0.93 U	0.032 U
CHRYSENE	UG/L	0.93 U	0.013 U
DIBENZ(A,H)ANTHRACENE	UG/L	0.93 U	0.0098 U
FLUORANTHENE	UG/L	0.93 U	0.027 U
FLUORENE	UG/L	0.93 U	0.015 U
INDENO(1,2,3-C,D)PYRENE	UG/L	0.93 U	0.013 U
NAPHTHALENE	UG/L	0.93 U	0.117 B
PHENANTHRENE	UG/L	0.93 U	0.026 U
PYRENE	UG/L	0.93 U	0.015 U

The flags shown were assigned during chemistry validation.

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

NOTE: Detection limits shown are MDL.

TABLE A-2
SURFACE WATER ANALYTICAL RESULTS - METALS
NIAGARA FALLS STORAGE SITE

Location Identifier		SWSD009	SWSD009	SWSD009	SWSD009	SWSD010
Field Sample Identifier		SWSD009	SWSD009-D	SWSD009	SWSD009-D	SWSD010
Sample Matrix		Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
Depth Interval (ft)		-	-	-	-	-
Date of Sample		04/23/18	04/23/18	10/24/18	10/24/18	04/23/18
Parameter	Units		Field Duplicate		Field Duplicate	
METALS						
ALUMINUM	UG/L	520	610	450 J	400 J	320
ANTIMONY	UG/L	8	8.2	3.5 J	3.5 J	3.7
ARSENIC	UG/L	3.5	3.7	1.6 J	1.8 J	1.8
BARIUM	UG/L	68	68	64	64	57
BERYLLIUM	UG/L	0.5 U	0.5 U	1 U	1 U	0.5 U
BORON	UG/L	300 J	300 J	440 J	430 J	330 J
CADMIUM	UG/L	0.5 U	0.5 U	1 U	1 U	0.5 U
CALCIUM	UG/L	120,000	120,000	120,000	120,000	96,000
CHROMIUM, TOTAL	UG/L	24	25	1.7 J	1.6 J	20
COBALT	UG/L	0.98 J	0.97 J	0.38 J	0.39 J	0.46 J
COPPER	UG/L	9.8	10	5.6 J	5.2 J	5.5
IRON	UG/L	1,900	1,900	650	620	1,500
LEAD	UG/L	3	2.9	1.6 J	1.6 J	1.1
LITHIUM	UG/L	29 J	30 J	33 J	34 J	17 J
MAGNESIUM	UG/L	43,000	44,000	39,000	41,000	29,000
MANGANESE	UG/L	73	74	110	100	27
MERCURY	UG/L	0.1 U	0.1 U	0.12 J	0.086 J	0.1 U
MOLYBDENUM	UG/L	8.5	8.8	9.2 J	8.7 J	4.6 J
NICKEL	UG/L	10 J	10 J	3.9 J	4 J	7.8 J
POTASSIUM	UG/L	30,000	30,000	10,000	10,000	7,800
SELENIUM	UG/L	6.4	8	5 U	5 U	3.6 J

The flags shown were assigned during chemistry validation.

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

NOTE: Detection limits shown are MDL.

TABLE A-2
SURFACE WATER ANALYTICAL RESULTS - METALS
NIAGARA FALLS STORAGE SITE

Location Identifier		SWSD009	SWSD009	SWSD009	SWSD009	SWSD010
Field Sample Identifier		SWSD009	SWSD009-D	SWSD009	SWSD009-D	SWSD010
Sample Matrix		Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
Depth Interval (ft)		-	-	-	-	-
Date of Sample		04/23/18	04/23/18	10/24/18	10/24/18	04/23/18
Parameter	Units		Field Duplicate		Field Duplicate	
METALS						
SILVER	UG/L	0.5 U	0.5 U	1 U	1 U	0.5 U
SODIUM	UG/L	170,000 J	170,000 J	140,000	140,000	86,000 J
THALLIUM	UG/L	0.43 J	0.45 J	0.33 J	1 U	0.32 J
VANADIUM	UG/L	7.4	7.6	5 U	5 U	3.9 J
ZINC	UG/L	22 J	24 J	26 J	22 J	19 J
METALS (FILTERED)						
ALUMINUM	UG/L	14 J	Not Analyzed	5.5 J	Not Analyzed	Not Analyzed
ANTIMONY	UG/L	6.8	Not Analyzed	4	Not Analyzed	Not Analyzed
ARSENIC	UG/L	3.5	Not Analyzed	1.3 J	Not Analyzed	Not Analyzed
BARIUM	UG/L	60	Not Analyzed	60	Not Analyzed	Not Analyzed
BERYLLIUM	UG/L	0.5 U	Not Analyzed	0.5 U	Not Analyzed	Not Analyzed
BORON	UG/L	370 J	Not Analyzed	400 J	Not Analyzed	Not Analyzed
CADMIUM	UG/L	0.5 U	Not Analyzed	0.5 U	Not Analyzed	Not Analyzed
CALCIUM	UG/L	120,000	Not Analyzed	120,000	Not Analyzed	Not Analyzed
CHROMIUM, TOTAL	UG/L	19	Not Analyzed	0.83 J	Not Analyzed	Not Analyzed
COBALT	UG/L	0.74 J	Not Analyzed	0.5 U	Not Analyzed	Not Analyzed
COPPER	UG/L	6.9	Not Analyzed	3.3 J	Not Analyzed	Not Analyzed
IRON	UG/L	740	Not Analyzed	110 J	Not Analyzed	Not Analyzed
LEAD	UG/L	1.4	Not Analyzed	0.92 J	Not Analyzed	Not Analyzed
LITHIUM	UG/L	30 J	Not Analyzed	35 J	Not Analyzed	Not Analyzed
MAGNESIUM	UG/L	42,000	Not Analyzed	43,000	Not Analyzed	Not Analyzed

The flags shown were assigned during chemistry validation.

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

NOTE: Detection limits shown are MDL.

TABLE A-2
SURFACE WATER ANALYTICAL RESULTS - METALS
NIAGARA FALLS STORAGE SITE

Location Identifier		SWSD009	SWSD009	SWSD009	SWSD009	SWSD010
Field Sample Identifier		SWSD009	SWSD009-D	SWSD009	SWSD009-D	SWSD010
Sample Matrix		Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
Depth Interval (ft)		-	-	-	-	-
Date of Sample		04/23/18	04/23/18	10/24/18	10/24/18	04/23/18
Parameter	Units		Field Duplicate		Field Duplicate	
METALS (FILTERED)						
MANGANESE	UG/L	61	Not Analyzed	92	Not Analyzed	Not Analyzed
MERCURY	UG/L	0.1 U	Not Analyzed	0.1 U	Not Analyzed	Not Analyzed
MOLYBDENUM	UG/L	9.1	Not Analyzed	8.7	Not Analyzed	Not Analyzed
NICKEL	UG/L	9.3 J	Not Analyzed	4.2 J	Not Analyzed	Not Analyzed
POTASSIUM	UG/L	15,000	Not Analyzed	9,500	Not Analyzed	Not Analyzed
SELENIUM	UG/L	6.6	Not Analyzed	2.5 U	Not Analyzed	Not Analyzed
SILVER	UG/L	0.5 U	Not Analyzed	0.5 U	Not Analyzed	Not Analyzed
SODIUM	UG/L	160,000	Not Analyzed	140,000	Not Analyzed	Not Analyzed
THALLIUM	UG/L	2 U	Not Analyzed	1.2 J	Not Analyzed	Not Analyzed
VANADIUM	UG/L	5.8	Not Analyzed	2.5 U	Not Analyzed	Not Analyzed
ZINC	UG/L	9.3 J	Not Analyzed	11 J	Not Analyzed	Not Analyzed

The flags shown were assigned during chemistry validation.

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

NOTE: Detection limits shown are MDL.

TABLE A-2
SURFACE WATER ANALYTICAL RESULTS - METALS
NIAGARA FALLS STORAGE SITE

Location Identifier		SWSD010	SWSD011	SWSD011	SWSD021	SWSD021
Field Sample Identifier		SWSD010	SWSD011	SWSD011	SWSD021	SWSD021
Sample Matrix		Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
Depth Interval (ft)		-	-	-	-	-
Date of Sample		10/24/18	04/23/18	10/24/18	04/23/18	10/24/18
Parameter	Units					
METALS						
ALUMINUM	UG/L	410 J	960	120 J	1,200	110 J
ANTIMONY	UG/L	1.4 J	2.6	1.5 U	0.67 J	1.5 U
ARSENIC	UG/L	1.2 J	1.2 J	2 U	1.3 J	1.4 J
BARIUM	UG/L	67	64	64	68	74
BERYLLIUM	UG/L	1 U	0.5 U	1 U	0.5 U	1 U
BORON	UG/L	710 J	210 J	760 J	44 J	85 U
CADMIUM	UG/L	1 U	0.5 U	1 U	0.5 U	1 U
CALCIUM	UG/L	110,000	97,000	130,000	90,000	97,000
CHROMIUM, TOTAL	UG/L	3.4 J	11	0.8 U	23	270
COBALT	UG/L	1 U	0.69 J	1 U	0.75 J	1 U
COPPER	UG/L	2.2 J	3.8 J	1.1 J	3.6 J	2.3 J
IRON	UG/L	480	2,200	740	2,300	210 J
LEAD	UG/L	0.72 J	1.1	1 U	0.5 J	1 U
LITHIUM	UG/L	20 J	11 J	17 J	7.2 J	7.5 J
MAGNESIUM	UG/L	33,000	28,000	38,000	29,000	22,000
MANGANESE	UG/L	41	66	410	67	58
MERCURY	UG/L	0.099 J	0.1 U	0.1 J	0.1 U	0.1 J
MOLYBDENUM	UG/L	4.4 J	2.1 J	3.9 J	2 J	7.8 J
NICKEL	UG/L	2.6 J	7 J	2.5 J	6.8 J	1 U
POTASSIUM	UG/L	6,800	4,800	5,100	3,500	4,600
SELENIUM	UG/L	5 U	2.4 J	5 U	2.5 U	5 U

The flags shown were assigned during chemistry validation.

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

NOTE: Detection limits shown are MDL.

TABLE A-2
SURFACE WATER ANALYTICAL RESULTS - METALS
NIAGARA FALLS STORAGE SITE

Location Identifier		SWSD010	SWSD011	SWSD011	SWSD021	SWSD021
Field Sample Identifier		SWSD010	SWSD011	SWSD011	SWSD021	SWSD021
Sample Matrix		Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
Depth Interval (ft)		-	-	-	-	-
Date of Sample		10/24/18	04/23/18	10/24/18	04/23/18	10/24/18
Parameter	Units					
METALS						
SILVER	UG/L	1 U	0.53 J	1 U	0.5 U	1 U
SODIUM	UG/L	96,000	36,000 J	88,000	38,000 J	11,000
THALLIUM	UG/L	1 U	0.26 J	1 U	0.21 J	1 U
VANADIUM	UG/L	5 U	2.9 J	5 U	3.1 J	5 U
ZINC	UG/L	11 J	12 J	12 J	3.5 J	10 U
METALS (FILTERED)						
ALUMINUM	UG/L	Not Analyzed	Not Analyzed	Not Analyzed	25 J	Not Analyzed
ANTIMONY	UG/L	Not Analyzed	Not Analyzed	Not Analyzed	0.75 U	Not Analyzed
ARSENIC	UG/L	Not Analyzed	Not Analyzed	Not Analyzed	1 J	Not Analyzed
BARIUM	UG/L	Not Analyzed	Not Analyzed	Not Analyzed	60	Not Analyzed
BERYLLIUM	UG/L	Not Analyzed	Not Analyzed	Not Analyzed	0.5 U	Not Analyzed
BORON	UG/L	Not Analyzed	Not Analyzed	Not Analyzed	48 J	Not Analyzed
CADMIUM	UG/L	Not Analyzed	Not Analyzed	Not Analyzed	0.5 U	Not Analyzed
CALCIUM	UG/L	Not Analyzed	Not Analyzed	Not Analyzed	92,000	Not Analyzed
CHROMIUM, TOTAL	UG/L	Not Analyzed	Not Analyzed	Not Analyzed	19	Not Analyzed
COBALT	UG/L	Not Analyzed	Not Analyzed	Not Analyzed	0.65 J	Not Analyzed
COPPER	UG/L	Not Analyzed	Not Analyzed	Not Analyzed	3 J	Not Analyzed
IRON	UG/L	Not Analyzed	Not Analyzed	Not Analyzed	790	Not Analyzed
LEAD	UG/L	Not Analyzed	Not Analyzed	Not Analyzed	0.29 J	Not Analyzed
LITHIUM	UG/L	Not Analyzed	Not Analyzed	Not Analyzed	6.4 J	Not Analyzed
MAGNESIUM	UG/L	Not Analyzed	Not Analyzed	Not Analyzed	29,000	Not Analyzed

The flags shown were assigned during chemistry validation.

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

NOTE: Detection limits shown are MDL.

TABLE A-2
SURFACE WATER ANALYTICAL RESULTS - METALS
NIAGARA FALLS STORAGE SITE

Location Identifier		SWSD010	SWSD011	SWSD011	SWSD021	SWSD021
Field Sample Identifier		SWSD010	SWSD011	SWSD011	SWSD021	SWSD021
Sample Matrix		Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
Depth Interval (ft)		-	-	-	-	-
Date of Sample		10/24/18	04/23/18	10/24/18	04/23/18	10/24/18
Parameter	Units					
METALS (FILTERED)						
MANGANESE	UG/L	Not Analyzed	Not Analyzed	Not Analyzed	63	Not Analyzed
MERCURY	UG/L	Not Analyzed	Not Analyzed	Not Analyzed	0.1 U	Not Analyzed
MOLYBDENUM	UG/L	Not Analyzed	Not Analyzed	Not Analyzed	2 J	Not Analyzed
NICKEL	UG/L	Not Analyzed	Not Analyzed	Not Analyzed	5.9 J	Not Analyzed
POTASSIUM	UG/L	Not Analyzed	Not Analyzed	Not Analyzed	3,400	Not Analyzed
SELENIUM	UG/L	Not Analyzed	Not Analyzed	Not Analyzed	2.5 U	Not Analyzed
SILVER	UG/L	Not Analyzed	Not Analyzed	Not Analyzed	0.5 U	Not Analyzed
SODIUM	UG/L	Not Analyzed	Not Analyzed	Not Analyzed	39,000	Not Analyzed
THALLIUM	UG/L	Not Analyzed	Not Analyzed	Not Analyzed	2 U	Not Analyzed
VANADIUM	UG/L	Not Analyzed	Not Analyzed	Not Analyzed	2.5 U	Not Analyzed
ZINC	UG/L	Not Analyzed	Not Analyzed	Not Analyzed	5 U	Not Analyzed

The flags shown were assigned during chemistry validation.

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

NOTE: Detection limits shown are MDL.

TABLE A-2
SURFACE WATER ANALYTICAL RESULTS - METALS
NIAGARA FALLS STORAGE SITE

Location Identifier		SWSD022	SWSD022	SWSD023	SWSD023	SWSD025
Field Sample Identifier		SWSD022	SWSD022	SWSD023	SWSD023	SWSD025
Sample Matrix		Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
Depth Interval (ft)		-	-	-	-	-
Date of Sample		04/23/18	10/24/18	04/23/18	10/25/18	02/07/18
Parameter	Units					
METALS						
ALUMINUM	UG/L	97	3,000 J	98	160	100
ANTIMONY	UG/L	0.68 J	1.5 U	3.7	0.59	4
ARSENIC	UG/L	0.74 J	3.3	2.1	1.2 U	2
BARIUM	UG/L	64	100	61	60	95
BERYLLIUM	UG/L	0.5 U	1 U	0.5 U	0.5 U	0.55 J
BORON	UG/L	230 J	790 J	120 J	170	380 J
CADMIUM	UG/L	0.5 U	1 U	0.5 U	0.54 U	0.5 U
CALCIUM	UG/L	110,000	130,000	110,000	110,000	140,000
CHROMIUM, TOTAL	UG/L	5.2 J	7.9 J	12	0.61 U	8 J
COBALT	UG/L	0.4 J	2.8 J	0.4 J	0.29 U	0.66 J
COPPER	UG/L	2.7 J	6.2 J	3.8 J	1 U	4 J
IRON	UG/L	1,300	6,700	1,600	610	1,300
LEAD	UG/L	0.5 U	4.2	0.82 J	1.4	0.78 J
LITHIUM	UG/L	7.2 J	21 J	9.8 J	26	25 J
MAGNESIUM	UG/L	26,000	37,000	35,000	31,000	46,000
MANGANESE	UG/L	14	2,300	61	140	66
MERCURY	UG/L	0.1 U	0.11 J	0.1 U	0.084 U	0.1 U
MOLYBDENUM	UG/L	0.95 J	2.9 J	3.9 J	3.1	4 J
NICKEL	UG/L	7.1 J	6.4 J	10	0.82 U	11
POTASSIUM	UG/L	4,600	5,700	4,600	5,700	9,500
SELENIUM	UG/L	1.8 J	5 U	1.7 J	2.9 U	3 J

The flags shown were assigned during chemistry validation.

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

NOTE: Detection limits shown are MDL.

TABLE A-2
SURFACE WATER ANALYTICAL RESULTS - METALS
NIAGARA FALLS STORAGE SITE

Location Identifier		SWSD022	SWSD022	SWSD023	SWSD023	SWSD025
Field Sample Identifier		SWSD022	SWSD022	SWSD023	SWSD023	SWSD025
Sample Matrix		Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
Depth Interval (ft)		-	-	-	-	-
Date of Sample		04/23/18	10/24/18	04/23/18	10/25/18	02/07/18
Parameter	Units					
METALS						
SILVER	UG/L	0.5 U	1 U	0.5 U	0.42 U	1 J
SODIUM	UG/L	19,000 J	97,000	120,000 J	89,000	120,000
THALLIUM	UG/L	0.5 U	1 U	0.32 J	0.33 U	0.46 J
VANADIUM	UG/L	2.5 U	6.9 J	3.5 J	2.7 U	2 J
ZINC	UG/L	6.6 J	42 J	16 J	9.6	13 J
METALS (FILTERED)						
ALUMINUM	UG/L	Not Analyzed	3.5 J	Not Analyzed	Not Analyzed	Not Analyzed
ANTIMONY	UG/L	Not Analyzed	2.6	Not Analyzed	Not Analyzed	Not Analyzed
ARSENIC	UG/L	Not Analyzed	0.84 J	Not Analyzed	Not Analyzed	Not Analyzed
BARIUM	UG/L	Not Analyzed	52	Not Analyzed	Not Analyzed	Not Analyzed
BERYLLIUM	UG/L	Not Analyzed	0.5 U	Not Analyzed	Not Analyzed	Not Analyzed
BORON	UG/L	Not Analyzed	750	Not Analyzed	Not Analyzed	Not Analyzed
CADMIUM	UG/L	Not Analyzed	0.5 U	Not Analyzed	Not Analyzed	Not Analyzed
CALCIUM	UG/L	Not Analyzed	120,000	Not Analyzed	Not Analyzed	Not Analyzed
CHROMIUM, TOTAL	UG/L	Not Analyzed	0.82 J	Not Analyzed	Not Analyzed	Not Analyzed
COBALT	UG/L	Not Analyzed	0.5 U	Not Analyzed	Not Analyzed	Not Analyzed
COPPER	UG/L	Not Analyzed	0.94 J	Not Analyzed	Not Analyzed	Not Analyzed
IRON	UG/L	Not Analyzed	460	Not Analyzed	Not Analyzed	Not Analyzed
LEAD	UG/L	Not Analyzed	0.52 J	Not Analyzed	Not Analyzed	Not Analyzed
LITHIUM	UG/L	Not Analyzed	21 J	Not Analyzed	Not Analyzed	Not Analyzed
MAGNESIUM	UG/L	Not Analyzed	36,000	Not Analyzed	Not Analyzed	Not Analyzed

The flags shown were assigned during chemistry validation.

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

NOTE: Detection limits shown are MDL.

TABLE A-2
SURFACE WATER ANALYTICAL RESULTS - METALS
NIAGARA FALLS STORAGE SITE

Location Identifier		SWSD022	SWSD022	SWSD023	SWSD023	SWSD025
Field Sample Identifier		SWSD022	SWSD022	SWSD023	SWSD023	SWSD025
Sample Matrix		Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
Depth Interval (ft)		-	-	-	-	-
Date of Sample		04/23/18	10/24/18	04/23/18	10/25/18	02/07/18
Parameter	Units					
METALS (FILTERED)						
MANGANESE	UG/L	Not Analyzed	340	Not Analyzed	Not Analyzed	Not Analyzed
MERCURY	UG/L	Not Analyzed	0.1 U	Not Analyzed	Not Analyzed	Not Analyzed
MOLYBDENUM	UG/L	Not Analyzed	3.6 J	Not Analyzed	Not Analyzed	Not Analyzed
NICKEL	UG/L	Not Analyzed	2.6 J	Not Analyzed	Not Analyzed	Not Analyzed
POTASSIUM	UG/L	Not Analyzed	4,500	Not Analyzed	Not Analyzed	Not Analyzed
SELENIUM	UG/L	Not Analyzed	1.9 J	Not Analyzed	Not Analyzed	Not Analyzed
SILVER	UG/L	Not Analyzed	0.5 U	Not Analyzed	Not Analyzed	Not Analyzed
SODIUM	UG/L	Not Analyzed	92,000	Not Analyzed	Not Analyzed	Not Analyzed
THALLIUM	UG/L	Not Analyzed	1.7 J	Not Analyzed	Not Analyzed	Not Analyzed
VANADIUM	UG/L	Not Analyzed	2.5 U	Not Analyzed	Not Analyzed	Not Analyzed
ZINC	UG/L	Not Analyzed	5 U	Not Analyzed	Not Analyzed	Not Analyzed

The flags shown were assigned during chemistry validation.

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

NOTE: Detection limits shown are MDL.

TABLE A-2
SURFACE WATER ANALYTICAL RESULTS - METALS
NIAGARA FALLS STORAGE SITE

Location Identifier		SWSD025	SWSD025	SWSD025	WDD2	WDD2
Field Sample Identifier		SWSD025	SWSD025	SWSD025	WDD2	WDD2
Sample Matrix		Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
Depth Interval (ft)		-	-	-	-	-
Date of Sample		04/23/18	08/01/18	10/24/18	04/23/18	10/25/18
Parameter	Units					
METALS						
ALUMINUM	UG/L	210	56	92 J	1,100	86
ANTIMONY	UG/L	1.7 J	0.85 J	1.5 U	0.64 J	0.38 U
ARSENIC	UG/L	1.1 J	2.8	1.2 J	1.3 J	1.2 U
BARIUM	UG/L	58	100	56	33	23
BERYLLIUM	UG/L	0.5 U	0.5 U	1 U	0.5 U	0.5 U
BORON	UG/L	240 J	1,000	720 J	52 J	79
CADMIUM	UG/L	0.5 U	0.5 U	1 U	0.5 U	0.54 U
CALCIUM	UG/L	110,000	190,000	130,000	53,000	62,000
CHROMIUM, TOTAL	UG/L	12	4.3 J	1.1 J	7.3 J	0.61 U
COBALT	UG/L	0.4 J	1 J	0.3 J	0.43 J	0.29 U
COPPER	UG/L	3.8 J	2.2 J	3 U	2.3 J	1 U
IRON	UG/L	1,600	2,500	1,200	1,500	350
LEAD	UG/L	0.48 J	0.5 U	1 U	0.62 J	0.48 U
LITHIUM	UG/L	12 J	23 J	16 J	6.5 J	14
MAGNESIUM	UG/L	33,000	50,000	35,000	20,000	19,000
MANGANESE	UG/L	34	2,100	440	51	260
MERCURY	UG/L	0.1 U	0.1 U	0.13 J	0.1 U	0.12
MOLYBDENUM	UG/L	2.8 J	9.8	3.1 J	1.3 J	2
NICKEL	UG/L	8.1 J	10	2 J	5.2 J	0.82 U
POTASSIUM	UG/L	5,700	6,300	4,800	5,000	8,700
SELENIUM	UG/L	2.5 J	2.5 U	5 U	2.5 U	2.9 U

The flags shown were assigned during chemistry validation.

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

NOTE: Detection limits shown are MDL.

TABLE A-2
SURFACE WATER ANALYTICAL RESULTS - METALS
NIAGARA FALLS STORAGE SITE

Location Identifier		SWSD025	SWSD025	SWSD025	WDD2	WDD2
Field Sample Identifier		SWSD025	SWSD025	SWSD025	WDD2	WDD2
Sample Matrix		Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
Depth Interval (ft)		-	-	-	-	-
Date of Sample		04/23/18	08/01/18	10/24/18	04/23/18	10/25/18
Parameter	Units					
METALS						
SILVER	UG/L	0.5 U	0.5 U	1 U	0.5 U	0.42 U
SODIUM	UG/L	50,000 J	83,000	95,000	36,000 J	42,000
THALLIUM	UG/L	0.28 J	0.5 U	1 U	0.23 J	0.33 U
VANADIUM	UG/L	2.2 J	1.7 J	5 U	3 J	2.7 U
ZINC	UG/L	6 J	10 J	5.8 J	4.3 J	4.8 U
METALS (FILTERED)						
ALUMINUM	UG/L	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed
ANTIMONY	UG/L	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed
ARSENIC	UG/L	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed
BARIUM	UG/L	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed
BERYLLIUM	UG/L	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed
BORON	UG/L	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed
CADMIUM	UG/L	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed
CALCIUM	UG/L	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed
CHROMIUM, TOTAL	UG/L	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed
COBALT	UG/L	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed
COPPER	UG/L	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed
IRON	UG/L	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed
LEAD	UG/L	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed
LITHIUM	UG/L	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed
MAGNESIUM	UG/L	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed

The flags shown were assigned during chemistry validation.

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

NOTE: Detection limits shown are MDL.

TABLE A-2
SURFACE WATER ANALYTICAL RESULTS - METALS
NIAGARA FALLS STORAGE SITE

Location Identifier		SWSD025	SWSD025	SWSD025	WDD2	WDD2
Field Sample Identifier		SWSD025	SWSD025	SWSD025	WDD2	WDD2
Sample Matrix		Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
Depth Interval (ft)		-	-	-	-	-
Date of Sample		04/23/18	08/01/18	10/24/18	04/23/18	10/25/18
Parameter	Units					
METALS (FILTERED)						
MANGANESE	UG/L	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed
MERCURY	UG/L	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed
MOLYBDENUM	UG/L	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed
NICKEL	UG/L	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed
POTASSIUM	UG/L	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed
SELENIUM	UG/L	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed
SILVER	UG/L	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed
SODIUM	UG/L	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed
THALLIUM	UG/L	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed
VANADIUM	UG/L	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed
ZINC	UG/L	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed

The flags shown were assigned during chemistry validation.

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

NOTE: Detection limits shown are MDL.

TABLE A-2
SURFACE WATER ANALYTICAL RESULTS - METALS
NIAGARA FALLS STORAGE SITE

Location Identifier		WDD3	WDD3
Field Sample Identifier		WDD3	WDD3
Sample Matrix		Surface Water	Surface Water
Depth Interval (ft)		-	-
Date of Sample		04/23/18	10/25/18
Parameter	Units		
METALS			
ALUMINUM	UG/L	940	160
ANTIMONY	UG/L	0.72 J	0.83
ARSENIC	UG/L	1.4 J	1.6
BARIUM	UG/L	33	24
BERYLLIUM	UG/L	0.5 U	0.5 U
BORON	UG/L	53 J	77
CADMIUM	UG/L	0.5 U	0.54 U
CALCIUM	UG/L	53,000	71,000
CHROMIUM, TOTAL	UG/L	6.3 J	0.61 U
COBALT	UG/L	0.4 J	0.29 U
COPPER	UG/L	2.3 J	1 U
IRON	UG/L	1,500	300
LEAD	UG/L	0.6 J	0.48 U
LITHIUM	UG/L	6.7 J	14
MAGNESIUM	UG/L	20,000	19,000
MANGANESE	UG/L	42	60
MERCURY	UG/L	0.1 U	0.091
MOLYBDENUM	UG/L	1.4 J	2.6
NICKEL	UG/L	5 J	0.82 U
POTASSIUM	UG/L	4,600	9,600
SELENIUM	UG/L	2.5 U	2.9 U

The flags shown were assigned during chemistry validation.

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

NOTE: Detection limits shown are MDL.

TABLE A-2
SURFACE WATER ANALYTICAL RESULTS - METALS
NIAGARA FALLS STORAGE SITE

Location Identifier		WDD3	WDD3
Field Sample Identifier		WDD3	WDD3
Sample Matrix		Surface Water	Surface Water
Depth Interval (ft)		-	-
Date of Sample		04/23/18	10/25/18
Parameter	**Units**		
METALS			
SILVER	UG/L	0.5 U	0.42 U
SODIUM	UG/L	35,000 J	45,000
THALLIUM	UG/L	0.23 J	0.33 U
VANADIUM	UG/L	2.9 J	2.7 U
ZINC	UG/L	4.7 J	4.8 U
METALS (FILTERED)			
ALUMINUM	UG/L	Not Analyzed	Not Analyzed
ANTIMONY	UG/L	Not Analyzed	Not Analyzed
ARSENIC	UG/L	Not Analyzed	Not Analyzed
BARIUM	UG/L	Not Analyzed	Not Analyzed
BERYLLIUM	UG/L	Not Analyzed	Not Analyzed
BORON	UG/L	Not Analyzed	Not Analyzed
CADMIUM	UG/L	Not Analyzed	Not Analyzed
CALCIUM	UG/L	Not Analyzed	Not Analyzed
CHROMIUM, TOTAL	UG/L	Not Analyzed	Not Analyzed
COBALT	UG/L	Not Analyzed	Not Analyzed
COPPER	UG/L	Not Analyzed	Not Analyzed
IRON	UG/L	Not Analyzed	Not Analyzed
LEAD	UG/L	Not Analyzed	Not Analyzed
LITHIUM	UG/L	Not Analyzed	Not Analyzed
MAGNESIUM	UG/L	Not Analyzed	Not Analyzed

The flags shown were assigned during chemistry validation.

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

NOTE: Detection limits shown are MDL.

TABLE A-2
SURFACE WATER ANALYTICAL RESULTS - METALS
NIAGARA FALLS STORAGE SITE

Location Identifier		WDD3	WDD3
Field Sample Identifier		WDD3	WDD3
Sample Matrix		Surface Water	Surface Water
Depth Interval (ft)		-	-
Date of Sample		04/23/18	10/25/18
Parameter	**Units**		
METALS (FILTERED)			
MANGANESE	UG/L	Not Analyzed	Not Analyzed
MERCURY	UG/L	Not Analyzed	Not Analyzed
MOLYBDENUM	UG/L	Not Analyzed	Not Analyzed
NICKEL	UG/L	Not Analyzed	Not Analyzed
POTASSIUM	UG/L	Not Analyzed	Not Analyzed
SELENIUM	UG/L	Not Analyzed	Not Analyzed
SILVER	UG/L	Not Analyzed	Not Analyzed
SODIUM	UG/L	Not Analyzed	Not Analyzed
THALLIUM	UG/L	Not Analyzed	Not Analyzed
VANADIUM	UG/L	Not Analyzed	Not Analyzed
ZINC	UG/L	Not Analyzed	Not Analyzed

The flags shown were assigned during chemistry validation.

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

NOTE: Detection limits shown are MDL.

TABLE A-3
SEDIMENT ANALYTICAL RESULTS - METALS
NIAGARA FALLS STORAGE SITE

Location Identifier		SWSD009	SWSD009	SWSD009	SWSD009	SWSD010
Field Sample Identifier		SWSD009	SWSD009-D	SWSD009	SWSD009-D	SWSD010
Sample Matrix		Sediment	Sediment	Sediment	Sediment	Sediment
Depth Interval (ft)		-	-	-	-	-
Date of Sample		04/25/18	04/25/18	10/29/18	10/29/18	04/24/18
Parameter	Units		Field Duplicate		Field Duplicate	
METALS						
ALUMINUM	*MG/KG*	19,000	19,000 J	14,400	19,400 J	30,000
ANTIMONY	*MG/KG*	8.9	8.5 J	1.3 J	1.9 J	14
ARSENIC	*MG/KG*	6.9	5.8 J	5.6 J	7.5 J	9.2
BARIUM	*MG/KG*	120	100 J	100 J	136 J	140
BERYLLIUM	*MG/KG*	0.84	0.66 J	0.71 J	0.98 J	1.1
BORON	*MG/KG*	31	32	Not Analyzed	Not Analyzed	47
CADMIUM	*MG/KG*	1.2	1.2 J	0.91 J	1.4 J	1.1
CALCIUM	*MG/KG*	56,000	51,000 J	41,400 J	59,600 J	50,000
CHROMIUM, TOTAL	*MG/KG*	66	55 J	40.2 J	59.9 J	88
COBALT	*MG/KG*	8.6	8.2 J	9.2 J	12.8 J	13
COPPER	*MG/KG*	76	74 J	57.5 J	93 J	100
IRON	*MG/KG*	24,000	26,000 J	20,600 J	29,300 J	40,000
LEAD	*MG/KG*	49	49 J	46.4 J	61.3 J	67
LITHIUM	*MG/KG*	24	23	28.9	30.4	38
MAGNESIUM	*MG/KG*	14,000	13,000 J	11,300 J	15,100 J	18,000
MANGANESE	*MG/KG*	890	710 J	474 J	720 J	930
MERCURY	*MG/KG*	0.2	0.19	0.23 J	0.21 J	0.21
MOLYBDENUM	*MG/KG*	2.3	2 J	Not Analyzed	Not Analyzed	4.3
NICKEL	*MG/KG*	29	27 J	27.1 J	34.9 J	40
POTASSIUM	*MG/KG*	4,500	5,200 J	3,280 J	4,740 J	7,600
SELENIUM	*MG/KG*	1.5 UJ	1.5 UJ	1.3 U	1.5 U	2.5 UJ

The flags shown were assigned during chemistry validation.

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

NOTE: Detection limits shown are MDL.

TABLE A-3
SEDIMENT ANALYTICAL RESULTS - METALS
NIAGARA FALLS STORAGE SITE

Location Identifier		SWSD009	SWSD009	SWSD009	SWSD009	SWSD010
Field Sample Identifier		SWSD009	SWSD009-D	SWSD009	SWSD009-D	SWSD010
Sample Matrix		Sediment	Sediment	Sediment	Sediment	Sediment
Depth Interval (ft)		-	-	-	-	-
Date of Sample		04/25/18	04/25/18	10/29/18	10/29/18	04/24/18
Parameter	Units		Field Duplicate		Field Duplicate	
METALS						
SILVER	MG/KG	0.2 J	0.084 J	0.55 J	0.67 J	0.42 U
SODIUM	MG/KG	590	550 J	430 J	563 J	670
THALLIUM	MG/KG	1.5 J	0.61 J	1.1 U	1.3 U	1.3 J
VANADIUM	MG/KG	36	34 J	31.5 J	43.9 J	55
ZINC	MG/KG	350	300 J	277	346	370

The flags shown were assigned during chemistry validation.

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

NOTE: Detection limits shown are MDL.

TABLE A-3
SEDIMENT ANALYTICAL RESULTS - METALS
NIAGARA FALLS STORAGE SITE

Location Identifier		SWSD010	SWSD011	SWSD011	SWSD021	SWSD021
Field Sample Identifier		SWSD010	SWSD011	SWSD011	SWSD021	SWSD021
Sample Matrix		Sediment	Sediment	Sediment	Sediment	Sediment
Depth Interval (ft)		-	-	-	-	-
Date of Sample		10/29/18	04/24/18	10/26/18	04/24/18	10/29/18
Parameter	Units					
METALS						
ALUMINUM	MG/KG	28,700	29,000	23,600	30,000	26,400
ANTIMONY	MG/KG	1.9 J	13	1.4 UJ	12	0.7 UJ
ARSENIC	MG/KG	9.7	8.4	8.3	5.1	6.3 J
BARIUM	MG/KG	161	150	154	130	153
BERYLLIUM	MG/KG	1.3	1	1.2	1.1	1.3
BORON	MG/KG	Not Analyzed	37	Not Analyzed	28	Not Analyzed
CADMIUM	MG/KG	1.3 J	0.68	0.7 J	0.064 J	0.12 J
CALCIUM	MG/KG	65,400	46,000	36,400	43,000	49,200
CHROMIUM, TOTAL	MG/KG	125	66	68.1	64	63.1
COBALT	MG/KG	16 J	13	14.2 J	12	16.6
COPPER	MG/KG	103	65	61.1	32	34.7
IRON	MG/KG	37,500	40,000	34,800	37,000	40,200
LEAD	MG/KG	70.4	34	36.9	10	15
LITHIUM	MG/KG	41.2	37	45.2	40	50.2
MAGNESIUM	MG/KG	17,500	15,000	12,600	14,000	14,200
MANGANESE	MG/KG	875	1,400	1,450	770	772
MERCURY	MG/KG	0.26 J	0.12	0.17 J	0.03	0.049 J
MOLYBDENUM	MG/KG	Not Analyzed	2.6	Not Analyzed	0.48 J	Not Analyzed
NICKEL	MG/KG	43.4	39	36	34	40.3
POTASSIUM	MG/KG	7,510 J	7,800	5,940 J	7,900	6,200 J
SELENIUM	MG/KG	3.1 U	2 UJ	2.3 U	1.6 UJ	2.2 U

The flags shown were assigned during chemistry validation.

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

NOTE: Detection limits shown are MDL.

TABLE A-3
SEDIMENT ANALYTICAL RESULTS - METALS
NIAGARA FALLS STORAGE SITE

Location Identifier		SWSD010	SWSD011	SWSD011	SWSD021	SWSD021
Field Sample Identifier		SWSD010	SWSD011	SWSD011	SWSD021	SWSD021
Sample Matrix		Sediment	Sediment	Sediment	Sediment	Sediment
Depth Interval (ft)		-	-	-	-	-
Date of Sample		10/29/18	04/24/18	10/26/18	04/24/18	10/29/18
Parameter	Units					
METALS						
SILVER	MG/KG	0.99 J	0.17 J	0.6 U	0.27 U	0.58 U
SODIUM	MG/KG	802 J	410	539 J	310	283 J
THALLIUM	MG/KG	2.7 U	1.4 J	2 U	1.1 J	2 U
VANADIUM	MG/KG	57.8	49	47.8	43	51.4
ZINC	MG/KG	412	300	327	71	93.4

The flags shown were assigned during chemistry validation.

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

NOTE: Detection limits shown are MDL.

TABLE A-3
SEDIMENT ANALYTICAL RESULTS - METALS
NIAGARA FALLS STORAGE SITE

Location Identifier		SWSD022	SWSD022	SWSD023	SWSD023	SWSD025
Field Sample Identifier		SWSD022	SWSD022	SWSD023	SWSD023	SWSD025
Sample Matrix		Sediment	Sediment	Sediment	Sediment	Sediment
Depth Interval (ft)		-	-	-	-	-
Date of Sample		04/24/18	10/26/18	04/25/18	10/29/18	02/07/18
Parameter	Units					
METALS						
ALUMINUM	MG/KG	32,000	23,100	16,000	10,400	27,000
ANTIMONY	MG/KG	14	1.3 J	10	1.1 J	13
ARSENIC	MG/KG	7.3	16.3	13	7.6	11
BARIUM	MG/KG	170	193	130	83.1	150
BERYLLIUM	MG/KG	1.2	1.1	0.65	0.59	0.97
BORON	MG/KG	41	Not Analyzed	26	Not Analyzed	46
CADMIUM	MG/KG	0.4	0.55 J	1.6	0.85 J	0.64
CALCIUM	MG/KG	41,000	29,500	110,000	83,900	32,000
CHROMIUM, TOTAL	MG/KG	62	58.8	60	21.9	55
COBALT	MG/KG	14	13.3 J	9.9	7.4 J	14
COPPER	MG/KG	58	52.6	200	68	55
IRON	MG/KG	41,000	42,100	30,000	17,300	38,000
LEAD	MG/KG	33	37.6	180	83.8	32
LITHIUM	MG/KG	43	47.7	22	19	30
MAGNESIUM	MG/KG	16,000	12,600	44,000	32,400	13,000
MANGANESE	MG/KG	810	734	790	543	1,700
MERCURY	MG/KG	0.11	0.16 J	0.35	0.22 J	0.069
MOLYBDENUM	MG/KG	1.4	Not Analyzed	7.5	Not Analyzed	3.6
NICKEL	MG/KG	44	35.1	34	20.8	35
POTASSIUM	MG/KG	8,500	5,670 J	3,200	2,510 J	8,500
SELENIUM	MG/KG	2 UJ	2.1 U	1.6 UJ	1.4 U	2.7 U

The flags shown were assigned during chemistry validation.

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

NOTE: Detection limits shown are MDL.

TABLE A-3
SEDIMENT ANALYTICAL RESULTS - METALS
NIAGARA FALLS STORAGE SITE

Location Identifier		SWSD022	SWSD022	SWSD023	SWSD023	SWSD025
Field Sample Identifier		SWSD022	SWSD022	SWSD023	SWSD023	SWSD025
Sample Matrix		Sediment	Sediment	Sediment	Sediment	Sediment
Depth Interval (ft)		-	-	-	-	-
Date of Sample		04/24/18	10/26/18	04/25/18	10/29/18	02/07/18
Parameter	Units					
METALS						
SILVER	*MG/KG*	0.33 U	0.55 J	0.72 J	0.79 J	0.48 J
SODIUM	*MG/KG*	470	583 J	430	353 J	550
THALLIUM	*MG/KG*	1.3 J	1.9 U	0.6 J	1.2 U	1.9 J
VANADIUM	*MG/KG*	56	50.2	29	27.7	55
ZINC	*MG/KG*	220	246	1,200	470	250

The flags shown were assigned during chemistry validation.

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

NOTE: Detection limits shown are MDL.

TABLE A-3
SEDIMENT ANALYTICAL RESULTS - METALS
NIAGARA FALLS STORAGE SITE

Location Identifier		SWSD025	SWSD025	SWSD025	WDD2	WDD2
Field Sample Identifier		SWSD025	SWSD025	SWSD025	WDD2	WDD2
Sample Matrix		Sediment	Sediment	Sediment	Sediment	Sediment
Depth Interval (ft)		-	-	-	-	-
Date of Sample		04/24/18	08/01/18	10/26/18	04/24/18	10/26/18
Parameter	Units					
METALS						
ALUMINUM	MG/KG	33,000	24,000	25,500	36,000	13,200
ANTIMONY	MG/KG	17	19	2.1 J	13	0.81 UJ
ARSENIC	MG/KG	14	18 U	8.2	4	4.2
BARIUM	MG/KG	220	370 J	189	240	130
BERYLLIUM	MG/KG	1.2	1.1	1.3	1.3	0.61
BORON	MG/KG	53	410 J	Not Analyzed	48	Not Analyzed
CADMIUM	MG/KG	0.78	0.74 J	0.78 J	0.12 J	0.14 U
CALCIUM	MG/KG	32,000	270,000	33,100	36,000	37,700
CHROMIUM, TOTAL	MG/KG	69	70	67.5	43	18
COBALT	MG/KG	16	22	16.3 J	12	9.5 J
COPPER	MG/KG	72	260	64.9	46	24.3
IRON	MG/KG	45,000	42,000	35,800	41,000	21,200
LEAD	MG/KG	39	99	43.5	19	8.5
LITHIUM	MG/KG	40	27	59	51	23.7
MAGNESIUM	MG/KG	15,000	70,000	14,700	13,000	8,100
MANGANESE	MG/KG	1,400	710	827	1,800	1,500
MERCURY	MG/KG	0.13	0.094	0.16 J	0.073	0.037 J
MOLYBDENUM	MG/KG	9.7	2.2	Not Analyzed	2.3	Not Analyzed
NICKEL	MG/KG	46	95	43.5	35	20.1
POTASSIUM	MG/KG	9,100	14,000	6,260 J	9,900	3,220 J
SELENIUM	MG/KG	3.2 UJ	1.3 J	2.7 U	3 UJ	1.3 U

The flags shown were assigned during chemistry validation.

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

NOTE: Detection limits shown are MDL.

TABLE A-3
SEDIMENT ANALYTICAL RESULTS - METALS
NIAGARA FALLS STORAGE SITE

Location Identifier		SWSD025	SWSD025	SWSD025	WDD2	WDD2
Field Sample Identifier		SWSD025	SWSD025	SWSD025	WDD2	WDD2
Sample Matrix		Sediment	Sediment	Sediment	Sediment	Sediment
Depth Interval (ft)		-	-	-	-	-
Date of Sample		04/24/18	08/01/18	10/26/18	04/24/18	10/26/18
Parameter	Units					
METALS						
SILVER	MG/KG	0.53 U	0.95 J	0.74 J	0.22 J	0.33 U
SODIUM	MG/KG	590	570 J	666 J	470	230 J
THALLIUM	MG/KG	1.9 J	3.3 U	2.4 U	1.6 J	1.1 U
VANADIUM	MG/KG	61	180 J	54.5	53	26.3
ZINC	MG/KG	360	680	303	280	105

The flags shown were assigned during chemistry validation.

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

NOTE: Detection limits shown are MDL.

TABLE A-3
SEDIMENT ANALYTICAL RESULTS - METALS
NIAGARA FALLS STORAGE SITE

Location Identifier		WDD3	WDD3
Field Sample Identifier		WDD3	WDD3
Sample Matrix		Sediment	Sediment
Depth Interval (ft)		-	-
Date of Sample		04/24/18	10/26/18
Parameter	Units		
METALS			
ALUMINUM	MG/KG	16,000	14,800
ANTIMONY	MG/KG	8.1	0.86 UJ
ARSENIC	MG/KG	4.2	4.2
BARIUM	MG/KG	100	119
BERYLLIUM	MG/KG	0.59	0.69
BORON	MG/KG	20	Not Analyzed
CADMIUM	MG/KG	0.057 J	0.15 J
CALCIUM	MG/KG	33,000	23,600
CHROMIUM, TOTAL	MG/KG	19	22.5
COBALT	MG/KG	7.4	9.8 J
COPPER	MG/KG	27	28.8
IRON	MG/KG	23,000	25,900
LEAD	MG/KG	9.3	11.7
LITHIUM	MG/KG	22	29.9
MAGNESIUM	MG/KG	8,400	7,730
MANGANESE	MG/KG	1,100	1,370
MERCURY	MG/KG	0.022	0.074 J
MOLYBDENUM	MG/KG	0.99	Not Analyzed
NICKEL	MG/KG	19	21.9
POTASSIUM	MG/KG	4,400	3,240 J
SELENIUM	MG/KG	1.3 UJ	1.4 U

The flags shown were assigned during chemistry validation.

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

NOTE: Detection limits shown are MDL.

TABLE A-3
SEDIMENT ANALYTICAL RESULTS - METALS
NIAGARA FALLS STORAGE SITE

Location Identifier		WDD3	WDD3
Field Sample Identifier		WDD3	WDD3
Sample Matrix		Sediment	Sediment
Depth Interval (ft)		-	-
Date of Sample		04/24/18	10/26/18
Parameter	Units		
METALS			
SILVER	MG/KG	0.22 U	0.36 U
SODIUM	MG/KG	250	243 J
THALLIUM	MG/KG	0.75 J	1.2 U
VANADIUM	MG/KG	28	29
ZINC	MG/KG	91	152

The flags shown were assigned during chemistry validation.

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

NOTE: Detection limits shown are MDL.

TABLE A-4
SEDIMENT ANALYTICAL RESULTS - PAHs
NIAGARA FALLS STORAGE SITE

Location Identifier		SWSD009	SWSD009	SWSD009	SWSD009	SWSD010
Field Sample Identifier		SWSD009	SWSD009-D	SWSD009	SWSD009-D	SWSD010
Sample Matrix		Sediment	Sediment	Sediment	Sediment	Sediment
Depth Interval (ft)		-	-	-	-	-
Date of Sample		04/25/18	04/25/18	10/29/18	10/29/18	04/24/18
Parameter	Units		Field Duplicate		Field Duplicate	
SEMI-VOLATILE ORGANIC ANALYSES						
2-METHYLNAPHTHALENE	UG/KG	100 U	110 UJ	3.93 J	4.4 U	170 U
ACENAPHTHENE	UG/KG	100 U	110 UJ	8.76	8.59	170 U
ACENAPHTHYLENE	UG/KG	100 U	110 UJ	7.5 J	3.46 J	170 U
ANTHRACENE	UG/KG	78 J	110 UJ	24 J	15.8 J	170 U
BENZO(A)ANTHRACENE	UG/KG	370 J	210 J	81.2 J	59.7 J	150 J
BENZO(A)PYRENE	UG/KG	420 J	240 J	84 J	63 J	110 J
BENZO(B)FLUORANTHENE	UG/KG	590 J	340 J	105 J	74.5 J	170 J
BENZO(G,H,I)PERYLENE	UG/KG	140 J	110 UJ	52.4 J	47.8 J	170 UJ
BENZO(K)FLUORANTHENE	UG/KG	200 UJ	130 J	30.9	30.9	340 U
CHRYSENE	UG/KG	380 J	230 J	75.9 J	55.9 J	170 UJ
DIBENZ(A,H)ANTHRACENE	UG/KG	200 UJ	210 UJ	13.3	11.3	340 UJ
FLUORANTHENE	UG/KG	650 J	400 J	163 J	125 J	170 UJ
FLUORENE	UG/KG	100 U	110 UJ	11	11.1	170 U
INDENO(1,2,3-C,D)PYRENE	UG/KG	86 J	55 J	48.1	40.6	340 UJ
NAPHTHALENE	UG/KG	100 U	110 UJ	5.76 J	5.95 J	170 U
PHENANTHRENE	UG/KG	250 J	170 J	70.6	59.1	170 UJ
PYRENE	UG/KG	770 J	460 J	135	106	190 J

The flags shown were assigned during chemistry validation.

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

NOTE: Detection limits shown are MDL.

TABLE A-4
SEDIMENT ANALYTICAL RESULTS - PAHs
NIAGARA FALLS STORAGE SITE

Location Identifier		SWSD010	SWSD011	SWSD011	SWSD021	SWSD021
Field Sample Identifier		SWSD010	SWSD011	SWSD011	SWSD021	SWSD021
Sample Matrix		Sediment	Sediment	Sediment	Sediment	Sediment
Depth Interval (ft)		-	-	-	-	-
Date of Sample		10/29/18	04/24/18	10/26/18	04/24/18	10/29/18
Parameter	Units					
SEMI-VOLATILE ORGANIC ANALYSES						
2-METHYLNAPHTHALENE	UG/KG	9.2 U	140 U	7.2 U	110 U	3.6 U
ACENAPHTHENE	UG/KG	4.31 J	140 U	2.13 J	110 U	0.9 U
ACENAPHTHYLENE	UG/KG	5.29 J	140 U	2.55 J	110 U	1 U
ANTHRACENE	UG/KG	10.6 J	140 U	4.73 J	110 U	1.29 J
BENZO(A)ANTHRACENE	UG/KG	43.5	140 J	17.9	80 J	3.61 J
BENZO(A)PYRENE	UG/KG	52.1	170 J	22	110 UJ	4.37 J
BENZO(B)FLUORANTHENE	UG/KG	68.9	260 J	29.9	98 J	6.32
BENZO(G,H,I)PERYLENE	UG/KG	49.3 J	110 J	20.8 J	110 UJ	3.62 J
BENZO(K)FLUORANTHENE	UG/KG	27.4	280 U	11.7 J	220 U	2.46 J
CHRYSENE	UG/KG	45.5	180 J	18.7	110 UJ	5.39 J
DIBENZ(A,H)ANTHRACENE	UG/KG	10.4 J	280 UJ	4.3 J	220 UJ	1.3 U
FLUORANTHENE	UG/KG	88	200 J	34.3	110 UJ	9.8
FLUORENE	UG/KG	7.1 J	140 U	3.37 J	110 U	1 U
INDENO(1,2,3-C,D)PYRENE	UG/KG	38.3	72 J	16	220 UJ	3.15 J
NAPHTHALENE	UG/KG	5.69 J	140 U	3.3 U	110 U	1.7 U
PHENANTHRENE	UG/KG	33.3	80 J	14.9	110 UJ	4.78 J
PYRENE	UG/KG	86.6	190 J	32.2	100 J	7.46

The flags shown were assigned during chemistry validation.

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

NOTE: Detection limits shown are MDL.

TABLE A-4
SEDIMENT ANALYTICAL RESULTS - PAHs
NIAGARA FALLS STORAGE SITE

Location Identifier		SWSD022	SWSD022	SWSD023	SWSD023	SWSD025
Field Sample Identifier		SWSD022	SWSD022	SWSD023	SWSD023	SWSD025
Sample Matrix		Sediment	Sediment	Sediment	Sediment	Sediment
Depth Interval (ft)		-	-	-	-	-
Date of Sample		04/24/18	10/26/18	04/25/18	10/29/18	02/07/18
Parameter	Units					
SEMI-VOLATILE ORGANIC ANALYSES						
2-METHYLNAPHTHALENE	UG/KG	150 U	6.5 U	260 J	8.58	69 U
ACENAPHTHENE	UG/KG	150 U	1.6 U	130 J	11.5	69 U
ACENAPHTHYLENE	UG/KG	150 U	1.8 U	100 J	15.3	69 U
ANTHRACENE	UG/KG	150 U	3.55 J	380 J	28.3	69 U
BENZO(A)ANTHRACENE	UG/KG	150 UJ	13.6	1,300 J	94.8	54 J
BENZO(A)PYRENE	UG/KG	150 UJ	15.9	1,400	108	47 J
BENZO(B)FLUORANTHENE	UG/KG	150 UJ	21.7	2,300 J	146	180 J
BENZO(G,H,I)PERYLENE	UG/KG	150 UJ	15.8 J	510 J	109 J	130 J
BENZO(K)FLUORANTHENE	UG/KG	290 U	8.64 J	890 J	62.9	140 U
CHRYSENE	UG/KG	150 UJ	14.9	2,100 J	120	58 J
DIBENZ(A,H)ANTHRACENE	UG/KG	290 UJ	2.85 J	230 UJ	19.7	140 U
FLUORANTHENE	UG/KG	150 UJ	27.6	2,900 J	185	85 J
FLUORENE	UG/KG	150 U	2.45 J	220 J	14	69 U
INDENO(1,2,3-C,D)PYRENE	UG/KG	290 UJ	11.8	310 J	68.6	130 J
NAPHTHALENE	UG/KG	150 U	3 U	210 J	6.99	69 U
PHENANTHRENE	UG/KG	150 UJ	13.2	890 J	71.9	69 U
PYRENE	UG/KG	150 U	25.9	4,600	173	80 J

The flags shown were assigned during chemistry validation.

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

NOTE: Detection limits shown are MDL.

TABLE A-4
SEDIMENT ANALYTICAL RESULTS - PAHs
NIAGARA FALLS STORAGE SITE

Location Identifier		SWSD025	SWSD025	SWSD025	WDD2	WDD2
Field Sample Identifier		SWSD025	SWSD025	SWSD025	WDD2	WDD2
Sample Matrix		Sediment	Sediment	Sediment	Sediment	Sediment
Depth Interval (ft)		-	-	-	-	-
Date of Sample		04/24/18	08/01/18	10/26/18	04/24/18	10/26/18
Parameter	Units					
SEMI-VOLATILE ORGANIC ANALYSES						
2-METHYLNAPHTHALENE	UG/KG	220 U	140 UJ	8.2 U	69 U	4.2 U
ACENAPHTHENE	UG/KG	220 U	140 UJ	2.22 J	69 U	1.1 U
ACENAPHTHYLENE	UG/KG	220 U	140 UJ	2.45 J	69 U	1.2 U
ANTHRACENE	UG/KG	220 U	140 UJ	5.17 J	69 U	1.1 U
BENZO(A)ANTHRACENE	UG/KG	220 UJ	190 J	18.7	69 UJ	1.42 J
BENZO(A)PYRENE	UG/KG	220 UJ	240 J	24.4	69 UJ	1.71 J
BENZO(B)FLUORANTHENE	UG/KG	220 UJ	430 J	33.7	69 UJ	2.67 J
BENZO(G,H,I)PERYLENE	UG/KG	220 UJ	120 J	24.8 J	69 UJ	1.8 UJ
BENZO(K)FLUORANTHENE	UG/KG	440 U	270 UJ	12.5 J	140 U	1.4 U
CHRYSENE	UG/KG	220 UJ	270 J	24.4	69 UJ	2.06 J
DIBENZ(A,H)ANTHRACENE	UG/KG	440 UJ	270 UJ	4.48 J	140 UJ	1.5 U
FLUORANTHENE	UG/KG	220 UJ	360 J	41.6	69 UJ	3.88 J
FLUORENE	UG/KG	220 U	140 UJ	3.08 J	69 U	1.2 U
INDENO(1,2,3-C,D)PYRENE	UG/KG	440 UJ	130 J	18.9	140 UJ	1.4 U
NAPHTHALENE	UG/KG	220 U	140 UJ	3.8 U	69 U	1.9 U
PHENANTHRENE	UG/KG	220 UJ	150 J	18.9	69 UJ	1.77 J
PYRENE	UG/KG	220 U	420 J	40.4	69 U	3.08 J

The flags shown were assigned during chemistry validation.

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

NOTE: Detection limits shown are MDL.

TABLE A-4
SEDIMENT ANALYTICAL RESULTS - PAHs
NIAGARA FALLS STORAGE SITE

Location Identifier		WDD3	WDD3
Field Sample Identifier		WDD3	WDD3
Sample Matrix		Sediment	Sediment
Depth Interval (ft)		-	-
Date of Sample		04/24/18	10/26/18
Parameter	Units		
SEMI-VOLATILE ORGANIC ANALYSES			
2-METHYLNAPHTHALENE	UG/KG	89 U	4.2 U
ACENAPHTHENE	UG/KG	89 U	1 U
ACENAPHTHYLENE	UG/KG	89 U	2.13 J
ANTHRACENE	UG/KG	89 U	2.93 J
BENZO(A)ANTHRACENE	UG/KG	89 UJ	14.2
BENZO(A)PYRENE	UG/KG	89 UJ	15.8
BENZO(B)FLUORANTHENE	UG/KG	89 UJ	20.2
BENZO(G,H,I)PERYLENE	UG/KG	89 UJ	10.4 J
BENZO(K)FLUORANTHENE	UG/KG	180 U	7.58
CHRYSENE	UG/KG	89 UJ	12.3
DIBENZ(A,H)ANTHRACENE	UG/KG	180 UJ	2.11 J
FLUORANTHENE	UG/KG	89 UJ	30.9
FLUORENE	UG/KG	89 U	1.58 J
INDENO(1,2,3-C,D)PYRENE	UG/KG	180 UJ	9.41
NAPHTHALENE	UG/KG	89 U	1.9 U
PHENANTHRENE	UG/KG	89 UJ	9.62
PYRENE	UG/KG	89 U	28

The flags shown were assigned during chemistry validation.

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

NOTE: Detection limits shown are MDL.

ATTACHMENT B

MANN-KENDALL TEST RESULTS

ATTACHMENT B-1

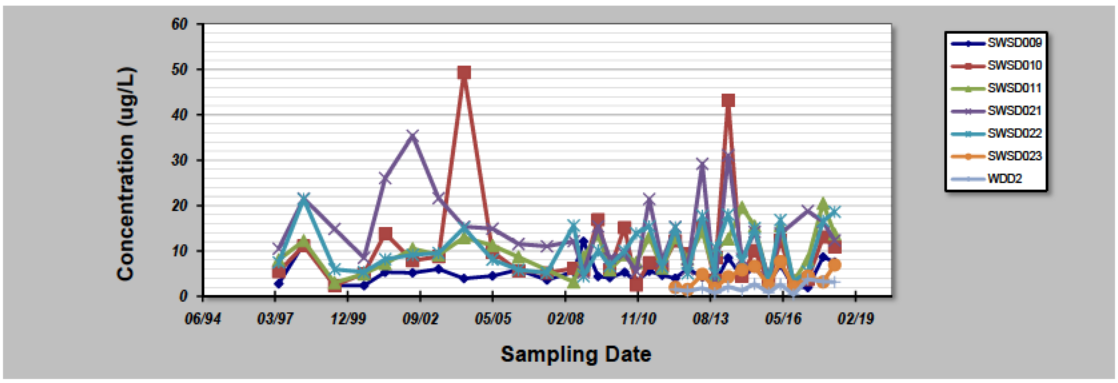
TOTAL URANIUM IN SURFACE WATER

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date: 23-May-19
Facility Name: NFSS
Conducted By: [redacted]

Job ID: Surface Water
Constituent: Total Uranium
Concentration Units: ug/L

Sampling Point ID:	SWSD009	SWSD010	SWSD011	SWSD021	SWSD022	SWSD023	WDD2
Sampling Event	Sampling Date	TOTAL URANIUM CONCENTRATION (ug/L)						
1	Apr-97	2.77	5.45	8.04	10.5	7.47		
2	Apr-98	11.6127	11.1375	12.2364	21.5622	21.4434		
3	Jun-99	2.376	2.376	2.97	14.85	5.94		
4	Jul-00	2.36709	5.03118	4.93317	8.48232	5.32224		
5	May-01	5.3163	13.8402	7.1874	26.0469	8.1675		
6	May-02	5.1678	7.8408	10.5	35.4	9.12		
7	May-03	5.9994	8.7615	9.1179	21.6216	9.5337		
8	Apr-04	3.9204	49.302	12.9492	15.3549	15.0579		
9	May-05	4.4847	9.801	11.1969	14.9094	8.0784		
10			39.501					
11	May-06	5.8509	5.5836	8.6427	11.5236	5.8212		
12	Jun-07	3.5937	5.1678		11.0187	5.1678		
13				5.1678				
14	Jun-08	5.3757	6.1479	3.1482	12.1473	15.5925		
15	Oct-08	12.1176	5.7024	8.613	5.2866	4.4253		
16	May-09	4.38075	16.89633	13.65309	15.41727	10.09206		
17	Oct-09	4.11048	5.89545	5.80041	8.39619	6.70626		
18	May-10	5.28957	15.15294	9.16839	9.28125	9.97029		
19	Oct-10	3.267	2.47104	7.4844	5.4648	13.8402		
20	Apr-11	5.5539	7.3953	13.0977	21.4434	15.444		
21	Oct-11	4.6332	6.6231	6.2073	7.8111	6.5043		
22	Apr-12	3.97	12.2	12.9	15.3	15.2	1.99	1.5
23	Oct-12	6.04	9.3	8.15	5.94	5.04	1.51	1.14
24	Apr-13	4.25	15.3	14.3	29.2	17.8	4.86	1.81
25	Oct-13	2.92	3.47	4.64	2.11	4.95	1.75	0.681
26	Nov-13		8.55	10.3		10.7		
27	Apr-14	8.49	43.2	12.6	31.1	18	4.3	2.11
28	Oct-14	4.25	4.44	19.6	8.21	7.69	5.83	1.28
29	Apr-15	6.3	10.1	15.5	14.2	15	6.58	2.71
30	Oct-15	3.08	3.19	3.43	4.08	3.26	2.37	0.831
31	Apr-16	6.86	12.3	15.6	13.8	16.8	7.67	2.64
32	Oct-16	2.06	3.37	3.39		3.15	2.12	0.351
33	Apr-17	1.95	3.7	8.08	18.8	5.45	4.47	3.75
34	Nov-17	8.67	13.1	20.5	16.4	16.6	3.17	3.26
35	Apr-18	7.53	10.9	13.7	12.3	18.6	6.93	3.15
Coefficient of Variation:		0.47	0.99	0.47	0.56	0.52	0.54	0.54
Mann-Kendall Statistic (S):		51	-1	109	-64	22	21	29
Confidence Factor:		78.0%	50.0%	94.5%	84.5%	62.2%	86.0%	93.7%
Concentration Trend:		No Trend	Stable	Prob. Increasing	Stable	No Trend	No Trend	Prob. Increasing



Notes

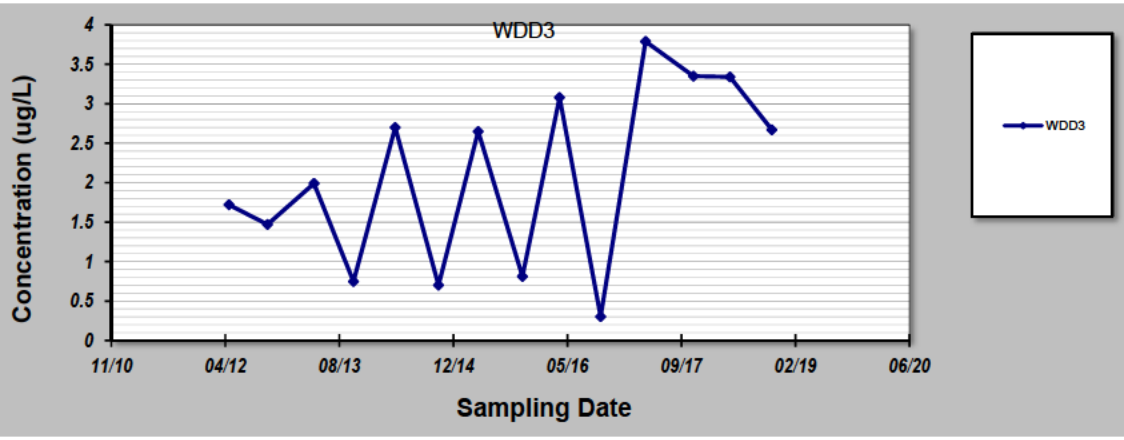
1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C J. Newell, and J.R. Gonzales, *Ground Water*, 41(3) 355-367, 2003.

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	23-May-19	Job ID:	Surface Water
Facility Name:	NFSS	Constituent:	Total Uranium
Conducted By:	[redacted]	Concentration Units:	ug/L

Sampling Point ID: WDD3

Sampling Event	Sampling Date	TOTAL URANIUM CONCENTRATION (ug/L)
1	Apr-12	1.72
2	Oct-12	1.47
3	Apr-13	1.99
4	Oct-13	0.748
5		
6	Apr-14	2.7
7	Oct-14	0.7
8	Apr-15	2.65
9	Oct-15	0.812
10	Apr-16	3.08
11	Oct-16	0.303
12	Apr-17	3.79
13	Nov-17	3.35
14	Apr-18	3.34
15	Oct-18	2.67
16		
17		
18		
19		
20		
Coefficient of Variation:		0.55
Mann-Kendall Statistic (S):		27
Confidence Factor:		92.1%
Concentration Trend:		Prob. Increasing



Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that cons ituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

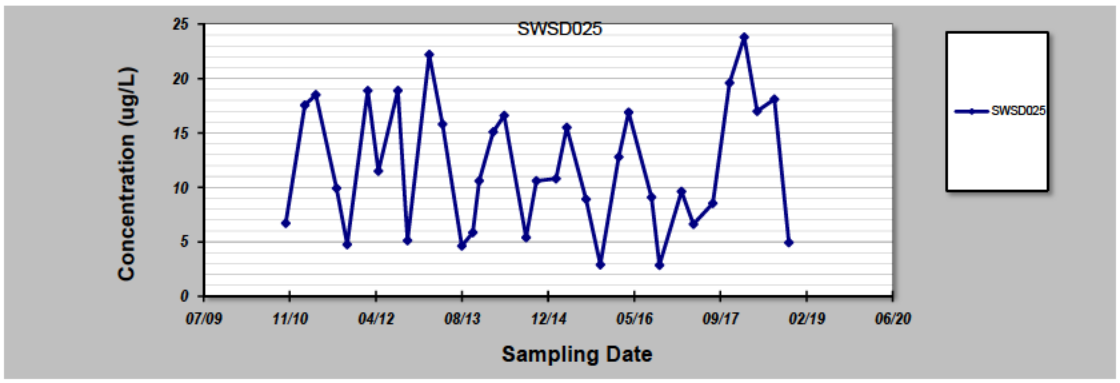
GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date: 23-May-19
Facility Name: NFSS
Conducted By: [redacted]

Job ID: Surface Water
Constituent: Total Uranium
Concentration Units: ug/L

Sampling Point ID: SWSD025

Sampling Event	Sampling Date	TOTAL URANIUM CONCENTRATION (ug/L)
1	Oct-10	6.7122
2	Feb-11	17.5527
3	Apr-11	18.5031
4	Aug-11	9.9198
5	Oct-11	4.752
6	Feb-12	18.8892
7	Apr-12	11.5
8	Aug-12	18.9
9	Oct-12	5.12
10	Feb-13	22.2
11	Apr-13	15.8
12	Aug-13	4.62
13	Oct-13	5.85
14	Nov-13	10.6
15	Feb-14	15.1
16	Apr-14	16.6
17	Aug-14	5.4
18	Oct-14	10.6
19	Feb-15	10.8
20	Apr-15	15.5
21	Aug-15	8.91
22	Oct-15	2.9
23	Feb-16	12.8
24	Apr-16	16.9
25	Aug-16	9.1
26	Oct-16	2.86
27	Feb-17	9.63
28	Apr-17	6.62
29	Aug-17	8.54
30	Nov-17	19.6
31	Feb-18	23.8
32	Apr-18	17
33	Aug-18	18.1
34	Oct-18	4.94
35		
Coefficient of Variation:		0.50
Mann-Kendall Statistic (S):		-26
Confidence Factor:		63.8%
Concentration Trend:		Stable



Notes

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C J. Newell, and J.R. Gonzales, *Ground Water* , 41(3) 355-367, 2003.

ATTACHMENT B-2

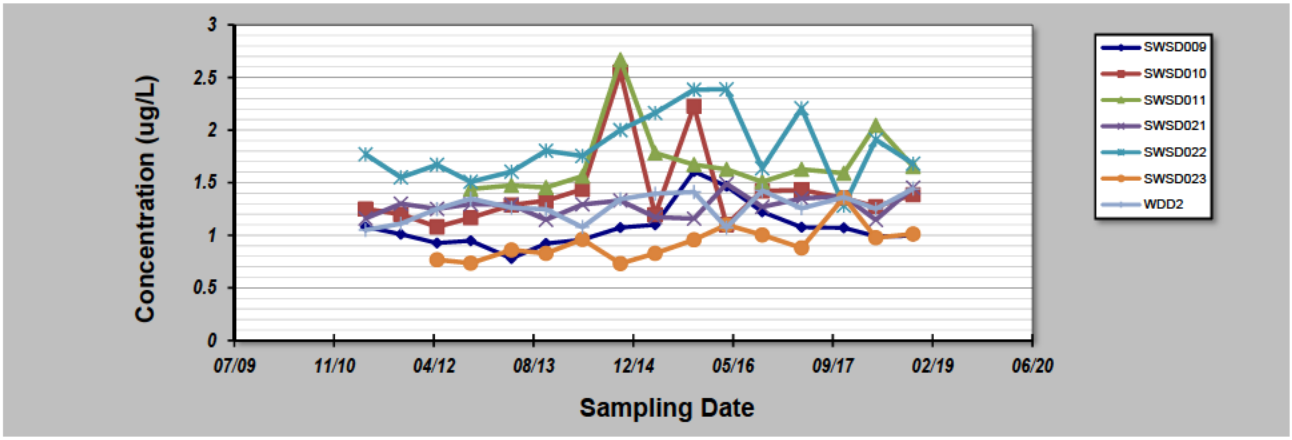
RADIUM-226 IN SEDIMENT
(901.1 analysis only)

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date: 23-May-19
Facility Name: NFSS
Conducted By: [redacted]

Job ID: Sediment
Constituent: Radium-226
Concentration Units: ug/L

Sampling Point ID:	SWSD009	SWSD010	SWSD011	SWSD021	SWSD022	SWSD023	WDD2
Sampling Event	Sampling Date	RADIUM-226 CONCENTRATION (ug/L)						
1	Apr-11	1 08	1.25		1.16	1.77		1 05
2	Oct-11	1 01	1.2		1.3	1.55		1.11
3	Apr-12	0.926	1.08		1 25	1.67	0.767	1 25
4	Oct-12	0.948	1.166	1.44	1.296	1 508	0.735	1.348
5	Apr-13	0.78	1 287	1.474	1 29	1 604	0.86	1.262
6	Oct-13	0.922	1 329	1.454	1.147	1 803	0.828	1.247
7	Apr-14	0.958	1.436	1.561	1.293	1.754	0.961	1.077
8	Oct-14	1.073	2 552	2.669	1 33	2	0.731	1.343
9	Apr-15	1.099	1.195	1.782	1.172	2.162	0.828	1.395
10	Oct-15	1.606	2 226	1.671	1.158	2 384	0.957	1.411
11	Apr-16	1.466	1.102	1.627	1.489	2 388	1.099	1.072
12	Oct-16	1.223	1.422	1.508	1 27	1 636	1.003	1.425
13	Apr-17	1.076	1.43	1.627	1.349	2 207	0.88	1.256
14	Nov-17	1.071	1 354	1.59	1.372	1 281	1.358	1.362
15	Apr-18	0 99	1 271	2.046	1.146	1 909	0.977	1.251
16	Oct-18	0.994	1 385	1.653	1.452	1 681	1.012	1.442
17								
18								
19								
20								
Coefficient of Variation:		0.19	0.28	0.20	0.08	0.17	0.18	0.10
Mann-Kendall Statistic (S):		22	30	27	24	28	50	48
Confidence Factor:		82.5%	90.3%	94.3%	84.7%	88.6%	99.8%	98.4%
Concentration Trend:		No Trend	Prob. Increasing	Prob. Increasing	No Trend	No Trend	Increasing	Increasing



Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that cons ituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

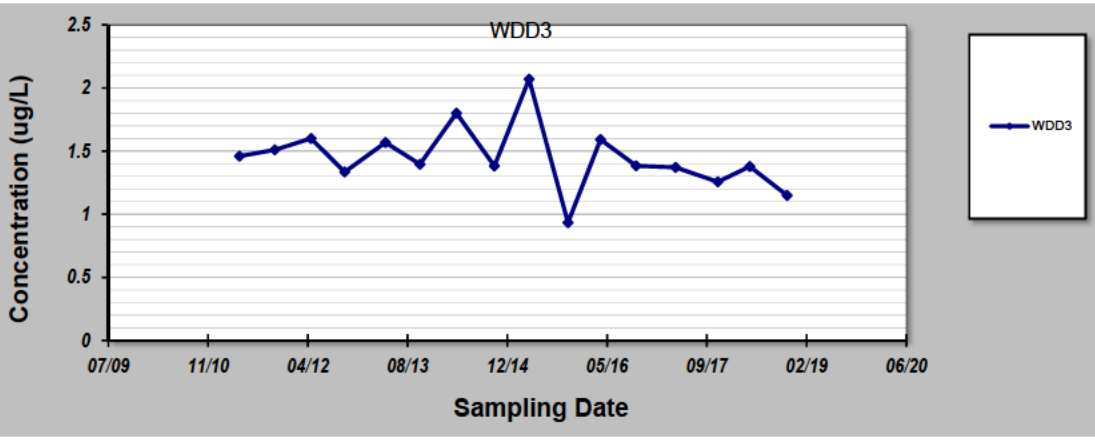
GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date: 23-May-19
Facility Name: NFSS
Conducted By: [redacted]

Job ID: Sediment
Constituent: Radium-226
Concentration Units: ug/L

Sampling Point ID: WDD3

Sampling Event	Sampling Date	RADIUM-226 CONCENTRATION (ug/L)
1	Apr-11	1.46
2	Oct-11	1 51
3	Apr-12	1.6
4	Oct-12	1.335
5	Apr-13	1.568
6	Oct-13	1.396
7	Apr-14	1.801
8	Oct-14	1.382
9	Apr-15	2 07
10	Oct-15	0.933
11	Apr-16	1.592
12	Oct-16	1.383
13	Apr-17	1.371
14	Nov-17	1.256
15	Apr-18	1.378
16	Oct-18	1.149
17		
18		
19		
20		
Coefficient of Variation:		0.18
Mann-Kendall Statistic (S):		-40
Confidence Factor:		96.1%
Concentration Trend:		Decreasing



Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that cons ituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

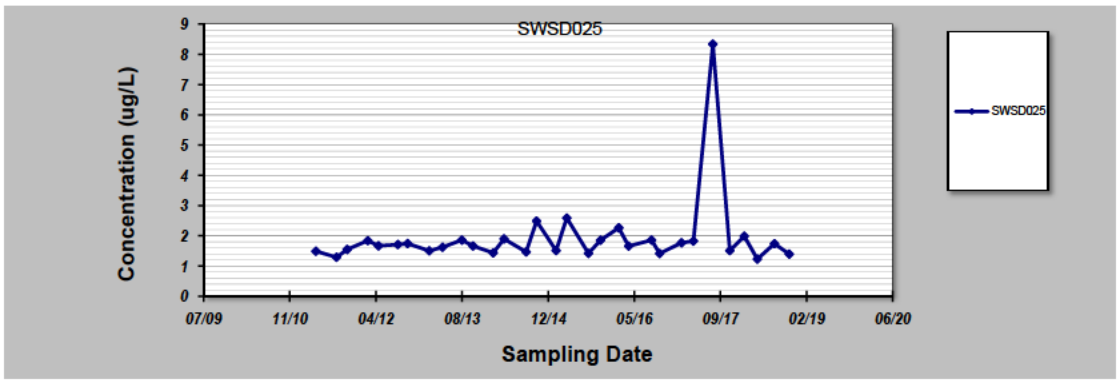
GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date: 23-May-19
Facility Name: NFSS
Conducted By: [redacted]

Job ID: Sediment
Constituent: Radium-226
Concentration Units: ug/L

Sampling Point ID: SWSD025

Sampling Event	Sampling Date	RADIUM-226 CONCENTRATION (ug/L)
1	Apr-11	1.49
2	Aug-11	1.29
3	Oct-11	1.55
4	Feb-12	1.84
5	Apr-12	1.67
6	Aug-12	1.71
7	Oct-12	1.743
8	Feb-13	1.503
9	Apr-13	1.624
10	Aug-13	1.859
11	Oct-13	1.663
12	Feb-14	1.435
13	Apr-14	1.897
14	Aug-14	1.468
15	Oct-14	2.488
16	Feb-15	1.511
17	Apr-15	2.591
18	Aug-15	1.419
19	Oct-15	1.854
20	Feb-16	2.264
21	Apr-16	1.658
22	Aug-16	1.858
23	Oct-16	1.415
24	Feb-17	1.772
25	Apr-17	1.826
26	Aug-17	8.338
27	Nov-17	1.51
28	Feb-18	1.989
29	**Apr-18**	1.231
30	Aug-18	1.739
31	Oct-18	1.397
32		
33		
34		
35		
Coefficient of Variation:		0.64
Mann-Kendall Statistic (S):		33
Confidence Factor:		70.5%
Concentration Trend:		No Trend



Notes

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C J. Newell, and J.R. Gonzales, *Ground Water* , 41(3) 355-367, 2003.

ATTACHMENT B-3

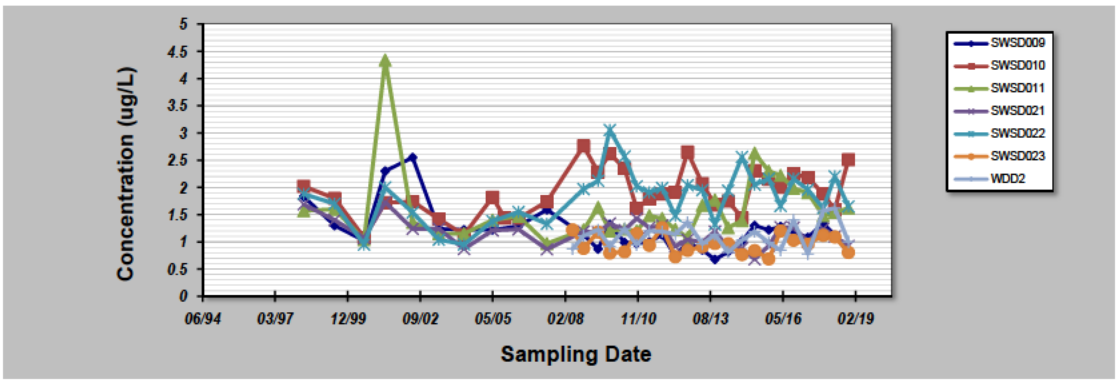
URANIUM-238 IN SEDIMENT

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date: 23-May-19
Facility Name: NFSS
Conducted By: [redacted]

Job ID: Sediment
Constituent: U-238
Concentration Units: ug/L

Sampling Point ID:	SWSD009	SWSD010	SWSD011	SWSD021	SWSD022	SWSD023	WDD2
Sampling Event	Sampling Date	U-238 CONCENTRATION (ug/L)						
1	Apr-98	1.83	2 02	1.57	1.69	1.88		
2	Jun-99	1.3	1.8	1.6	1.4	1.7		
3	Jul-00	1.021	1 08	1.04	1.068	0.951		
4	May-01	2.3	1.72	4.34	1.73	2		
5	May-02	2.55	1.74	1.36	1.24	1.54		
6	May-03	1.24	1.42	1.15	1.24	1.04		
7	Apr-04	1.22	1.13	1.15	0.869	0.953		
8	May-05	1.22	1 82	1.4	1.21	1.38		
9	Nov-05		1.44					
10	May-06	1.29	1.43	1.47	1.23	1.55		
11	Jun-07	1.59	1.74	0 969	0.863	1.33		
12	Jun-08						1.22	0 87
13	Oct-08	1.13	2.76	1.22	1.19	1.97	0.88	1.11
14	May-09	0.8679	2.282	1.633	1.173	2.123	1.179	1.219
15	Oct-09	1.32	2.623	1 2	1.338	3.055	0.7944	0 9161
16	May-10	0.9876	2.351	1 235	1.215	2.569	0.8181	1 24
17	Nov-10	0.969	1.61	1 2	1.43	2.02	1.15	0.945
18	Apr-11	1	1.79	1.48	1.26	1.91	0 937	1.2
19	Oct-11	1.13	1 88	1.43	1.3	1.99	1.26	1.19
20	Apr-12	0.741	1 91	1.23	0.915	1.48	0.727	1.14
21	Oct-12	0.999	2.65	1.08	1.04	2.04	0 845	1 36
22	Apr-13	0.852	2 07	1.67	0.996	1.95	0 911	0.963
23	Oct-13	0.677	1.68	1.77	1.19	1.32	0 971	1.13
24	Apr-14	0.815	1.75	1.26	0.895	1.94	0 965	0.811
25	Oct-14	1.01	1.44	1.39	0.884	2.56	0.767	1 03
26	Apr-15	1.3	2 31	2.63	0.679	2.05	0 838	1.19
27	Oct-15	1.22	2.15	2 3	0.93	2.16	0.687	0.986
28	Apr-16	1.28	2	2.22	1.27	1.66	1 2	0.846
29	Oct-16	1.18	2 25	1.98	1.26	2.16	1.03	1.4
30	Apr-17	1.08	2.18	1 9	1.01	1.96	0 957	0.777
31	Nov-17	1.34	1 88	1.48	1.24	1.62	1.12	1 57
32	Apr-18	1.12	1 59	1.54	1.1	2.2	1.09	1.62
33	Oct-18	0.802	2 51	1.62	0.925	1.65	0 805	1
34								
35								
Coefficient of Variation:		0.34	0.22	0.40	0.20	0.26	0.18	0.21
Mann-Kendall Statistic (S):		-132	123	134	-124	114	-11	16
Confidence Factor:		98.8%	97.6%	98.9%	98.2%	97.3%	61.0%	66.2%
Concentration Trend:		Decreasing	Increasing	Increasing	Decreasing	Increasing	Stable	No Trend



Notes

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C J. Newell, and J.R. Gonzales, *Ground Water* , 41(3) 355-367, 2003.

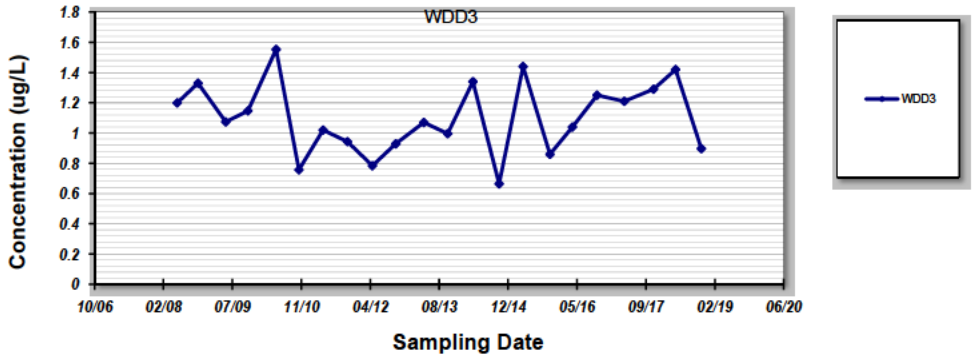
GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date: 23-May-19
Facility Name: NFSS
Conducted By: [redacted]

Job ID: Sediment
Constituent: U-238
Concentration Units: ug/L

Sampling Point ID: WDD3

Sampling Event	Sampling Date	U-238 CONCENTRATION (ug/L)
1	Apr-98	
2	Jun-99	
3	Jul-00	
4	May-01	
5	May-02	
6	May-03	
7	Apr-04	
8	May-05	
9	Nov-05	
10	May-06	
11	Jun-07	
12	Jun-08	1.2
13	Oct-08	1.33
14	May-09	1.074
15	Oct-09	1.147
16	May-10	1.553
17	Nov-10	0.757
18	Apr-11	1.02
19	Oct-11	0.943
20	Apr-12	0.784
21	Oct-12	0.929
22	Apr-13	1.07
23	Oct-13	0.996
24	Apr-14	1.34
25	Oct-14	0.664
26	Apr-15	1.44
27	Oct-15	0.86
28	Apr-16	1.04
29	Oct-16	1.25
30	Apr-17	1.21
31	Nov-17	1.29
32	Apr-18	1.42
33	Oct-18	0.897
34		
35		
Coefficient of Variation:		0.22
Mann-Kendall Statistic (S):		5
Confidence Factor:		54.4%
Concentration Trend:		No Trend



Notes

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C J. Newell, and J.R. Gonzales, *Ground Water* , 41(3) 355-367, 2003.

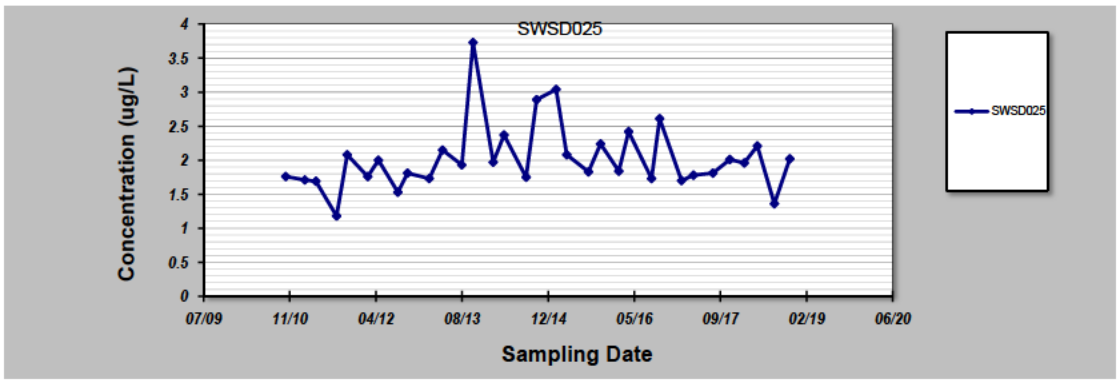
GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date: 23-May-19
Facility Name: NFSS
Conducted By: [redacted]

Job ID: Sediment
Constituent: U-238
Concentration Units: ug/L

Sampling Point ID: SWSD025

Sampling Event	Sampling Date	U-238 CONCENTRATION (ug/L)
1	Oct-10	1.76
2	Feb-11	1.71
3	Apr-11	1.69
4	Aug-11	1.18
5	Oct-11	2.08
6	Feb-12	1.76
7	Apr-12	2
8	Aug-12	1.53
9	Oct-12	1.81
10	Feb-13	1.73
11	Apr-13	2.15
12	Aug-13	1.93
13	Oct-13	3.73
14	Feb-14	1.97
15	Apr-14	2.37
16	Aug-14	1.75
17	Oct-14	2.89
18	Feb-15	3.04
19	Apr-15	2.08
20	Aug-15	1.83
21	Oct-15	2.24
22	Feb-16	1.84
23	Apr-16	2.42
24	Aug-16	1.73
25	Oct-16	2.61
26	Feb-17	1.7
27	Apr-17	1.78
28	Aug-17	1.81
29	Nov-17	2.01
30	Feb-18	1.96
31	Apr-18	2.21
32	Aug-18	1.36
33	Oct-18	2.02
34		
35		
Coefficient of Variation:		0.24
Mann-Kendall Statistic (S):		86
Confidence Factor:		90.5%
Concentration Trend:		Prob. Increasing



Notes

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C J. Newell, and J.R. Gonzales, *Ground Water* , 41(3) 355-367, 2003.

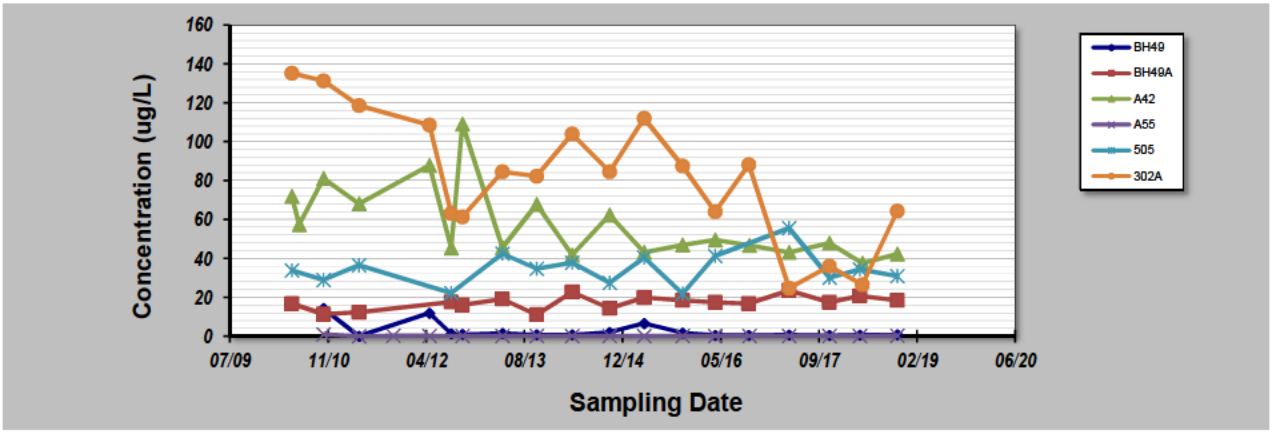
ATTACHMENT B-4

TOTAL URANIUM IN GROUNDWATER

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	20-May-19	Job ID:	2018 ESP
Facility Name:	NFSS	Constituent:	Total Uranium
Conducted By:	[redacted]	Concentration Units:	ug/L

Sampling Point ID:	BH49	BH49A	A42	A55	505	302A	
Sampling Event	Sampling Date	TOTAL URANIUM CONCENTRATION (ug/L)						
1	May-10		16.72	71 91		33.82	135 23	
2	Jun-10			57 39				
3	Oct-10	14 25	11.23	81 07	0.99	28.82	131.3	
4	Apr-11	0	12.35	68.11	0.01	36.4	118 54	
5	Oct-11				0.23			
6	Apr-12	11 84		87 88	0.129		108.48	
7	Aug-12	1.23	17.6	45.4		22.1	63.1	
8	Oct-12	0.904	16	109	0.03		61 3	
9	Apr-13	1.47	19	45.6	0.111	42.4	84 5	
10	Oct-13	0.701	11	67.8	0.107	34.7	82 2	
11	Apr-14	0.723	22.7	41.8	0.079	37.8	104	
12	Oct-14	1.98	14.3	62.3	0.107	27.4	84.6	
13	Apr-15	6.59	19.9	43	0.13	40.4	112	
14	Oct-15	1.62	18.4	46.8	0.141	21.9	87 5	
15	Apr-16	0.443	17.3	49.5	0.134	41.3	64	
16	Sep-16	0.505	16.8				88.1	
17	Oct-16			46.7	0.059			
18	Apr-17	0.645	23 5	43.1	0.059	55.5	24.6	
19	Nov-17	0.408	17.4	47.9	0.039	30.1	35.9	
20	Apr-18	0.638	20.6		0.178	34.4		
21	May-18			37.4			26.5	
22	Oct-18	0.742	18.4	42.2	0.226	30.9	64.3	
23								
24								
25								
Coefficient of Variation:		1.60	0.21	0.33	1.37	0.25	0.40	
Mann-Kendall Statistic (S):		-42	49	-79	2	9	-71	
Confidence Factor:		95.4%	97.7%	99.7%	51.6%	65.1%	99.7%	
Concentration Trend:		Decreasing	Increasing	Decreasing	No Trend	No Trend	Decreasing	



Notes

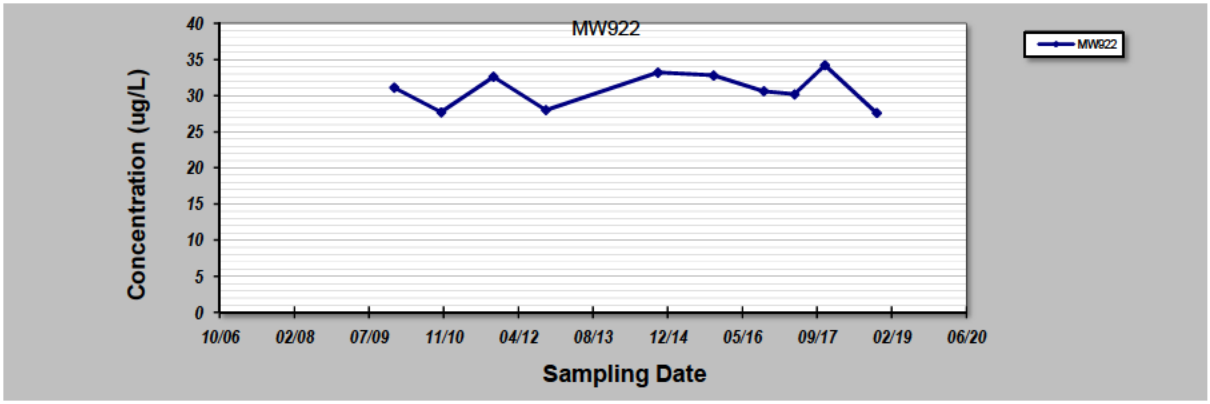
1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J R. Gonzales, *Ground Water*, 41(3) 355-367, 2003.

NOTE: If filtered and unfiltered data are available for a sampling event, the most elevated result is used for trend analysis.

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	20-May-19	Job ID:	2018 ESP TM
Facility Name:	NFSS	Constituent:	TOTAL URANIUM
Conducted By:	[redacted]	Concentration Units:	ug/L

Sampling Point ID:	MW922						
Sampling Event	Sampling Date	TOTAL URANIUM CONCENTRATION (ug/L)						
1	Sep-00							
2	May-03							
3	Oct-03							
4	Apr-04							
5	Dec-09	31.1						
6	Jan-10							
7	Jun-10							
8	Oct-10							
9	Nov-10	27.71						
10	Apr-11							
11	Oct-11	32.6						
12	Apr-12							
13	Oct-12	28						
14	Apr-13							
15	Oct-13							
16	Apr-14							
17	Oct-14	33 2						
18	Apr-15							
19	Oct-15	32 8						
20	Apr-16							
21	Aug-16							
22	Sep-16	30.6						
23	Apr-17	30.2						
24	Nov-17	34.2						
25	Apr-18							
26	Oct-18	27.6						
27								
28								
29								
30								
Coefficient of Variation:		0.08						
Mann-Kendall Statistic (S):		1						
Confidence Factor:		50.0%						
Concentration Trend:		No Trend						



Notes

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
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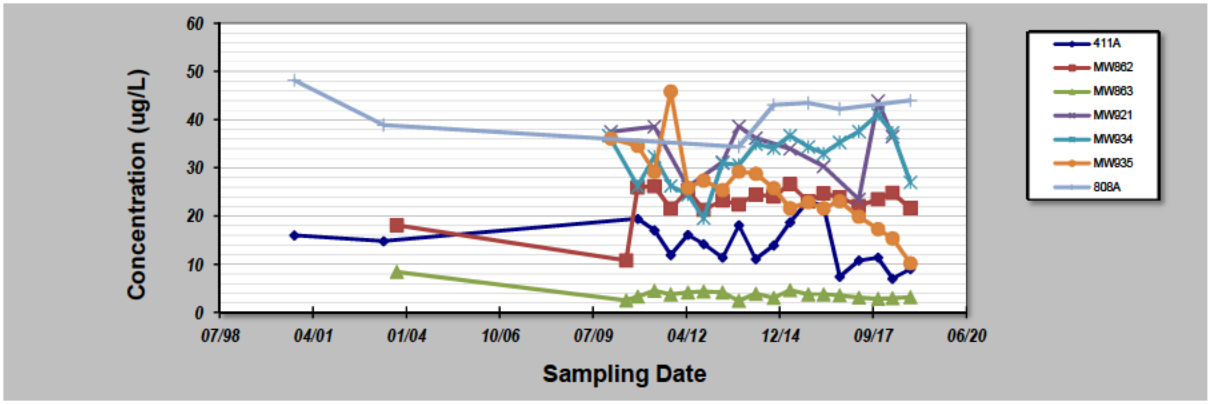
NOTE: If filtered and unfiltered data are available for a sampling event, the most elevated result is used for trend analysis.

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date: 20-May-19
Facility Name: NFSS
Conducted By: [redacted]

Job ID: 2018 ESP TM
Constituent: TOTAL URANIUM
Concentration Units: ug/L

Sampling Point ID:	411A	MW862	MW863	MW921	MW934	MW935	808A
Sampling Event	Sampling Date	TOTAL URANIUM CONCENTRATION (ug/L)						
1	Sep-00	16 01						48 22
2	May-03	14.8						38.9
3	Oct-03		18.11	8.39				
4	Apr-04							
5	Dec-09					36.69		
6	Jan-10				37 51		36.08	
7	Jun-10		10.78	2.5				
8	Oct-10	19.46	25.94	3.3		26.19	34.55	
9	Nov-10							
10	Apr-11	17 07	26.21	4.52	38 54	32.37	29 2	
11	Oct-11	11 94	21.56	3.74		26.3	45.89	
12	Apr-12	16.1	25.3	4.16	26	24.5	25 9	
13	Oct-12	14.2	21.3	4.37		19.6	27.4	
14	Apr-13	11.4	23.2	4.16	31.2	31	25.4	
15	Oct-13	18.1	22.4	2.44	38.6	30.6	29 3	34.4
16	Apr-14	11.1	24.5	3.93	36.2	35	28 8	
17	Oct-14	13.9	24.1	3.04		34.1	25 8	43.1
18	Apr-15	18.7	26.6	4.64	34	36.7	21.6	
19	Oct-15	23.2	23	3.75		34.4	22 9	43.5
20	Apr-16	21.9	24.7	3.77	30.3	33	21.6	
21	Sep-16	7.45	23.9	3.58		35.3	23.1	42.2
22	Apr-17	10.8	22.1	3.09	23.5	37.6	19 9	
23	Nov-17	11.4	23.5	2.86	43.9	41.1	17 3	
24	Apr-18	7.03	24.8	2.97	36.5	37.3	15.4	
25	Oct-18	9	21.6	3.16		27	10 2	44
26								
27								
28								
29								
30								
Coefficient of Variation:		0.32	0.16	0.34	0.18	0.17	0.32	0.10
Mann-Kendall Statistic (S):		-54	15	-50	-3	61	-120	3
Confidence Factor:		96.9%	68.6%	95.7%	56.0%	98.9%	>99.9%	61.4%
Concentration Trend:		Decreasing	No Trend	Decreasing	Stable	Increasing	Decreasing	No Trend



Notes

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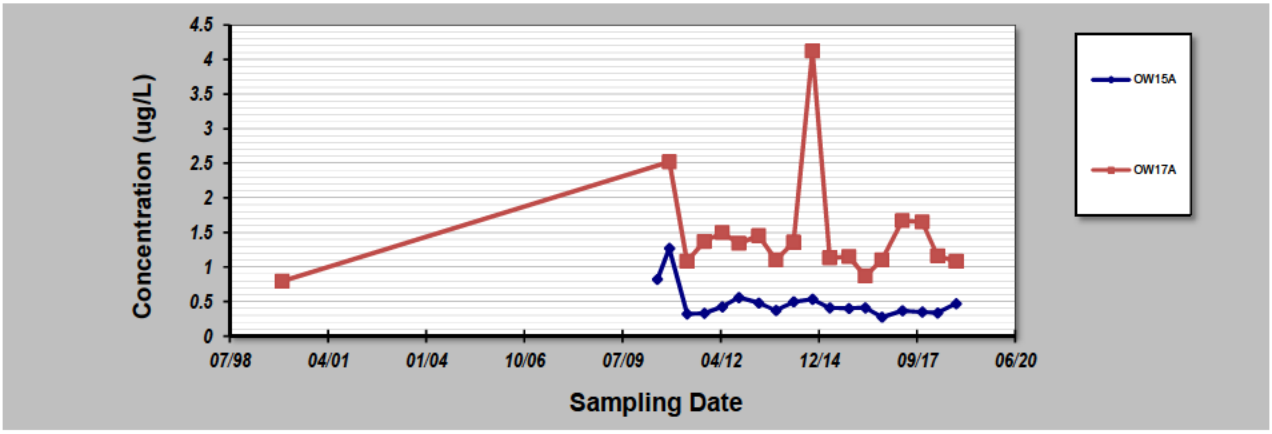
NOTE: If filtered and unfiltered data are available for a sampling event, the most elevated result is used for trend analysis.

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	20-May-19	Job ID:	2018 ESP TM
Facility Name:	NFSS	Constituent:	TOTAL URANIUM
Conducted By	[redacted]	Concentration Units:	ug/L

Sampling Point ID:	OW15A	OW17A					
Sampling Event	Sampling Date	TOTAL URANIUM CONCENTRATION (ug/L)					
1	Jan-00		0.794				
2	Oct-00						
3	May-02						
4	May-03						
5	Jun-10	0.82					
6	Oct-10	1.27	2.52				
7	Apr-11	0.32	1.08				
8	Oct-11	0.33	1.37				
9	Apr-12	0.426	1.5				
10	Oct-12	0.56	1.34				
11	Apr-13	0.481	1.45				
12	Oct-13	0.372	1.1				
13	Apr-14	0.497	1.36				
14	Oct-14	0.535	4.12				
15	Apr-15	0.41	1.13				
16	Oct-15	0.402	1.15				
17	Apr-16	0.412	0.867				
18	Sep-16	0.274	1.1				
19	Oct-16						
20	Apr-17	0.367	1.67				
21	Nov-17	0.348	1.65				
22	Apr-18	0.337	1.16				
23	May-18						
24	Oct-18	0.472	1.08				
25							
Coefficient of Variation:		0.49	0.52				
Mann-Kendall Statistic (S):		-45	-7				
Confidence Factor:		95.2%	58.9%				
Concentration Trend:		Decreasing	Stable				



Notes

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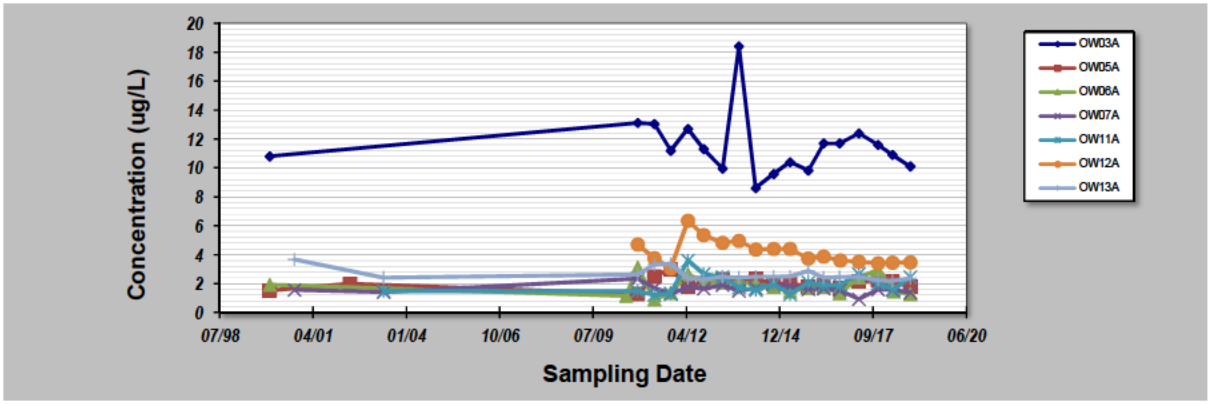
NOTE: If filtered and unfiltered data are available for a sampling event, the most elevated result is used for trend analysis.

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date: 20-May-19
Facility Name: NFSS
Conducted By: [redacted]

Job ID: 2018 ESP TM
Constituent: TOTAL URANIUM
Concentration Units: ug/L

Sampling Point ID:	OW03A	OW05A	OW06A	OW07A	OW11A	OW12A	OW13A
Sampling Event	Sampling Date	TOTAL URANIUM CONCENTRATION (ug/L)						
1	Jan-00	10.8	1 53	1.93				
2	Oct-00				1.57			3.66
3	May-02		1 98					
4	May-03				1.41	1.47		2.4
5	Jun-10			1.14				
6	Oct-10	13.11	1 27	3.11	2.34	1.47	4.72	2.62
7	Apr-11	13 04	2.5	0.91	1.71	1 21	3.75	3.31
8	Oct-11	11.2	2 98	1.37	1.28	1 32	3.06	3.37
9	Apr-12	12.7	1 82	2.64	1.77	3.6	6.34	2.39
10	Oct-12	11.3	2 03	2.14	1.66	2.67	5.36	2.28
11	Apr-13	9.95	2.3	2.07	1 9	2.45	4.83	2.47
12	Oct-13	18.4	2 08	2.07	1.51	1.73	4.95	2.4
13	Apr-14	8.61	2 31	1.99	1.68	1 55	4.36	2.47
14	Oct-14	9.58	1 96	1.78	1.94	1 96	4.4	2.47
15	Apr-15	10.4	2	1.45	1.79	1 25	4.41	2 5
16	Oct-15	9.82	1.78	1.71	1.62	2 08	3.73	2.87
17	Feb-16							
18	Apr-16	11.7	1 91	1.77	1.66	1.9	3.88	2.41
19	Sep-16	11.7		1.35	1.54			2.45
20	Oct-16		1.68			1 88	3.6	
21	Apr-17	12.4	2.15	2.42	0.936	2.67	3.52	2.47
22	Nov-17	11.6	2 21	2.93	1.58	2 02	3.41	2.24
23	Apr-18	10.9	2.14		1.57		3.44	2.19
24	May-18			1.45		1 58		
25	Oct-18	10.1	1.79	1.28	1.4	2.46	3.46	2.36
26								
27								
28								
29								
30								
Coefficient of Variation:		0.18	0.18	0.32	0.18	0.32	0.20	0.16
Mann-Kendall Statistic (S):		-24	-1	-19	-37	33	-68	-58
Confidence Factor:		80.6%	50.0%	73.3%	89.5%	88.5%	99.8%	97.7%
Concentration Trend:		Stable	Stable	Stable	Stable	No Trend	Decreasing	Decreasing



Notes

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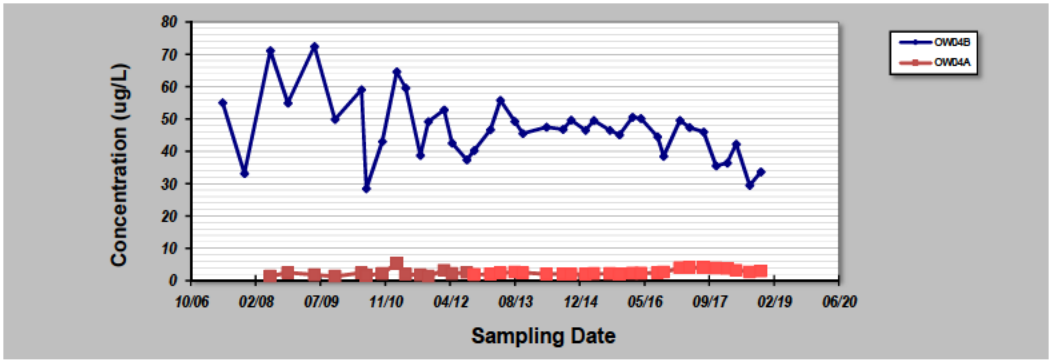
NOTE: If filtered and unfiltered data are available for a sampling event, the most elevated result is used for trend analysis.

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date: 20-May-19
Facility Name: NFSS
Conducted By: [redacted]

Job ID: 2018 ESP TM
Constituent: TOTAL URANIUM
Concentration Units: ug/L

Sampling Point ID:	OW04B	OW04A					
Sampling Event	Sampling Date	TOTAL URANIUM CONCENTRATION (ug/L)					
1	Jun-07	55.01					
2	Nov-07	33.17					
3	Jun-08	71.16	1.33				
4	Oct-08	54.91	2.47				
5	May-09	72.4	1.76				
6	Oct-09	49.88	1.32				
7	May-10	59.12	2.38				
8	Jun-10	28.5	1.63				
9	Oct-10	43.04	2.17				
10	Feb-11	64.64	5.27				
11	Apr-11	59.58	1.93				
12	Aug-11	38.74	1.79				
13	Oct-11	49.22	1.4				
14	Feb-12	52.85	3.15				
15	Apr-12	42.5	2.11				
16	Aug-12	37.4	2.54				
17	Oct-12	40.3	1.82				
18	Feb-13	46.7	2.01				
19	Apr-13	55.8	2.38				
20	Aug-13	49.3	2.6				
21	Oct-13	45.5	2.44				
22	Apr-14	47.5	2.03				
23	Aug-14	46.8	2.05				
24	Oct-14	49.7	1.92				
25	Feb-15	46.5	1.99				
26	Apr-15	49.6	2.1				
27	Aug-15	46.5	2.11				
28	Oct-15	45.1	1.93				
29	Feb-16	50.6	2.26				
30	Apr-16	50.2	2.24				
31	Aug-16	44.5	2.45				
32	Oct-16	38.5	2.61				
33	Feb-17	49.6	3.89				
34	Apr-17	47.4	4.11				
35	Aug-17	46	4				
36	Nov-17	35.5	3.83				
37	Feb-18	36.4	3.68				
38	Apr-18	42.2	3.17				
39	Aug-18	29.5	2.66				
40	Oct-18	33.6	2.9				
Coefficient of Variation:		0.21	0.35				
Mann-Kendall Statistic (S):		-254	296				
Confidence Factor:		99.9%	>99.9%				
Concentration Trend:		Decreasing	Increasing				



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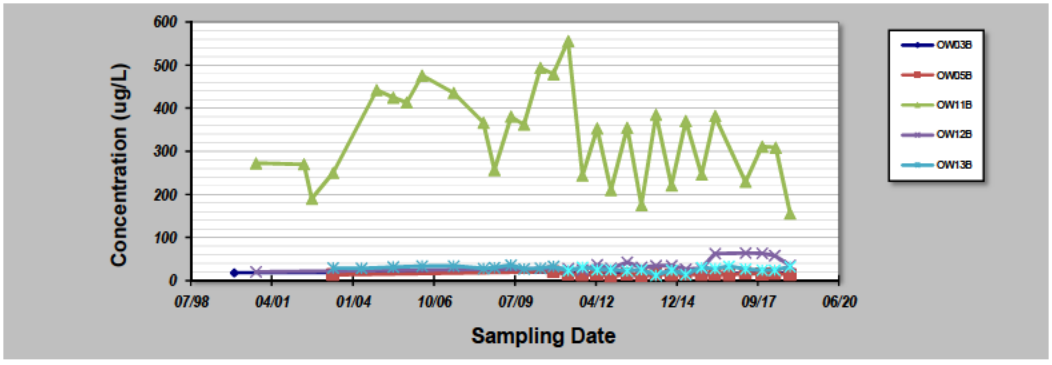
NOTE: If filtered and unfiltered data are available for a sampling event, the most elevated result is used for trend analysis.

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date: 20-May-19
Facility Name: NESS
Conducted By: [redacted]

Job ID: 2018 ESP TM
Constituent: TOTAL URANIUM
Concentration Units: ug/L

Sampling Point ID:		OW03B	OW05B	OW11B	OW12B	OW13B		
Sampling Event	Sampling Date	TOTAL URANIUM CONCENTRATION (ug/L)						
1	Jan-00	18.1						
2	Oct-00			272.49	20.43			
3	May-02			270				
4	Aug-02			190				
5	May-03		13.5	250		29.2		
6	Apr-04					28.5		
7	Nov-04			442				
8	May-05			424.69		31.4		
9	Nov-05			413.16				
10	May-06			475.84		33.61		
11	Jun-07			435.46		34.2		
12	Jun-08			366.69		28.13		
13	Oct-08			256.8		30.16		
14	May-09			380.51		36.35		
15	Oct-09			362.06		26.95		
16	May-10			493.76		28.75		
17	Oct-10	19.79	20.74	478.8		33.01		
18	Apr-11	16.92	14.74	555.94	28.25	23.41		
19	Oct-11	17.39	13.45	244.04	24.74	31.19		
20	Apr-12	15.6	14.4	353	36.6	25		
21	Oct-12	17	9.79	210	28.4	25.2		
22	Apr-13	17.1	14.9	355	42.8	22.9		
23	Oct-13	8.91	12.1	175	30.8	25.3		
24	Apr-14	17.6	15.1	385	34.3	12.7		
25	Oct-14	18.5	13.2	221	34.8	24.3		
26	Apr-15	19.2	15.5	370	26.5	14.2		
27	Oct-15	17.3	13.7	246	28.1	30.3		
28	Apr-16	16.1	15.5	382	62.8	27.8		
29	Sep-16	16.4				33.3		
30	Oct-16		13.2					
31	Apr-17	17	16.7	229	64.2	27		
32	Nov-17	17	15	311	63.3	24.1		
33	Apr-18	17.1	16.3		58.1	24.3		
34	May-18			309				
35	Oct-18	17.2	13.8	156	35.2	32.1		
36								
37								
38								
39								
40								
Coefficient of Variation:		0.13	0.15	0.31	0.39	0.20		
Mann-Kendall Statistic (S):		-13	27	-83	56	-94		
Confidence Factor:		67.3%	83.5%	92.8%	99.4%	97.4%		
Concentration Trend:		Stable	No Trend	Prob. Decreasing	Increasing	Decreasing		



Notes:

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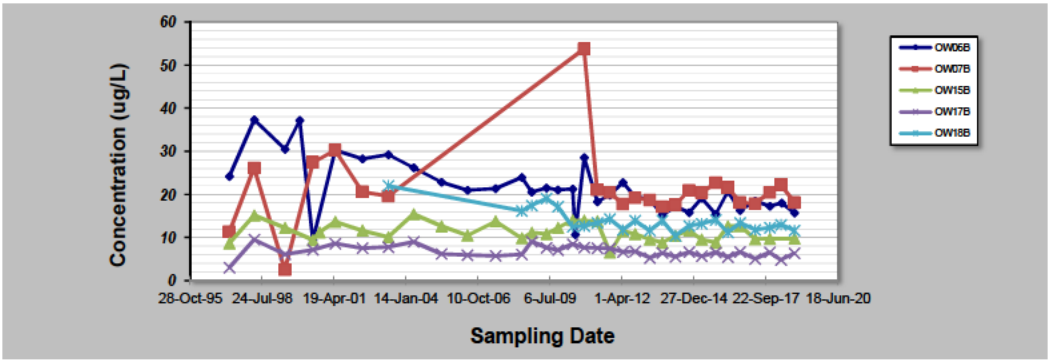
GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date: 20-May-19
Facility Name: NESS
Conducted By: [redacted]

Job ID: 2018 ESP TM
Constituent: TOTAL URANIUM
Concentration Units: ug/L

Sampling Point ID:		OW06B	OW07B	OW15B	OW17B	OW18B		
Sampling Event	Sampling Date	TOTAL URANIUM CONCENTRATION (ug/L)						
1	Apr-97	24 2	11 3	8.69	3 03			
2	Apr-98	37 3	26.12	15.14	9 52			
3	Jun-99	30.49	2.47	12 26	6.11			
4	Jan-00	37 2						
5	Jul-00	9.43	27.44	9.43	7.17			
6	Oct-00			11 22				
7	May-01	30.28	30.27	13.64	8.62			
8	May-02	28 3	20.6	11.6	7 52			
9	May-03	29 2	19.6	10.1	7.79	22		
10	Apr-04	26.15		15.42	9 01			
11	May-05	22.85		12.62	6 21			
12	May-06	21.02		10.5	5 93			
13	Jun-07	21.37		13.77	5.74			
14	Jun-08	23.93		9.83	6 08	16.17		
15	Oct-08	20.53		11.13	9 06	17.45		
16	May-09	21.49		10 83	7.65	19.03		
17	Oct-09	21.04		12 23	7 07	17.19		
18	May-10	21.28		13 98	8.47	12 5		
19	Jun-10	10.64						
20	Oct-10	28.59	53.75	13 93	7.66	12.68		
21	Apr-11	18.31	21.05	13.75	7 57	13.43		
22	Oct-11	19.85	20.45	6 5	7.44	14 3		
23	Apr-12	22 8	17.7	11.5	6.69	11 8		
24	Oct-12	19.4	19 2	10.8	6.8	13 9		
25	Apr-13	18 9	18.7	9.59	5 25	11.6		
26	Oct-13	15 2	17.1	8.84	6.4	13 9		
27	Apr-14	17 2	17.6	10.4	5 57	10.4		
28	Oct-14	15 8	20 9	11.6	6.64	12.7		
29	Apr-15	19.1	20.4	9.55	5.69	13 2		
30	Oct-15	15.4	22.7	8.83	6 53	14.1		
31	Apr-16	20.7	21.6	12.6	5.48	11 2		
32	Sep-16	16 3	18.1	12.7	6.62	13.4		
33	Apr-17	18 5	17 8	9.66	5 04	11 8		
34	Nov-17	17 3	20 5	9.72	6 56	12 3		
35	Apr-18		22 2		4 83	13		
36	May-18	18						
37	Oct-18	15.7	18.1	9.74	6 39	11.6		
38								
39								
40								
Coefficient of Variation:		0.29	0.41	0.18	0.20	0.20		
Mann-Kendall Statistic (S):		-335	-19	-97	-176	-114		
Confidence Factor:		>99.9%	67.1%	93.1%	99.7%	99.9%		
Concentration Trend:		Decreasing	Stable	Prob. Decreasing	Decreasing	Decreasing		



Notes:

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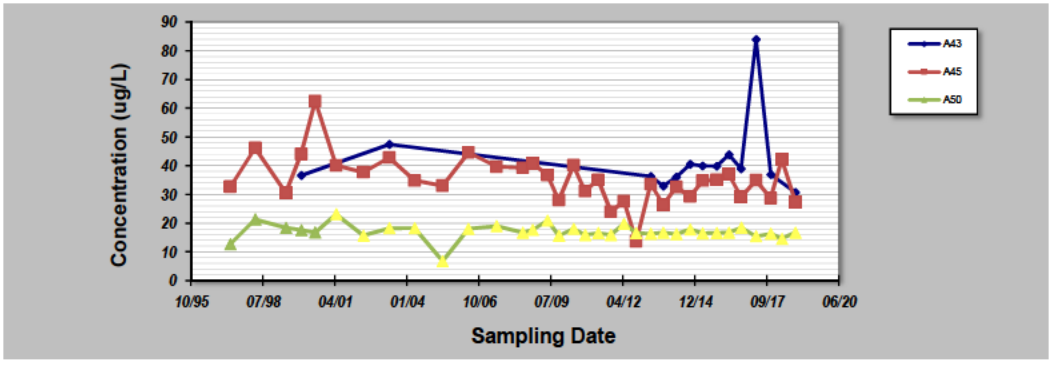
NOTE: If filtered and unfiltered data are available for a sampling event, the most elevated result is used for trend analysis.

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date: 20-May-19
Facility Name: NFSS
Conducted By: [redacted]
Job ID: 2018 ESP TM
Constituent: TOTAL URANIUM
Concentration Units: ug/L

Sampling Point ID:		A43	A45	A50				
Sampling Event	Sampling Date	TOTAL URANIUM CONCENTRATION (ug/L)						
1	Apr-97		32.67	12.66				
2	Apr-98		46.16	21 33				
3	Jun-99		30.53	18 36				
4	Jan-00	36.6	44.1	17.6				
5	Jul-00		62.46	16.75				
6	May-01		40.09	23 09				
7	May-02		37.7	15.7				
8	May-03	47.4	42 8	18.2				
9	Apr-04		34.86	18 24				
10	May-05		33.02	6.77				
11	May-06		44.62	18 04				
12	Jun-07		39.62	18 98				
13	Jun-08		39.27	16.67				
14	Oct-08		40.78	17.67				
15	May-09		36.73	20 93				
16	Oct-09		27.99	15.65				
17	May-10		40.14	18 06				
18	Oct-10		31 2	15 94				
19	Apr-11		35.1	16 55				
20	Oct-11		23.92	15 94				
21	Apr-12		27.6	19.8				
22	Oct-12		13.7	16.6				
23	Apr-13	36 3	33.6	16.3				
24	Oct-13	32 9	26.4	16.7				
25	Apr-14	36	32.6	16.2				
26	Oct-14	40 5	29 2	17.8				
27	Apr-15	40	34 8	16.5				
28	Oct-15	39 8	35	16.6				
29	Apr-16	43 9	37	16.7				
30	Sep-16	38 9	29.1					
31	Oct-16			18.4				
32	Apr-17	83 9	34 9	15.4				
33	Nov-17	36 9	28.7	16.3				
34	Apr-18		42 2	14.6				
35	Oct-18	30.7	27 2	16.7				
36								
37								
38								
39								
40								
Coefficient of Variation:		0.32	0.24	0.16				
Mann-Kendall Statistic (S):		0	-185	-111				
Confidence Factor:		47.6%	99.7%	94.8%				
Concentration Trend:		Stable	Decreasing	Prob. Decreasing				



Notes:

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2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

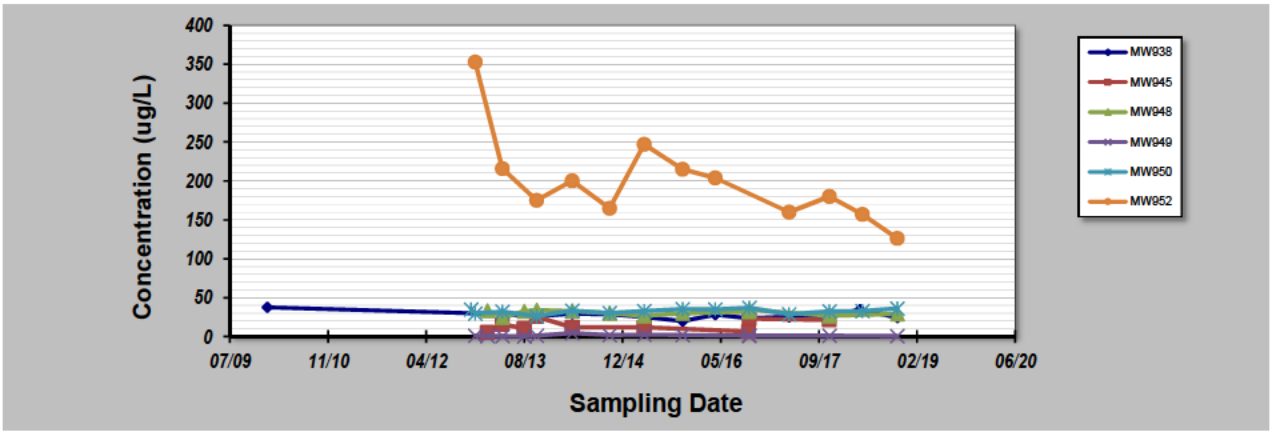
NOTE: If filtered and unfiltered data are available for a sampling event, the most elevated result is used for trend analysis.

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date: 20-May-19
Facility Name: NFSS
Conducted By: [redacted]

Job ID: 2018 ESP TM
Constituent: TOTAL URANIUM
Concentration Units: ug/L

Sampling Point ID:	MW938	MW945	MW948	MW949	MW950	MW952
Sampling Event	Sampling Date	TOTAL URANIUM CONCENTRATION (ug/L)					
1	Jan-10	37.51					
2	Nov-12					35	
3	Dec-12				1.05	29.4	353
4	Feb-13		5.25	33.1	0.803		
5	Apr-13	28.7	15 3	24.6	0.469	31.8	216
6	Aug-13		10.7	32.4	0.289		
7	Oct-13	25.9	25 2	33.9	1.12	26.3	175
8	Apr-14	29.2	11 9	32.7	4.44	33.1	200
9	Oct-14	28.3		29.7	2.1	30.1	165
10	Apr-15	25.3	11.6	26.6	2.25	32.9	247
11	Oct-15	19.7		29.7	2.04	35.4	215
12	Apr-16	28.1				34.9	204
13	Sep-16	23.3	6.55	31.9	1.02		
14	Oct-16		22 9	34.5	1.27	36.9	
15	Apr-17	25.5				28.7	160
16	Nov-17	26.3	21 2	26.6	1.14	32.2	180
17	Apr-18	34.7					
18	May-18					32.6	157
19	Oct-18	24.4		29.1	0.506	36	126
20							
Coefficient of Variation:		0.17	0.49	0.11	0.77	0.09	0.29
Mann-Kendall Statistic (S):		-24	8	-10	6	21	-38
Confidence Factor:		91.8%	76.2%	72.7%	61.7%	86.0%	99.6%
Concentration Trend:		Prob. Decreasing	No Trend	Stable	No Trend	No Trend	Decreasing



Notes

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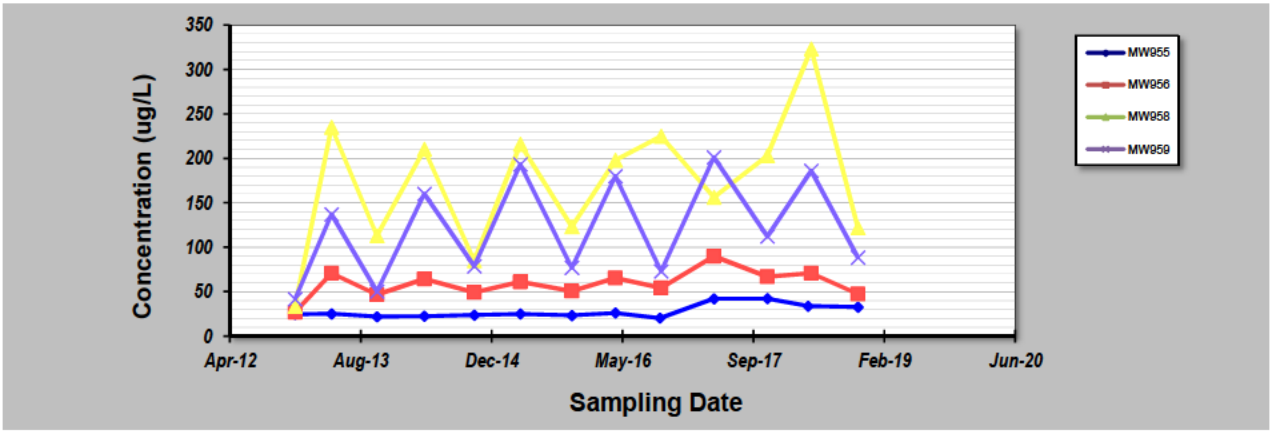
NOTE: If filtered and unfiltered data are available for a sampling event, the most elevated result is used for trend analysis.

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date: 20-May-19
Facility Name: NESS
Conducted By: [redacted]
Job ID: 2018 ESP TM
Constituent: TOTAL URANIUM
Concentration Units: ug/L

Sampling Point ID:	MW955	MW956	MW958	MW959			
Sampling Event	Sampling Date	TOTAL URANIUM CONCENTRATION (ug/L)						
1	Dec-09							
2	Jan-10							
3	Nov-12							
4	Dec-12	24.7	27	33.2	41.7			
5	Feb-13							
6	Apr-13	25.2	70 8	235	137			
7	Aug-13							
8	Oct-13	22	46 8	113	50 3			
9	Apr-14	22.5	64 3	210	160			
10	Oct-14	23.7	49.1	84.8	78.6			
11	Apr-15	24.9	61 2	216	193			
12	Oct-15	23.3	50 5	123	76 8			
13	Apr-16	26.1	65 5	198	180			
14	Sep-16	20.3						
15	Oct-16		54 2	225	72 9			
16	Apr-17	42.1	89 8	156	201			
17	Nov-17	42.3	66 8	203	112			
18	Apr-18	33.8						
19	May-18		70.6	323	186			
20	Oct-18	32.8	47 5	122	88 5			
21								
22								
23								
24								
25								
Coefficient of Variation:		0.26	0.26	0.44	0.47			
Mann-Kendall Statistic (S):		30	22	16	22			
Confidence Factor:		96.2%	89.8%	81.6%	89.8%			
Concentration Trend:		Increasing	No Trend	No Trend	No Trend			



Notes

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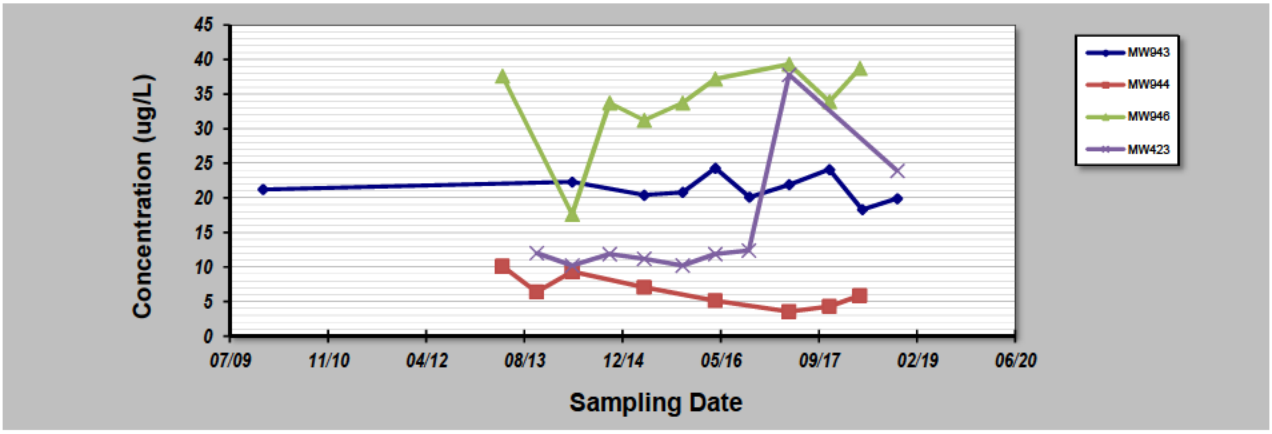
NOTE: If filtered and unfiltered data are available for a sampling event, the most elevated result is used for trend analysis.

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	20-May-19	Job ID:	2018 ESP TM
Facility Name:	NFSS	Constituent:	TOTAL URANIUM
Conducted By:	[redacted]	Concentration Units:	ug/L

Sampling Point ID:	MW943	MW944	MW946	MW423			
Sampling Event	Sampling Date	TOTAL URANIUM CONCENTRATION (ug/L)						
1	Dec-09	21.22						
2	Jan-10							
3	Nov-12							
4	Dec-12							
5	Feb-13							
6	Apr-13		10.1	37.6				
7	Aug-13							
8	Oct-13		6.37		12			
9	Apr-14	22.3	9.32	17.6	10 2			
10	Oct-14			33.7	11 9			
11	Apr-15	20.4	7.08	31.2	11 2			
12	Oct-15	20.8		33.7	10 2			
13	Apr-16	24.3	5.1	37.2	11 9			
14	Sep-16				12.4			
15	Oct-16	20.1						
16	Apr-17	21.9	3.56	39.3	37 8			
17	Nov-17	24.1	4.29	33.9				
18	Apr-18		5.87	38.7				
19	May-18	18.3						
20	Oct-18	19.9			23 9			
21								
22								
23								
24								
25								
Coefficient of Variation:		0.09	0.36	0.20	0.59			
Mann-Kendall Statistic (S):		-11	-16	15	16			
Confidence Factor:		81.0%	96.9%	92.5%	94.0%			
Concentration Trend:		Stable	Decreasing	Prob. Increasing	Prob. Increasing			



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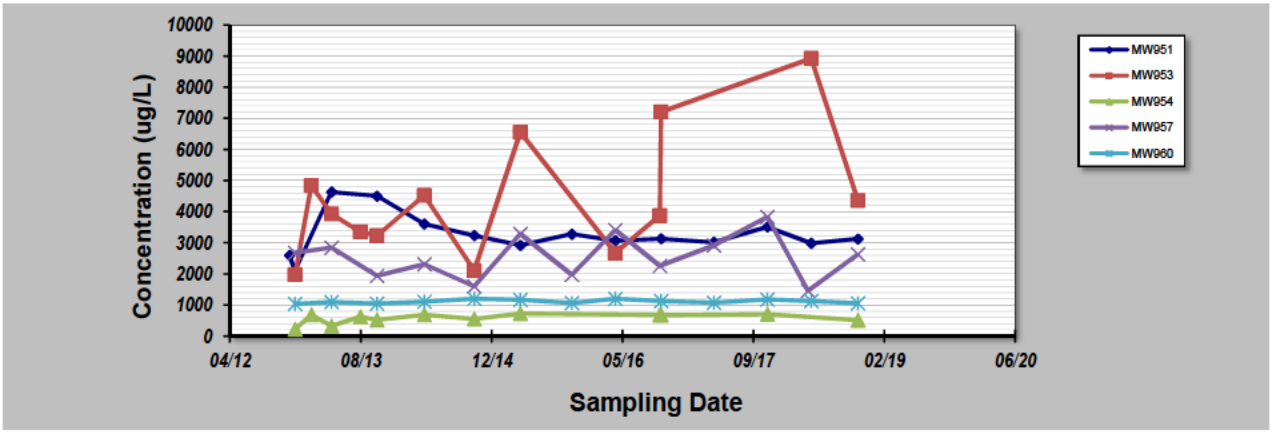
NOTE: If filtered and unfiltered data are available for a sampling event, the most elevated result is used for trend analysis.

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date: 20-May-19
Facility Name: NFSS
Conducted By: [redacted]

Job ID: 2018 ESP TM
Constituent: TOTAL URANIUM
Concentration Units: ug/L

Sampling Point ID:	MW951	MW953	MW954	MW957	MW960		
Sampling Event	Sampling Date	TOTAL URANIUM CONCENTRATION (ug/L)						
1	Dec-09							
2	Jan-10							
3	Nov-12	2600						
4	Dec-12	2090	1970	218	2680	1040		
5	Feb-13		4843	687				
6	Apr-13	4631	3929	322	2846	1097		
7	Aug-13		3351	620				
8	Oct-13	4502	3221	523	1944	1049		
9	Apr-14	3601	4523	682	2310	1109		
10	Oct-14	3231	2106	548	1600	1201		
11	Apr-15	2917	6547	724	3290	1165		
12	Oct-15	3280			1967	1063		
13	Apr-16	3069	2671		3410	1204		
14	Sep-16		3875	689	2260			
15	Oct-16	3130	7207	680		1124		
16	Apr-17	3018			2913	1080		
17	Nov-17	3509		711	3832	1177		
18	Apr-18				1459			
19	May-18	2988	8927			1126		
20	Oct-18	3124	4359	508	2634	1060		
21								
22								
23								
24								
25								
Coefficient of Variation:		0.20	0.46	0.28	0.28	0.05		
Mann-Kendall Statistic (S):		-9	24	20	6	16		
Confidence Factor:		66.6%	91.8%	90.2%	61.7%	81.6%		
Concentration Trend:		Stable	Prob. Increasing	Prob. Increasing	No Trend	No Trend		



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