



**US Army Corps
of Engineers®**

Buffalo District

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**NIAGARA FALLS STORAGE SITE
Formerly Utilized Sites Remedial Action Program**

**2020
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
CF	confidence factor
CFR	Code of Federal Regulations
COV	coefficient of variation
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
km	kilometer
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
PCE	tetrachloroethene
pCi/g	picocuries per gram
pCi/L	picocuries per liter
Ra	radium
RCRA	Resource Conservation and Recovery Act
SCO	soil cleanup objective
SDWA	Safe Drinking Water Act
TDS	total dissolved solids
TED	total effective dose
U	lab qualifier–nondetect
U ₃ O 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, 30.6 kilometres (km) (19 miles) 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 10-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.

In late 2018, the Corps of Engineers replaced nine ESP monitoring wells that were in disrepair. Wells replaced include A50, A55, BH49, BH49A, MW953, OW13B, OW15B, OW17B, and OW18B. The new wells are identified as the former name followed by an “R” for replacement (e.g., A50R, A55R, BH49R, BH49AR, etc.)

The Corps of Engineers made no changes to the air monitoring schedule 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 2020 environmental surveillance analytical results confirm that site controls are fully protective of human health and the environment.

The results of the 2020 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 (pCi/L).
- 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.
- The annual average radon flux across the IWCS was well below 20 picocuries per meter squared per second (pCi/m²/s), the standard specified in 40 CFR Part 61, Subpart Q
- Tetrachloroethene was detected in groundwater monitoring wells in the former acidification area.

In response to elevated radon flux measurements recorded in a limited area on the IWCS cap in 2018 and 2019, the Corps of Engineers placed six to eight inches of topsoil, grass seed, and matting (for erosion control) to the affected area in June 2020. After the remedy was implemented, the Corps completed several rounds of radon flux sampling in the area. The results showed that the strategy effectively reduced radon flux to levels that are consistent with past measurements and well below the regulatory standard.

Trend analysis indicates fairly stable total uranium concentrations in surface water across the Central Drainage Ditch with no evidence of a statistically increasing or decreasing trend with one exception, sampling location SWSD011. Location SWSD011, which is situated at the property boundary and is the most downgradient location in the Central Drainage Ditch, shows evidence of an “increasing” trend. Both locations sampled along the West Drainage Ditch also exhibit “increasing” trends.

Trend analysis shows uranium-238 (used as a surrogate for total uranium) concentrations in sediment increasing in a downgradient path along the Central Drainage Ditch. The highest concentration of uranium-238 detected at any location in 2020 was 4.52 pCi/g (SWSD025), which is slightly greater than

the site-specific background concentration of 3.08 pCi/g reported in the remedial investigation (USACE 2007).

Trend analysis of radium-226 in sediment shows evidence of an increasing trend at sample locations SWSD010, SWSD023, SWSD011, SWSD025, and WDD2, a probably increasing trend at location, SWSD021, a stable trend at WDD3, and no trend at locations SWSD009 and SWSD022. The maximum concentration of radium-226 in sediment detected in the Central Drainage Ditch in 2020 was 2.15 pCi/g at location SWSD022. For comparison, the site-specific background concentration developed for the remedial investigation was 2.43 pCi/g (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. Radium-226 concentrations in surface water continue to be predominantly nondetect or less than the laboratory detection limit.

The 2020 groundwater analytical data showed that total uranium concentrations in 25 groundwater monitoring wells exceeded the uranium drinking water criterion (30 µg/L). Total uranium concentrations continue to decrease significantly in wells MW951 and MW953R, located south and east (across the Central Drainage Ditch), respectively, from the IWCS. No significant changes in total uranium concentrations were observed over the past several years in the remaining 55 wells monitored for the ESP. The Corps of Engineers believes the source of elevated uranium in groundwater is residual soil contamination from former operations at the site. 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 11 of 57 wells evaluated. Among the wells exhibiting an increasing or probably increasing trend, only wells OW03A, OW04A and A55R are located proximate and downgradient of the IWCS. All three wells are screened in the lower-water bearing zone. The cause of increasing uranium concentrations in OW03A and OW04A is likely legacy sources since there is no apparent trend pattern of increasing uranium concentrations when considering either their respective paired wells (e.g., OW03B and OW04B) or nearby wells. Regarding well A55R, the increasing trend is due to the fact that the well it replaced, A55, exhibited lower total uranium concentrations and has been sampled over a longer time period. The average total uranium concentration between 2010 and 2018 in well A55 was 0.17 µg/L, while the average total uranium concentration between 2019 and 2020 in well A55R was 3.66 µg/L. If evaluated separately, the trending analysis shows no trend in well A55 and a stable trend in well A55R.

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 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 30 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 NFSS* (USACE 2007), *NFSS Remedial Investigation Report Addendum* (USACE 2011), *Feasibility Study Report for the IWCS at the NFSS* (USACE 2015b), *Proposed Plan IWCS Operable Unit* (USACE 2015c), and the *Feasibility Study Balance of Plant and Groundwater Operable Units* (USACE 2019). 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 2018).

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/> (under “REPORTS” and “Site-Wide Environmental Monitoring Documents”).

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 3.2 kilometers (km) (2 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 creeks 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 4.8 km (3 miles) northwest of the NFSS. The vegetation that grows in the on-site ditches during the summer months dewater 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 Radonova Radtrak2® 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 10 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 Radtrak2® 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 (background) locations are monitored for radon concentrations and gamma emissions.
- Sediment is monitored for isotopic 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 7471
Total Uranium	ASTM D5174.97, Trace Uranium by Pulsed Laser Phosphorimetry	ASTM D5174.97 Trace Uranium by Pulsed Laser Phosphorimetry	ASTM D3972, 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 using method S4500PE

--- 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 Radtrak2® detectors placed around the IWCS and the NFSS. The Radtrak2® detectors are placed on the fence at breathing height (1.7 meters [5.6 feet] above the ground) and replaced every six months. The Radtrak2® detector consists of a small piece of film inside an anti-static plastic container. Radon diffuses through a plastic cover in the container; alpha particles from radon and its decay products strike the film and produce alpha tracks. At the end of the deployment, the detectors are returned to a laboratory for analysis, i.e., the alpha tracks are chemically etched and counted using computer-assisted image analysis equipment. The number of alpha

tracks along with the deployment duration provides the basis for converting calculated radon exposure to the average air 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 Radtrak2[®] 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 2020), 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 ($\text{pCi}/(\text{meter}^2\text{-sec})$) ($1.9 \text{ pCi}/(\text{feet}^2\text{-sec})$) of radon-222 as an average for the entire source, into the air.”

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 4.8 km (3 miles) 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 is not the main source of drinking water; however, the New York State Department of Environmental Conservation (NYSDEC) Class GA groundwater standards are conservatively used to compare to ESP groundwater analytical results. Groundwater at the NFSS 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 ($\mu\text{g/L}$).

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 NYSDOH, 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 does not 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 2020 ESP analytical results for groundwater, surface water, sediment, airborne particulates, radon, and gamma radiation. It is 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 - 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 2020 results, corrected for dose due to shipping and background, are presented in Table 4. The net dose rate at each OSLD location is used to calculate the annual gamma radiation dose at each of the four property boundaries or perimeter fences, as shown in the table below.

Direction	OSLD Locations	Calculated Average Net Dose Rate (mrem/year) ^a
Eastern Perimeter (closest to worker receptor)	45, 50, 55, 65	5.9
Western Perimeter (closest to residential receptor)	8, 10, 11, 13, 15, 29, 36	3.4
Northern Perimeter	1, 11, 12, 60, 65, 122	1.1
Southern Perimeter	7, 28, 29, 45	5.3

^a Net dose rates (corrected for background) for each perimeter are summed and divided by the total number of observations (e.g., for the western perimeter, seven locations sampled twice a year for a total of 14 observations)

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

As indicated in the table above, the calculated average net dose rates at the NFSS perimeter fences ranged from 1.1 to 5.9 mrem/year, which are below the allowable public dose limit of 100 mrem/year above background (see Section 3.1). The average net dose rates at the NFSS perimeter fences used to calculate the hypothetical dose to the nearest worker and residential receptors consider 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 1.38 mrem/year. Calculation details are as follows:

- The worker stands at the fence for 2,000 hours (eight hours per day, five 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 5.9 mrem/year receives a dose of 1.36 mrem/year (5.9 mrem/year multiplied by 0.23)

Trend graphs depicting external gamma dose rates at the NFSS and IWCS perimeters from 1998 thru 2020 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 2020, 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 2020.

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 80 km (50 miles) 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, an infant resident, 914 meters (2,999 feet) south-southwest of the site, in 2020, was 0.00027 mrem. Consistent with results from previous years, this value is well below the 10 mrem/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 2020 was 0.00574 person-rem. This compares to an annual background dose of 5,425,000 person-rem to the same population. Details of the calculations, including methodology, are presented in the Corps of Engineers' *FUSRAP CY2020 NESHAP Annual Report for Niagara Falls Storage Site (NFSS)*, Lewiston, New York (USACE 2021).

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/year dose limit (excluding radon). The maximum external dose is conservatively estimated to be the dose at the southern perimeter fence (i.e., a resident is assumed to stand at the fence 24 hours a day for 365 days). Based on 2020 data, the cumulative annual dose is 5.3 mrem (0.00027 mrem + 5.3 mrem), which is significantly less than the DOE limit of 100 mrem/year (excluding radon) and the U.S. average per capita background dose of approximately 620 mrem/year² (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 is unlikely that the IWCS would emit radon-220; however, it is possible that it would emit radon-222. The Corps of Engineers uses Radtrak2® detectors to conduct air surveillance to determine the concentration of radon gas at NFSS. These Radtrak2® detectors measure alpha particle emissions from radon-222 and collect passive, integrated data throughout the period of exposure. Because radon-220 is not a contaminant of concern at NFSS (due to the relatively low concentrations of radium-228 and the short half-life of radon-220), all concentrations are assumed to be radon-222.

The Corps of Engineers monitors for radon gas semi-annually; Radtrak2® detectors are deployed in January and July. Surveillance locations are shown on Figure 6.

The results, presented in Table 5, indicate that there was no increase in radon gas at the site perimeter during either of the two monitoring periods in 2020. Consistent with results from previous years, all site radon-222 results from the 2020 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 0.5 pCi/L. The results from the background locations 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.

On June 1, 2020, the Corps of Engineers placed six to eight inches of topsoil and scattered grass seed on the area where elevated radon flux readings and distressed grass were identified in 2018 and 2019. The area is shown on Figure 4A and includes canister locations 62 and 65. Following seeding, matting was placed over the area for erosion control.

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.

The Corps of Engineers implemented several radon flux sampling events in 2020 to evaluate the effectiveness of the topsoil and grass remedy. The pre-remedy radon flux events took place on May 6-7 and May 20-21, 2020, and were limited to sample locations B2 and B9. The data, shown on Table 6b, indicate elevated readings ranging from 8.233 to 508 pCi/m²/s. Post remedy events in 2020 occurred on July 14-15, August 18-19, September 9-10, October 28-29, and November 3-4, and included sample location B2 and four additional locations approximately 20 feet east, west, north and south of B2. Measured results from these events, presented on Table 6c, ranged from nondetect to 0.105 pCi/m²/s, with an average result (of detects and nondetects) of 0.035 pCi/m²/s. The full radon flux event also took place on July 14-15, 2020. The data, presented in Table 6a, show the remedy was successful with a maximum measurement of 0.255 pCi/m²/s.

4.2 Surface Water

In 2020, all surface water samples were collected semiannually (2nd and 4th quarters) from nine designated locations. Location SWSD025 is also sampled during 1st and 3rd quarters. For five years (2013 through 2018), location SWSD025 was sampled by an auto-sampler during significant rain events. In late 2018, the auto-sampler experienced mechanical failure and the decision was made to discontinue rain event sampling because the rain event data reflect the same range as quarterly data, neither of which show increasing trends in contaminant concentrations. It is suspected that the rain event data reflect first-flush storm flows that dilute any standing water or groundwater seepage in the Central Drainage Ditch that accumulates between storm flows. 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 May 4 and 6, 2020
- 4th quarter samples were collected on October 14 and 15, 2020
- 1st and 3rd quarter samples were also collected from SWSD025 on February 26 and August 20, 2020, respectively (on September 17, 2020, a second 3rd quarter sample was collected for PAH analysis because the laboratory misplaced the original sample)
- Analytical parameters included radium-226, total uranium, PAHs, and metals

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 2020 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 19 of 23 surface water samples, which included one filtered sample. Among the four detections, the concentrations ranged between 0.26 pCi/L (SWSD009) and 0.49 pCi/L, at WDD3 and SWSD009, respectively, 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 24 surface water samples collected in 2020, which included two filtered samples. Concentrations ranged from 1.59 µg/L at SWSD009 to 63.5 µg/L at SWSD011.

Total uranium concentrations detected in surface water over the course of the Corps of Engineers' ESP (1997 through 2020) 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 coefficient of variation (COV).
- **The Coefficient of Variation:** 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
$S > 0$	$95\% \geq CF \geq 90\%$	Probably Increasing
$S > 0$	$CF < 90\%$	No Trend
$S \leq 0$	$CF < 90\%$ and $COV \geq 1$	No Trend
$S \leq 0$	$CF < 90\%$ and $COV < 1$	Stable
$S < 0$	$95\% \geq CF \geq 90\%$	Probably Decreasing
$S < 0$	$CF > 95\%$	Decreasing

Source: Aziz, et al. (2003).

The results of the trend evaluation (spring and fall data from 1997 to 2020) 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
Central Drainage Ditch			
SWSD009	36	No Trend	Upgradient
SWSD021	34	Decreasing	Upgradient
SWSD023	18	No trend	Upgradient
SWSD010	38	Stable	Midgradient 1
SWSD022	37	No trend	Midgradient 2
SWSD025 ¹	40	No trend	Midgradient 3
SWSD011	37	Increasing	Downgradient
West Drainage Ditch			
WDD2	18	Increasing	Upgradient
WDD3	18	Increasing	Downgradient

¹Only the results from the scheduled 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).

Trend analysis indicates fairly stable total uranium concentrations in surface water across the Central Drainage Ditch with no evidence of a statistically increasing or decreasing trend with one exception, sampling location SWSD011. Location SWSD011, which is situated at the property boundary and is the most downgradient location in the Central Drainage Ditch, shows evidence of an “increasing” trend. While the May 2020 sample at SWSD011 was low at 11.9 µg/L, the October 2020 sample was elevated at 63.4 µg/L. When the October sample was collected, water in the ditches was reportedly lower than normal and it is speculated that the inlet to the sample tubing was closer to the sediment than usual (it is noted that turbidity in this sample was 40 NTUs, over two times higher than normal).

Trend analysis shows that total uranium concentrations at WDD2 and WDD3 are increasing, however, total uranium concentrations remain low - 3.58 µg/L and 3.48 µg/L in May 2020 and 4.46 µg/L and 3.78 µg/L in October 2020, respectively. For purposes of 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 2020 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 were detected, predominantly at upgradient locations. Several metals also were detected in surface water samples. The results are comparable to previous years.

4.3 Sediment

In accordance with the 2020 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 2020 is as follows:

- 2nd quarter samples were collected on May 7, 2020
- 4th quarter samples were collected on October 16 and 19, 2020
- Location SWSD025 was also sampled on February 26 and August 20, 2020 (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 2020 analytical results for radionuclides in sediment are presented on Table 9.

Radium-226

The 2020 analytical results for the 22 sediment samples (including two field duplicate samples) analyzed for radium-226 ranged from 0.93 pCi/g (SWSD009) to 2.15 pCi/g (SWSD022). 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 2020.

Trend analysis of radium-226 in sediment using the *GSI Mann-Kendall Toolkit* shows evidence of an increasing trend at sample locations SWSD010, SWSD023, SWSD011, SWSD025, and WDD2, a “probably increasing” trend at location, SWSD021, a stable trend at WDD3, and no trend at locations SWSD009 and SWSD022. Results are summarized below and presented in Attachment B-2.

Mann-Kendall Trend Results¹ for Radium-226 in Sediment

SAMPLE ID	SAMPLE SIZE	RESULTING TREND	LOCATION ALONG DITCH
Central Drainage Ditch			
SWSD009	20	No trend	Upgradient
SWSD021	20	Probably increasing	Upgradient
SWSD023	18	Increasing	Upgradient
SWSD010	20	Increasing	Midgradient 1
SWSD022	20	No trend	Midgradient 2
SWSD025	38	Increasing	Midgradient 3
SWSD011	20	Increasing	Downgradient
West Drainage Ditch			
WDD2	20	Increasing	Upgradient
WDD3	20	Stable	Downgradient

¹Trend 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 the Central Drainage Ditch in 2020 was 2.15 pCi/g at location SWSD022. For comparison, the site-specific background concentration developed for the remedial investigation was 2.43 pCi/g (USACE 2007).

Isotopic Uranium

The 2020 analytical results for uranium isotopes uranium-234, uranium-235 and uranium-238 in sediment showed detections in all but two of the samples collected. Among the detections, the isotopic activity levels ranged from 0.038 pCi/g to 5.31 pCi/g. The isotopic uranium data are similar to historical data although the sample collected from SWSD025 in August 2020 was slightly elevated (5.31 pCi/g for U-233/234). In October 2020, the sample collected from SWSD025 exhibited 2.12 pCi/g of U-233/234, which is within the range typically measured. A graphical representation of the analytical data for total uranium in sediment since 1997 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, SWSD022, and 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 2020 was 4.52 pCi/g (SWSD025), which is slightly more 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 Results¹ for Uranium-238 in Sediment

SAMPLE ID	SAMPLE SIZE	RESULTING TREND	LOCATION ALONG DITCH
Central Drainage Ditch			
SWSD009	35	Decreasing	Upgradient
SWSD021	35	Decreasing	Upgradient
SWSD023	26	Stable	Upgradient
SWSD010	36	Increasing	Midgradient 1
SWSD022	35	Increasing	Midgradient 2
SWSD025	40	Increasing	Midgradient 3
SWSD011	35	Increasing	Downgradient
West Drainage Ditch			
WDD2	26	No trend	Upgradient
WDD3	26	No trend	Downgradient

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

4.3.2 Sediment Chemical Findings

The 2020 analytical results for metals and PAHs in sediment are presented in Attachment A as Tables A-3 and A-4, respectively. Several metals were detected in all sediment samples and several polycyclic aromatic hydrocarbons were detected predominantly at upstream sample locations. The 2020 data were generally 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. Well locations are presented on Figure 5. Water levels are measured on a quarterly basis in over 100 wells.

In late 2018, nine monitoring wells that are sampled regularly as part of the ESP were replaced due to damaged components. They include BH49, BH49A, A50, A55, OW13B, OW15B, OW17B, OW18B, and MW953. The new wells were installed at the same locations and at the same depths and are identified as BH49R, BH49AR, A50R, A55R, OW13BR, OW15BR, OW17BR, OW18BR, and MW953R.

Highlights of the groundwater sample collection effort in 2020 are as follows:

- The semiannual sampling took place between May 23 and June 6 (2nd quarter) and October 24 and October 30 (4th quarter); wells OW04A and OW04B were also sampled on March 12 and August 28, 2020.
- 18 groundwater samples were filtered for total U.
- Water levels were measured in 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 2020, the Corps of Engineers measured groundwater levels in 104 wells using an electronic depth-to-water meter. Potentiometric data were recorded from 68 wells in the upper water-bearing zone and 36 wells in the lower water-bearing zone. 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 vary between proximal wells. Groundwater levels imply general groundwater elevations and regional to local flow directions that vary slightly from

seasonal high- and low-water conditions in each water-bearing zone. Figures 13 through 16 exemplify the spatial and temporal variability of groundwater levels.

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 0.53 to 4.13 meters (1.75 to 13.54 feet) below ground surface during 2020. The quarterly water level fluctuations in the upper water-bearing zone averaged 0.86 meters (2.81 feet) and showed low and high elevations on August 20, 2020, and May 4, 2020, respectively.

In the lower groundwater system, the depth to water ranged from 1.12 to 2.71 meters (3.69 to 8.89 feet) below ground surface during 2020. Quarterly water level fluctuations in the lower groundwater system averaged 0.48 meters (1.56 feet) and showed low and high elevations also on February 26, 2020, and May 4, 2020, 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 94.91 to 97.29 meters (311.39 to 319.20 feet) above mean sea level, whereas the low-water condition ranged from 91.12 to 96.92 meters (298.95 to 317.97 feet). The high-water elevation in the lower system ranged from 95.10 to 96.80 meters (312.00 to 317.60 feet) above mean sea level, whereas the low-water condition ranged from 95.27 to 96.79 meters (312.55 to 317.55 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 2020 reflect normal seasonal patterns of a wet spring and dry summer through fall. The lower zone exhibited a continuation of late-2019 low-water levels that rebounded in May 2020 and then minimally varied in fluctuation (averaging 0.48 meters or 1.56 feet).

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 spring, when evapotranspiration is less robust. Vertical gradients show more upward pressure due to water-level declines in the upper water-bearing zone from midsummer to late fall when evapotranspiration is robust. 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 km (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 2020.

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 2020 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 104 of the 114 samples (includes two filtered and four field duplicate samples) collected in 2020. Among the 10 detections, radium-226 concentrations were below the NYS drinking water standard of 3 pCi/L and ranged from 0.23 pCi/L to 0.91 pCi/L. The highest activity level was detected in well OW04B, which is screened in the upper water-bearing zone and is situated north 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 2019 and 2020		
Groundwater Zone Monitored	Concentration Range	
	2019	2020
Upper water-bearing zone	Nondetect— 1.93 pCi/L	Nondetect— 0.91 pCi/L
Lower water-bearing zone	Nondetect— 1.75 pCi/L	Nondetect— 0.52 pCi/L

Total Uranium

The 2020 groundwater analytical data showed that total uranium concentrations in 25 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 in 2020 are MW951 (2,832 µg/L) and MW957 (2,734 µg/L), both located south of the IWCS. The table below presents a comparison of range of total uranium concentrations detected in groundwater in 2019 and 2020.

**Total Uranium Findings
2018 and 2019**

Groundwater Zone Monitored	Concentration Range	
	2019	2020
Upper water-bearing zone	5.25 – 3,487 µg/L	3.52 - 2,832 µg/L
Lower water-bearing zone	0.094 – 11.4 µg/L	0.32 – 9.88 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 DOE remediation activities. Also, video footage taken during IWCS construction shows 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 of 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 2020 analysis showed PCE in well MW934 at concentrations of 1.3 µg/L and 0.64 µg/L, and in well 411A at a concentration of 0.64 µg/L. All of these detections are below the state drinking water standard of 5 µg/L. It is noted that PCE was not detected in well MW948, which is nearby and downgradient of well MW934. Several wells also exhibited VOCs that are typical laboratory contaminants (e.g., acetone, chloroform, and methylene chloride). 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 2020) 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 29 of 57 wells analyzed. Decreasing or "Probably Decreasing" trends in total uranium concentrations were identified in 17 wells. Increasing or "Probably Increasing" trends were identified in 11 wells: OW12B, A55R, 505, OW03A, OW04A, MW423, MW934, MW946, MW955, MW958, and MW959. The results are presented in Attachment B-4 and summarized in the table below.

Mann-Kendall Trend Results for Total Uranium in Groundwater

No.	Well	Sample Size (n)	Resulting Trend
1	OW03B	22	Stable
2	OW04B	40	Decreasing
3	OW05B	22	No trend
4	OW06B	38	Decreasing
5	OW07B	26	Stable
6	OW11B	34	Stable
7	OW12B	20	Increasing¹
8	OW13BR	31	Decreasing
9	OW15BR	37	No trend
10	OW17BR	37	Decreasing
11	OW18BR	27	Decreasing
12	BH49R	20	Decreasing
13	BH49AR	26	No trend
14	A42	37	Decreasing
15	A43	17	No trend
16	A45	37	Decreasing
17	A50R	36	Stable
18	A55R	22	Increasing²
19	505	25	Increasing³
20	302A	36	Decreasing
21	411A	23	No trend
22	808A	8	No trend
23	OW03A	22	Probably increasing⁴
24	OW04A	39	Increasing⁵
25	OW05A	23	Stable
26	OW06A	23	Stable
27	OW07A	23	Stable
28	OW11A	22	No trend
29	OW12A	21	Decreasing

No.	Well	Sample Size (n)	Resulting Trend
30	OW13A	23	Stable
31	OW15A	21	Decreasing
32	OW17A	22	Stable
33	MW423	10	Increasing⁶
34	MW862	23	Stable
35	MW863	23	Decreasing
36	MW921	14	No trend
37	MW922	12	No trend
38	MW934	22	Increasing⁷
39	MW935	22	Decreasing
40	MW938	17	Decreasing
41	MW943	14	No Trend
42	MW944	11	Stable
43	MW945	13	No trend
44	MW946	12	Increasing⁸
45	MW948	16	No trend
46	MW949	17	Stable
47	MW950	18	No trend
48	MW951	18	Decreasing
49	MW952	16	Decreasing
50	MW953R	17	Probably decreasing
51	MW954	16	No trend
52	MW955	17	Increasing⁹
53	MW956	17	No trend
54	MW957	17	No trend
55	MW958	17	Probably Increasing¹⁰
56	MW959	17	Increasing¹¹
57	MW960	17	Stable

¹ Total uranium concentrations in OW12B ranged from 17.9 µg/L to 64.2 µg/L.

² Total uranium concentrations in A55R ranged from non-detect to 4.75 µg/L.

³ Total uranium concentrations in 505 ranged from 21.5 µg/L to 55.5 µg/L.

⁴ Total uranium concentrations in OW03A ranged from 8.61 µg/L to 18.4 µg/L.

⁵ Total uranium concentrations in OW04A ranged from 1.32 µg/L to 5.27 µg/L.

⁶ Total uranium concentrations in MW423 ranged from 10.2 µg/L to 37.8 µg/L.

⁷ Total uranium concentrations in MW934 ranged from 19.6 µg/L to 41.1 µg/L.

⁸ Total uranium concentrations in MW946 ranged from 17.6 µg/L to 46.8 µg/L.

⁹ Total uranium concentrations in MW955 ranged from 20.3 µg/L to 42.3 µg/L.

¹⁰ Total uranium concentrations in MW958 ranged from 32.2 µg/L to 379 µg/L.

¹¹ Total uranium concentrations in MW959 ranged from 41.7 µg/L to 204 µg/L.

Among the wells exhibiting an increasing or probably increasing trend, only wells OW03A, OW04A and A55R are located proximate and downgradient of the IWCS. All three wells are screened in the lower-water bearing zone. Between 2000 and 2020, total uranium concentrations in well OW03A ranged from 8.61 µg/L to 18.4 µg/L, with concentrations in 2020 of 9.88 µg/L and 9.64 µg/L. Between 2010 and 2020, total uranium concentrations in well OW04A ranged from 1.32 µg/L to 5.27 µg/L, with concentrations in 2020 of 1.87 µg/L, 2.05 µg/L, 1.76 µg/L, and 1.70 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 OW03A and OW04A. For example, wells OW03B and OW04B, companion wells to OW03A and OW04A that are screened in the upper-water bearing zone, exhibit stable and decreasing trends, respectively. Regarding well A55R, the increasing trend is due to the fact that the well it replaced, A55, exhibited lower total uranium concentrations and has been sampled over a longer time period. The average total uranium concentration between 2010 and 2018 in well A55 was 0.17 µg/L, while the average total uranium concentration between 2019 and 2020 in well A55R was 3.66 µg/L. If evaluated separately, the trending analysis shows that well A55 exhibits no trend and A55R a stable trend.

Uranium concentrations in most upper water-bearing zone wells increase during wet-season periods (winter through spring) and decline during dry-season periods (late spring through fall). This variation is derived from residual low-concentration soil impacts (especially south of the IWCS) and changes in uranium solubility during the wet season, when soil saturation (or groundwater recharge) increases the oxygen content in the subsurface. The seasonal oxygenation of groundwater increases the uranium solubility of pre-existing contamination (soil and pore-water residuals) that 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 appears to increase during this period, which further reduces oxygen in the soils and groundwater. This seasonal geochemical response promotes uranium adsorption to soil minerals that lowers groundwater concentrations in fall samples. The geochemical cycle of uranium solubility repeats annually in most wells, as seen in the spring and fall sampling data. The seasonal trend may be less evident or slightly opposite in wells with larger sand lenses that produce a delayed or dampened geochemical response in the 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 2020) 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:

- Measures radon gas concentrations at several locations around the property boundary and radon flux on top of the IWCS
- 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
- 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, as well as VOCs in a limited area of the site

In June 2020, the Corps of Engineers placed six to eight inches of topsoil, grass seed, and matting (for erosion control) to the area where elevated radon flux readings and distressed grass were identified in 2018 and 2019. To evaluate the effectiveness of the remedy, the Corps of Engineers implemented several radon flux sampling events in 2020. The maximum radon flux measurement in the area was 0.255 pCi/m²/s. These results showed a marked reduction in radon flux levels and demonstrated the success of the remedy. In 2021, the Corps of Engineers will place additional soil on the cover in the area and continue periodic radon flux monitoring to ensure protectiveness of the IWCS.

A summary of the 2020 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
Central Drainage Ditch				
SWSD009	Upgradient	No trend	Decreasing	No trend
SWSD021	Upgradient	Decreasing	Decreasing	Probably Increasing
SWSD023	Upgradient	No trend	Stable	Increasing
SWSD010	Midstream	Stable	Increasing	Increasing
SWSD022	Midstream	No trend	Increasing	No trend
SWSD025	Midstream	No trend	Increasing	Increasing
SWSD011 ²	Downgradient	Increasing	Increasing	Increasing
West Drainage Ditch				
WDD2	Upgradient	Increasing	No trend	Increasing
WDD3	Downgradient	Increasing	No trend	Stable

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)

Three of the nine surface water sample locations (SWSD011, WDD2, and WDD3) show evidence of an increasing trend for total uranium. Similar to previous years, total uranium concentrations at WDD2 and WDD3 remain low, less than or equal to 4.46 µg/L. For comparison, the site-specific background total uranium concentration in surface water developed during the remedial investigation was 12.5 µg/L (USACE 2007).

At SWSD011, the May 2020 result was 11.9 µg/L, which is within the range typically detected at this location; however, the October 2020 result was elevated at 63.4 µg/L. When this sample was collected, water in the ditches was reportedly lower than normal and it is speculated that the inlet to the sample tubing was closer to the sediment than usual (it is noted that turbidity in this sample was 40 NTUs, over two times higher than normal). Future data at SWSD011 will determine whether this sample was an anomaly or indicative of a change in conditions.

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 2020 was 4.52 pCi/g (SWSD025), which is slightly greater 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 the Central Drainage Ditch in 2020 was 2.15 pCi/g at location SWSD022. For comparison, the site-specific background concentration developed for the remedial investigation was 2.43 pCi/g (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. Radium-226 concentrations in surface water continue to be predominantly nondetect or less than the laboratory detection limit.

The 2020 groundwater analytical data showed that total uranium concentrations continue to decrease significantly in wells MW951 and MW953R, located south and east (across the Central Drainage Ditch), respectively, from the IWCS. Total uranium concentrations in well MW951 fell from a high of approximately 4,600 µg/L in 2013 to 2,800 µg/L in 2020. Total uranium concentrations in well MW953 fell sharply after the well was replaced in late 2018. In 2018, prior to replacement, the well exhibited a high concentration of 8,900 µg/L. Between 2019 and 2020, total uranium concentrations ranged from 57 µg/L to 376 µg/L.

No significant changes in total uranium concentrations were observed over the past several years in the remaining 55 wells monitored for the ESP. 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 11 of 57 wells evaluated. Among the wells exhibiting an increasing or probably increasing trend, only wells OW03A, OW04A and A55R are located proximate and downgradient of the IWCS. All three wells are screened in the lower-water bearing zone. The cause of increasing uranium concentrations in OW03A and OW04A is likely legacy sources since there is no apparent trend pattern of increasing uranium concentrations when considering either their respective paired wells (e.g., OW03B and OW04B) or nearby wells. Regarding well A55R, the increasing trend is due to the fact that the well it replaced, A55, exhibited lower total uranium concentrations and has been sampled over a longer time period. The average total uranium concentration

between 2010 and 2018 in well A55 was 0.17 µg/L, while the average total uranium concentration between 2019 and 2020 in well A55R was 3.66 µg/L. If evaluated separately, the trending analysis shows that well A55 exhibits no trend and A55R 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 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.

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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
LOD	limit of detection
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
MSL	mean sea level
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
SDWA	Safe Drinking Water Act
Spec. Cond.	Specific conductance
TDS	total dissolved solids
TLD	thermo luminescent dosimeter
TOGS	Technical and Operational Guidance Series
U	not detected
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	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 <u>Field Parameters:</u> Dissolved oxygen, redox potential, turbidity, temperature, specific conductivity, pH <u>Water quality analytes:</u> calcium, magnesium, potassium, sodium alkalinity, bicarbonate, carbonate, chloride, nitrate-nitrogen, nitrite-nitrogen, phosphate, sulfate, Total Dissolved Solids, sulfate <u>Radionuclides:</u> Total uranium, radium, thorium <u>Metals:</u> Copper, lead, vanadium	8 wells (same) <u>Field Parameters:</u> Same <u>Water quality analytes:</u> Same <u>Radionuclides:</u> Same <u>Metals:</u> Same	8 wells (same) <u>Field Parameters:</u> Same <u>Water quality analytes:</u> Same <u>Radionuclides:</u> Same <u>Metals:</u> 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 <u>Field Parameters:</u> Same <u>Water quality analytes:</u> alkalinity(calcium carbonate) and total dissolved solids <u>Anions:</u> chloride, fluoride, nitrate, nitrite, ortho-phosphate, sulfate <u>Radionuclides:</u> 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 <u>Metals:</u> Target analyte list, boron, and lithium <u>Volatile Organic Compounds (VOCs):</u> Only wells 415A and 201A	18 wells (same) <u>Field Parameters:</u> Same <u>Water quality analytes:</u> Same <u>Anions:</u> Same <u>Radionuclides:</u> Same <u>Metals:</u> Same <u>VOCs:</u> Same	Spring 2010 - Same as 2009 Fall 2010 – 39 wells (wells OW04A/4B are sampled quarterly; all others are sampled semi-annually) <u>Field Parameters:</u> Same <u>Water quality analytes:</u> Same <u>Anions:</u> Same <u>Radionuclides:</u> Iso-uranium, Iso-thorium, Radium-226, -228 Strontium-90, Technetium-99, Cesium-137, Iso-plutonium, Tritium <u>Metals:</u> Same <u>VOCs:</u> Only wells 415A, 411A, 201A, MW934, MW948, MW949, MW950	54 wells: <u>Field Parameters:</u> Same <u>Water quality analytes:</u> Same <u>Anions:</u> Same <u>Radionuclides:</u> Total Uranium Radium-226 <u>Metals:</u> Total Uranium Radium-226 <u>VOCs:</u> Same	55 wells: (wells listed on Table 2) <u>Field Parameters:</u> Same <u>Water quality analytes:</u> Same <u>Anions:</u> Same <u>Radionuclides:</u> Total Uranium Radium-226 <u>Metals:</u> Total Uranium Radium-226 <u>VOCs:</u> 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 <u>Field Parameters:</u> Dissolved oxygen, redox potential, turbidity, temperature, specific conductivity, pH <u>Radionuclides:</u> total uranium radium-226, -228 thorium-230, -232	Same 5 locations <u>Field Parameters:</u> Same <u>Radionuclides:</u> Uranium-234, -235, -238 radium-226, -228 thorium-230, -232	Same 5 locations <u>Field Parameters:</u> Same <u>Radionuclides:</u> Same	Same 5 locations plus 5 additional locations: SWSD023, SWSD024, WDD1, WDD2, WDD3. <u>Field Parameters:</u> Same <u>Radionuclides:</u> Uranium-234, -235, -238, radium-226, -228 thorium-228 (new), -230, -232 <u>Metals:</u> TAL metals, lithium, boron <u>Organics:</u> PCBs, pesticides, VOCs, PAHs	Same 10 locations <u>Field Parameters:</u> Same <u>Radionuclides:</u> Same <u>Metals:</u> Same <u>Organics:</u> Same	Spring 2010 - Same 10 locations as 2009 Fall 2010: 11 locations (Added location SWSD025) <u>Field Parameters:</u> Same <u>Radionuclides:</u> Iso-uranium, Iso-thorium, Radium-226, -228 Strontium-90, Technetium-99, Cesium-137, Iso-plutonium, Tritium <u>Metals:</u> Same <u>Organics:</u> Same	9 locations (removed SWSD024 and WDD1) <u>Field Parameters:</u> Same <u>Radionuclides:</u> Total Uranium Radium-226 <u>Metals:</u> Same <u>Organics:</u> PAHs only	9 locations (removed SWSD024 and WDD1) <u>Field Parameters:</u> Same <u>Radionuclides:</u> Total Uranium Radium-226 <u>Metals:</u> Same <u>Organics:</u> PAHs only
Sediment:	SWSD011, SWSD021, SWSD010, SWSD022, SWSD009 <u>Radionuclides:</u> total uranium radium-226, -228 thorium-230, -232	Same 5 locations <u>Radionuclides:</u> Uranium-234, -235, -238 radium-226, -228 thorium-230, -232	Same 5 locations <u>Radionuclides:</u> Same	Same 5 locations plus 5 additional locations: WDD1, WDD2, WDD3, SWSD023, SWSD024 <u>Radionuclides:</u> Uranium-234, -235, -238 radium-226, -228 thorium-228 (new), -230, -232 <u>Metals:</u> TAL metals, lithium, boron <u>Organics:</u> PCBs, pesticides, VOCs, PAHs	Same 10 locations <u>Radionuclides:</u> Same <u>Metals:</u> Same <u>Organics:</u> Same	Spring 2010 - Same as 2009 Fall 2010: <u>Radionuclides:</u> Iso-uranium, Iso-thorium, Radium-226, -228 Strontium-90, Technetium-99, Cesium-137, Iso-plutonium, Tritium <u>Metals:</u> Same <u>Organics:</u> Same	9 locations (removed SWSD024 and WDD1) <u>Radionuclides:</u> Total Uranium Radium-226 <u>Metals:</u> Same <u>Organics:</u> PAHs only	9 locations (removed SWSD024 and WDD1) <u>Radionuclides:</u> Total Uranium Radium-226 <u>Metals:</u> Same <u>Organics:</u> PAHs only

Table 2
2020 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
BH49AR		UWBZ	N (IWCS)	X	X		X	X	X	X
BH49R		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
A50R		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
OW13BR		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
OW15BR		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
OW17BR		UWBZ	W (IWCS)	X	X		X	X	X	X
OW18BR		UWBZ	W (IWCS)	X	X		X	X	X	X
A55R		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-953R		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

2020 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
2020 External Gamma Radiation Dose Rates
Niagara Falls Storage Site

Monitoring Location	Monitoring Station	Gross ^a OSL Data (mrem/monitoring period) 1/2/2020-7/2/2020	Gross ^a OSL Data (mrem/monitoring period) 7/2/2020-1/4/2021	Normalized Gross OSL Data ^b (mrem/yr)	CY2020 Net ^d OLD Data (mrem/yr)
NFSS Perimeter	1	8.0	-0.5	7.5	-11.1
	1	12.0	13.5	25.4	6.8
	7	10.0	14.5	24.4	5.8
	7	9.0	13.5	22.4	3.8
	11	6.0	6.5	12.4	-6.1
	11	6.0	3.5	9.4	-9.1
	12	10.0	13.5	23.4	4.8
	12	7.0	12.5	19.4	0.8
	13	11.0	11.5	22.4	3.8
	13	8.0	12.5	20.4	1.8
	15	13.0	14.5	27.4	8.8
	15	11.0	14.5	25.4	6.8
	28	13.0	17.5	30.3	11.8
	28	11.0	13.5	24.4	5.8
	29	10.0	13.5	23.4	4.8
	29	12.0	11.5	23.4	4.8
	32*	11.0	12.5	23.4	4.8
	32*	12.0	11.5	23.4	4.8
	36	12.0	16.5	28.3	9.8
	36	11.0	11.5	22.4	3.8
	45	9.0	13.5	22.4	3.8
	45	12.0	8.5	20.4	1.8
	50	13.0	17.5	30.3	11.8
	50	15.0	12.5	27.4	8.8
	55	10.0	18.5	28.3	9.8
	55	8.0	10.5	18.4	-0.2
	60	9.0	9.5	18.4	-0.2
	60	10.0	12.5	22.4	3.8
	65	10.0	13.5	23.4	4.8
	65	11.0	14.5	25.4	6.8
	122	12.0	13.5	25.4	6.8
	122	10.0	13.5	23.4	4.8
	123	14.0	13.5	27.4	8.8
	123	9.0	16.5	25.4	6.8
IWCS Perimeter	8	7.0	12.5	19.4	0.8
	8	6.0	10.5	16.4	-2.2
	10	12.0	16.5	28.3	9.8
	10	11.0	17.5	28.3	9.8
	18	8.0	9.5	17.4	-1.2
	18	16.0	8.5	24.4	5.8
	21	6.0	11.5	17.4	-1.2
	21	8.0	10.5	18.4	-0.2
	23	9.0	10.5	19.4	0.8
	23	11.0	12.5	23.4	4.8
	24	11.0	13.5	24.4	5.8
	24	11.0	9.5	20.4	1.8
	40	5.0	9.5	14.4	-4.1
	40	7.0	8.5	15.4	-3.1
Background ^c	105	3.0	5.5	8.5	
	105	5.0	3.5	8.5	
	116	13.0	10.5	23.4	
	116	13.0	10.5	23.4	
	120	12.0	12.5	24.4	
	120	10.0	13.5	23.4	
Average Background		9.3	9.3	18.6	

a Gross refers to total deployment exposure. Transit exposures are subtracted as the mean of the two USACE-assigned controls

b Gross 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

d Net data are corrected by subtracting the average normalized background value

* Location 32 is a duplicate sample for location 12.

OSL - Optically Stimulated Luminescence dosimeters

Table 5
2020 Radon Gas Concentrations^a

Monitoring Location ^b	Station	Average Daily Concentration (pCi/L) 1/02/20 - 07/02/20 ^c	Average Daily Concentration (pCi/L) 7/02/19 - 1/04/21 ^c
NFSS Perimeter	1	0.3 ± 0.2	0.3 ± 0.2
	7	< 0.2	0.5 ± 0.2
	11	< 0.2	0.2 ± 0.2
	12	< 0.2	< 0.2
	12 (dup ^d)	< 0.2	< 0.2
	13	< 0.2	< 0.2
	15	0.2 ± 0.2	< 0.2
	28	< 0.2	< 0.2
	29	< 0.2	0.2 ± 0.2
	36	< 0.2	< 0.2
	45	< 0.2	< 0.2
	50	< 0.2	< 0.2
	55	< 0.2	0.3 ± 0.2
	60	< 0.2	< 0.2
	65	< 0.2	< 0.2
	122	0.2 ± 0.2	0.3 ± 0.2
	123	< 0.2	< 0.2
IWCS Perimeter	8	< 0.2	< 0.2
	10	< 0.2	0.5 ± 0.2
	18	< 0.2	< 0.2
	21	< 0.2	< 0.2
	23	< 0.2	< 0.2
	24	< 0.2	0.5 ± 0.2
	40	< 0.2	0.3 ± 0.2
Background	105	< 0.2	< 0.2
	116	0.2 ± 0.2	< 0.2
	120	0.3 ± 0.2	< 0.2

a. Radon gas concentrations were measured with RadTrak2® detectors

These detectors measure the concentration of 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
2020 Radon Flux Monitoring Results^a
Niagara Falls Storage Site

NFSS Sample ID	Qualifier ^d	Radon-222 Flux				NFSS Sample ID	Qualifier ^d	Radon-222 Flux			
		(pCi/m ² /s)			MDA			(pCi/m ² /s)			MDA
1		0.042	±	0.009	0.018	51	J	0.048	±	0.015	0.015
2	U	0.038	±	0.013	0.055	52	U	0.030	±	0.010	0.037
3	U	0.022	±	0.033	0.120	53	U	0.059	±	0.028	0.105
4		0.072	±	0.013	0.025	54	U	0.053	±	0.020	0.061
5	U	0.015	±	0.015	0.049	55	U	0.038	±	0.013	0.053
6	U	0.043	±	0.031	0.108	56	U	-0.003	±	0.023	0.100
7	U	0.021	±	0.016	0.051	57		0.053	±	0.012	0.025
8	U	0.002	±	0.014	0.050	58		0.037	±	0.008	0.016
9	J	0.057	±	0.019	0.057	59	U	0.057	±	0.028	0.081
10		0.058	±	0.011	0.025	60		0.036	±	0.010	0.018
10-DUP		0.051	±	0.011	0.025	60-DUP	U	0.014	±	0.012	0.046
11		0.030	±	0.008	0.029	61	U	0.038	±	0.035	0.096
12	U	0.049	±	0.017	0.052	62	U	0.041	±	0.014	0.056
13		0.053	±	0.012	0.044	63	U	0.017	±	0.027	0.096
14	J	0.064	±	0.016	0.016	64		0.019	±	0.007	0.018
15		0.071	±	0.013	0.044	65		0.030	±	0.008	0.017
16		0.086	±	0.014	0.021	66	U	0.080	±	0.028	0.094
17	J	0.103	±	0.024	0.024	67	U	0.046	±	0.022	0.078
18		0.050	±	0.013	0.042	68		0.048	±	0.010	0.035
19	U	0.025	±	0.010	0.056	69	U	0.087	±	0.033	0.089
20	U	0.078	±	0.022	0.085	70		0.113	±	0.016	0.018
20-DUP		0.116	±	0.022	0.023	70-DUP		0.082	±	0.015	0.042
21	U	0.017	±	0.019	0.059	71	U	0.010	±	0.012	0.052
22		0.111	±	0.015	0.025	72	U	0.053	±	0.027	0.123
23	U	0.032	±	0.010	0.040	73		0.073	±	0.013	0.039
24	U	0.034	±	0.029	0.122	74		0.082	±	0.014	0.021
25		0.088	±	0.015	0.025	75	J	0.150	±	0.032	0.024
26		0.044	±	0.010	0.036	76		0.073	±	0.013	0.025
27	U	0.051	±	0.026	0.100	77		0.074	±	0.013	0.021
28		0.033	±	0.009	0.024	78	J	0.128	±	0.022	0.016
29	U	0.032	±	0.014	0.057	79		0.041	±	0.009	0.018
30	J	0.081	±	0.022	0.065	80		0.049	±	0.010	0.019
30-DUP		0.074	±	0.019	0.023	80-DUP		0.039	±	0.009	0.021
31		0.066	±	0.011	0.022	81		0.041	±	0.010	0.025
32		0.064	±	0.013	0.050	82	U	0.044	±	0.032	0.097
33		0.048	±	0.011	0.032	83		0.072	±	0.015	0.047
34	U	0.025	±	0.011	0.055	84		0.054	±	0.011	0.021
35	U	0.035	±	0.030	0.127	85	U	0.039	±	0.026	0.091
36	U	0.032	±	0.010	0.039	86	U	0.025	±	0.019	0.051
37		0.073	±	0.012	0.019	87		0.075	±	0.013	0.017
38	J	0.152	±	0.029	0.024	88	J	0.111	±	0.023	0.024
39		0.065	±	0.013	0.025	89		0.049	±	0.012	0.042
40		0.057	±	0.011	0.041	90		0.067	±	0.011	0.017
40-DUP		0.068	±	0.012	0.021	90-DUP		0.055	±	0.010	0.019
41	U	0.034	±	0.010	0.042	91	U	0.017	±	0.012	0.080
42	J	0.084	±	0.016	0.016	92		0.045		0.010	0.025
43		0.175	±	0.021	0.025	93		0.093		0.019	0.016
44	U	0.045	±	0.022	0.060	94	U	0.034	±	0.012	0.036
45	U	0.035	±	0.030	0.096	95	U	-0.003	±	0.003	0.009
46	U	0.015	±	0.012	0.055	96	U	-0.009	±	0.029	0.076
47	U	0.029	±	0.011	0.048	97		0.045	±	0.012	0.024
48	U	0.001	±	0.028	0.092	98	U	0.040	±	0.021	0.120
49		0.030	±	0.008	0.018	99	U	0.002	±	0.015	0.058
50		0.038	±	0.010	0.032	100	U	0.018	±	0.010	0.041
50-DUP	U	0.020	±	0.015	0.058	100-DUP		0.085	±	0.022	0.027

Niagara Falls Storage Site

f. Highest detectable finding.

Table 6b
2020 Biased Radon Flux Prior to Topsoil Restoration^a
Niagara Falls Storage Site

NFSS Sample ID	Qualifier ^b	Radon-222 Flux				NFSS Sample ID	Qualifier ^b	Radon-222 Flux			
		(pCi/m ² /s)			MDA			(pCi/m ² /s)			MDA
May 06-07											
B2		508.385	±	78.326	5.156	B9		51.220	±	7.628	1.085
May 20-21											
B2		179.378	±	22.269	2.385	B9		8.233	±	1.177	0.412
a. Radon-222 flux was performed over a 24 hour exposure b. Data Qualifiers:						Mean ^c		186.804		(pCi/m2/s)	
						High ^d		508.385		(pCi/m2/s)	
						Low		8.233		(pCi/m2/s)	

Table 6c
2020 Biased Radon Flux After Topsoil Restoration^a
Niagara Falls Storage Site

NFSS Sample ID	Qualifier ^b	Radon-222 Flux				NFSS Sample ID	Qualifier ^b	Radon-222 Flux			
		(pCi/m ² /s)		MDA	(pCi/m ² /s)			MDA			
July 14-15											
B2	U	0.016	±	0.014	0.063	B9	U	0.017	±	0.017	0.038
RF-B2-N	U	0.004	±	0.035	0.115	RF-B9-N	U	0.033	±	0.013	0.048
RF-B2-E	U	0.002	±	0.015	0.058	RF-B9-E	U	0.059	±	0.025	0.127
RF-B2-S	U	0.036	±	0.020	0.053	RF-B9-S	U	0.009	±	0.007	0.044
RF-B2-W	U	0.000	±	0.027	0.107	RF-B9-W	U	0.032	±	0.023	0.065
August 19-20											
B2	J+	0.046	±	0.019	0.025	B9	J+	0.037	±	0.015	0.015
RF-B2-N	U	0.023	±	0.018	0.050	RF-B9-N	U	0.002	±	0.012	0.032
RF-B2-E	J+	0.083	±	0.027	0.025	RF-B9-E	U	0.023	±	0.016	0.025
RF-B2-S	U	0.044	±	0.031	0.058	RF-B9-S	U	0.004	±	0.008	0.031
RF-B2-W	U	0.015	±	0.025	0.050	RF-B9-W	U	0.009	±	0.024	0.051
September 09-10											
B2	U	0.010	±	0.027	0.051	B9		0.025	±	0.016	0.019
RF-B2-N	U	0.041	±	0.031	0.072	RF-B9-N	U	0.008	±	0.022	0.047
RF-B2-E		0.058	±	0.021	0.019	RF-B9-E		0.065	±	0.021	0.017
RF-B2-S		0.079	±	0.042	0.067	RF-B9-S		0.030	±	0.013	0.014
RF-B2-W		0.040	±	0.018	0.017	RF-B9-W	U	0.014	±	0.028	0.050
October 28-29											
B2		0.064	±	0.024	0.038	B9		0.090	±	0.036	0.041
RF-B2-N	U	0.040	±	0.018	0.041	RF-B9-N		0.068	±	0.025	0.042
RF-B2-E		0.042	±	0.019	0.036	RF-B9-E		0.035	±	0.017	0.022
RF-B2-S		0.063	±	0.023	0.042	RF-B9-S		0.105	±	0.046	0.041
RF-B2-W		0.093	±	0.038	0.027	RF-B9-W	U	0.008	±	0.032	0.060
November 03-04											
B2	U	0.010	±	0.024	0.045	B9	U	0.038	±	0.051	0.096
RF-B2-N		0.039	±	0.019	0.033	RF-B9-N		0.028	±	0.014	0.010
RF-B2-E	U	0.029	±	0.032	0.058	RF-B9-E	U	0.017	±	0.034	0.082
RF-B2-S	U	0.022	±	0.024	0.035	RF-B9-S	U	-0.007	±	0.028	0.039
RF-B2-W		0.069	±	0.034	0.015	RF-B9-W		0.035	±	0.018	0.025
a. Radon-222 flux was performed over a 24 hour exposure b. Data Qualifiers: U - no analyte was detected (Non-Detect). J+ - The result was an estimated quantity, but the result may be biased high. c. Average of all values (detects and Un-detects) d. Highest detectable finding.						July ^c		0.021		(pCi/m2/s)	
						August ^c		0.029		(pCi/m2/s)	
						September ^c		0.037		(pCi/m2/s)	
						October ^c		0.061		(pCi/m2/s)	
						November ^c		0.028		(pCi/m2/s)	
						Mean ^c		0.035		(pCi/m ² /s)	
						Maximum ^d		0.105		(pCi/m2/s)	
						Minimum		-0.007		(pCi/m2/s)	

Table 7
2020 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	02/26/2020	36.3	6.39	215	0.99	45.5	7.86
SWSD009	05/4/2020	57.0	6.75	184	1.87	32.5	9.59
SWSD010	05/6/2020	49.8	7.21	183	1.09	3.1	7.71
SWSD011	05/6/2020	52.2	6.53	198	0.87	1.6	10.75
SWSD021	05/6/2020	50.1	7.26	110	0.90	8.5	7.08
SWSD022	05/6/2020	49.9	7.14	200	0.95	3.0	8.52
SWSD023	05/6/2020	51.2	7.40	74	1.30	1.6	5.73
SWSD025 ¹	05/6/2020	50.7	7.04	187	0.98	2.6	8.26
WDD2	05/4/2020	59.2	7.70	209	0.87	24.4	11.00
WDD3	05/4/2020	58.6	7.87	190	0.89	32.5	7.81
SWSD025 ¹	08/4/2020	65.9	7.14	235.0	1.66	0.0	5.54
SWSD009 ²	10/14/2020	63.9	7.83	170.0	1.82	194.8	9.15
SWSD010	10/15/2020	61.8	7.20	198.0	1.54	46.9	5.41
SWSD011	10/15/2020	60.2	7.04	201.0	1.65	40.1	7.47
SWSD021 ³	10/15/2020						
SWSD022	10/15/2020	59.3	7.29	165.0	1.71	24.9	8.19
SWSD023	10/14/2020	60.6	6.93	214.0	1.20	47.8	8.87
SWSD025 ¹	10/15/2020	58.0	7.18	203.0	1.72	0.0	7.20
WDD2	10/14/2020	56.0	7.34	200.0	0.58	13.9	4.23
WDD3	10/14/2020	56.9	6.08	211.0	0.59	13.9	5.79

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.

NA - Not Applicable

*Parameter not taken/meter malfunction

¹ NYSDOH requested sampling location for quarterly sampling.

²Primary sample will have an accompanying filtered sample (-F).

³Location was dry (no water to sample).

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

Location Identifier		SWSD009	SWSD009	SWSD009	SWSD010	SWSD010
Field Sample Identifier		SWSD009	SWSD009-D	SWSD009	SWSD010	SWSD010
Sample Matrix		Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
Depth Interval (ft)		-	-	-	-	-
Date of Sample		05/04/20	05/04/20	10/14/20	05/06/20	10/15/20
Parameter	Units		Field Duplicate			
RADIONUCLIDES						
RADIUM-226	PCI/L	0.54 U	0.28 U	0 U	0.27 U	0 U
TOTAL URANIUM	UG/L	6.35	6.6	1.59	16.6	5.61
RADIONUCLIDES (FILTERED)						
RADIUM-226	PCI/L	0.37 U	Not Analyzed	0.49	Not Analyzed	Not Analyzed
TOTAL URANIUM	UG/L	6.4	Not Analyzed	1.63	Not Analyzed	Not Analyzed

The qualifiers 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.

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

Location Identifier		SWSD011	SWSD011	SWSD021	SWSD022	SWSD022
Field Sample Identifier		SWSD011	SWSD011	SWSD021	SWSD022	SWSD022
Sample Matrix		Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
Depth Interval (ft)		-	-	-	-	-
Date of Sample		05/06/20	10/15/20	05/06/20	05/06/20	10/15/20
Parameter	Units					
RADIONUCLIDES						
RADIUM-226	PCI/L	0.37 U	0 U	0.31 U	0.23 U	0 U
TOTAL URANIUM	UG/L	11.9	63.4	11.6	15.2	21.5
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

The qualifiers 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.

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

Location Identifier		SWSD023	SWSD023	SWSD025	SWSD025	SWSD025
Field Sample Identifier		SWSD023	SWSD023	SWSD025	SWSD025	SWSD025
Sample Matrix		Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
Depth Interval (ft)		-	-	-	-	-
Date of Sample		05/06/20	10/14/20	02/26/20	05/06/20	08/20/20
Parameter	Units					
RADIONUCLIDES						
RADIUM-226	PCI/L	0.27	0 U	0.53 U	0.36 U	0 U
TOTAL URANIUM	UG/L	4.85	2.16	18.9	14.8	20.5
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

The qualifiers 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.

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

Location Identifier		SWSD025	WDD2	WDD2	WDD3	WDD3
Field Sample Identifier		SWSD025	WDD2	WDD2	WDD3	WDD3
Sample Matrix		Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
Depth Interval (ft)		-	-	-	-	-
Date of Sample		10/15/20	05/04/20	10/14/20	05/04/20	10/14/20
Parameter	Units					
RADIONUCLIDES						
RADIUM-226	PCI/L	0.41	0.98 U	0 U	0.39 U	0 U
TOTAL URANIUM	UG/L	24.3	3.58	4.46	3.48	3.78
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

The qualifiers 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.

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

Location Identifier		WDD3
Field Sample Identifier		WDD3-D
Sample Matrix		Surface Water
Depth Interval (ft)		-
Date of Sample		10/14/20
Parameter	Units	Field Duplicate
RADIONUCLIDES		
RADIUM-226	PCI/L	0.26
TOTAL URANIUM	UG/L	3.48
RADIONUCLIDES (FILTERED)		
RADIUM-226	PCI/L	Not Analyzed
TOTAL URANIUM	UG/L	Not Analyzed

The qualifiers 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.

TABLE 9
SEDIMENT ANALYTICAL RESULTS - RADIONUCLIDES
NIAGARA FALLS STORAGE SITE

Location Identifier		SWSD009	SWSD009	SWSD009	SWSD010	SWSD010
Field Sample Identifier		SWSD009	SWSD009-D	SWSD009	SWSD010	SWSD010
Sample Matrix		Sediment	Sediment	Sediment	Sediment	Sediment
Depth Interval (ft)		-	-	-	-	-
Date of Sample		05/07/20	05/07/20	10/19/20	05/07/20	10/19/20
Parameter	Units		Field Duplicate			
RADIONUCLIDES						
RADIUM-226	PCI/G	0.97	1.01	0.93	1.29 J	1.74
URANIUM-233/234	PCI/G	1.02	0.99	1.07	1.35	2.49
URANIUM-235/236	PCI/G	0.045	0.045	0.071	0.067	0.189
URANIUM-238	PCI/G	0.92	0.87	0.96	1.25	2.21

The qualifiers 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.

TABLE 9
SEDIMENT ANALYTICAL RESULTS - RADIONUCLIDES
NIAGARA FALLS STORAGE SITE

Location Identifier		SWSD011	SWSD011	SWSD021	SWSD021	SWSD022
Field Sample Identifier		SWSD011	SWSD011	SWSD021	SWSD021	SWSD022
Sample Matrix		Sediment	Sediment	Sediment	Sediment	Sediment
Depth Interval (ft)		-	-	-	-	-
Date of Sample		05/07/20	10/16/20	05/07/20	10/19/20	05/07/20
Parameter	Units					
RADIONUCLIDES						
RADIUM-226	PCI/G	1.67	1.85	1.6	1.39	1.99
URANIUM-233/234	PCI/G	1.96	2.61	1.05	1.18	3.16
URANIUM-235/236	PCI/G	0.133	0.136	0.038	0.077	0.096
URANIUM-238	PCI/G	1.78	2.79	1.04	1.03	2.55

The qualifiers 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.

TABLE 9
SEDIMENT ANALYTICAL RESULTS - RADIONUCLIDES
NIAGARA FALLS STORAGE SITE

Location Identifier		SWSD022	SWSD023	SWSD023	SWSD023	SWSD025
Field Sample Identifier		SWSD022	SWSD023	SWSD023	SWSD023-D	SWSD025
Sample Matrix		Sediment	Sediment	Sediment	Sediment	Sediment
Depth Interval (ft)		-	-	-	-	-
Date of Sample		10/19/20	05/07/20	10/19/20	10/19/20	02/26/20
Parameter	Units				Field Duplicate	
RADIONUCLIDES						
RADIUM-226	PCI/G	2.15	1.25 J	1.21	1.23	1.92
URANIUM-233/234	PCI/G	2.48	0.91	0.83	0.82	2.19
URANIUM-235/236	PCI/G	0.128	0.062 U	0 U	0 U	0.127
URANIUM-238	PCI/G	2.14	0.8	0.85	0.81	2.12

The qualifiers 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.

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		05/07/20	08/20/20	10/16/20	05/07/20	10/16/20
Parameter	Units					
RADIONUCLIDES						
RADIUM-226	PCI/G	1.45	2.14	1.91 J	1.47	1.47
URANIUM-233/234	PCI/G	3.05	5.31	2.12	1.36	1.36
URANIUM-235/236	PCI/G	0.124	0.33	0.097	0.085	0.074
URANIUM-238	PCI/G	2.79	4.52	2.16	1.26	1.38

The qualifiers 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.

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		05/07/20	10/16/20
Parameter	Units		
RADIONUCLIDES			
RADIUM-226	PCI/G	0.97	1.67
URANIUM-233/234	PCI/G	1.07	1.71
URANIUM-235/236	PCI/G	0.1	0.068
URANIUM-238	PCI/G	1.16	1.64

The qualifiers 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.

Table 10
2020 Water Level Measurements

Well No.	Reference Elevation (ft)	1st Quarter		2nd Quarter		3rd Quarter		4th Quarter	
		(02/26/20)		(05/04/20)		(08/20/20)		10/13/20	
		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	6.50	311.30	3.10	314.70	18.85	298.95	19.98	297.82
201A	321.47	4.50	316.97	4.50	316.97	8.55	312.92	9.20	312.27
203A	321.87	4.50	317.37	4.48	317.39	8.95	312.92	11.00	310.87
213A	321.37	4.84	316.53	4.41	316.96	7.54	313.83	11.25	310.12
215A	320.26	3.77	316.49	3.40	316.86	12.60	307.66	12.62	307.64
302A	320.53	4.02	316.51	4.09	316.44	11.50	309.03	13.96	306.57
303A	321.83	4.10	317.73	4.27	317.56	9.18	312.65	9.08	312.75
404A	323.73	4.84	318.89	4.62	319.11	11.39	312.34	12.93	310.80
411A	322.05	4.35	317.70	3.86	318.19	14.32	307.73	16.05	306.00
415A	321.27	3.35	317.92	3.11	318.16	10.98	310.29	13.08	308.19
603A	320.57	2.13	318.44	2.14	318.43	7.30	313.27	10.64	309.93
606A	321.49	3.17	318.32	2.87	318.62	7.82	313.67	9.32	312.17
808A	319.27	2.42	316.85	1.97	317.30	11.16	308.11	14.25	305.02
810A	318.44	4.77	313.67	4.69	313.75	16.60	301.84	16.41	302.03
816A	320.62	1.75	318.87	2.04	318.58	2.65	317.97	2.15	318.47
A42	319.70	4.75	314.95	4.90	314.80	9.20	310.50	10.05	309.65
A43	320.50	4.51	315.99	4.60	315.90	7.50	313.00	8.75	311.75
A45	321.70	7.58	314.12	7.91	313.79	12.30	309.40	11.56	310.14
A50	321.30	9.56	311.74	9.91	311.39	13.10	308.20	13.81	307.49
B02W20S	322.00	2.84	319.16	2.80	319.20	6.90	315.10	8.20	313.80
BH49A	320.65	3.26	317.39	3.10	317.55	8.22	312.43	9.63	311.02
MW313	320.88	3.65	317.23	3.56	317.32	10.66	310.22	14.01	306.87
MW314	318.94	2.32	316.62	2.24	316.70	10.42	308.52	13.51	305.43
MW422	321.36	12.23	309.13	3.46	317.90	20.50	300.86	22.22	299.14
MW423	322.39	4.35	318.04	3.85	318.54	12.39	310.00	14.15	308.24
MW424	320.93	3.00	317.93	3.04	317.89	10.62	310.31	12.30	308.63
MW862	319.62	4.32	315.30	4.82	314.80	7.35	312.27	7.73	311.89
MW921	319.88	4.48	315.40	4.66	315.22	18.20	301.68	18.25	301.63
MW922	318.56	3.13	315.43	2.52	316.04	11.00	307.56	12.71	305.85
MW923	319.53	3.66	315.87	3.25	316.28	18.80	300.73	21.09	298.44
MW930	323.16	4.61	318.55	4.44	318.72	12.62	310.54	14.35	308.81
MW934	322.20	3.35	318.85	3.41	318.79	12.05	310.15	14.65	307.55
MW935	319.33	4.11	315.22	4.12	315.21	8.44	310.89	9.53	309.80
MW936	320.64	2.44	318.20	2.40	318.24	6.32	314.32	6.80	313.84
MW938	319.54	3.59	315.95	3.80	315.74	10.05	309.49	11.62	307.92
MW941	318.98	2.81	316.17	2.88	316.10	6.03	312.95	6.14	312.84
MW943	321.60	2.89	318.71	3.00	318.60	6.25	315.35	8.98	312.62
MW944	318.64	6.11	312.53	3.85	314.79	15.95	302.69	17.44	301.20
MW945	320.24	5.12	315.12	5.38	314.86	15.90	304.34	17.50	302.74
MW946	319.65	2.46	317.19	2.46	317.19	13.90	305.75	14.99	304.66
MW947	322.53	13.54	308.99	4.62	317.91	19.40	303.13	21.05	301.48
MW948	321.04	2.75	318.29	2.72	318.32	9.30	311.74	11.44	309.60
MW950	322.03	3.39	318.64	3.45	318.58	7.30	314.73	9.85	312.18
MW951	320.84	4.05	316.79	4.09	316.75	4.10	316.74	7.36	313.48
MW952	320.16	3.55	316.61	3.72	316.44	8.32	311.84	8.55	311.61
MW953	319.94	4.00	315.94	3.93	316.01	7.26	312.68	8.31	311.63
MW954	319.85	3.44	316.41	3.50	316.35	9.23	310.62	10.44	309.41
MW955	320.09	3.63	316.46	4.19	315.90	8.39	311.70	8.27	311.82
MW956	323.13	5.68	317.45	5.74	317.39	8.30	314.83	10.22	312.91
MW957	324.48	6.24	318.24	6.17	318.31	10.90	313.58	11.19	313.29
MW958	319.77	3.49	316.28	3.56	316.21	9.60	310.17	11.61	308.16
MW959	320.56	3.75	316.81	3.72	316.84	7.25	313.31	8.63	311.93
MW960	321.02	4.37	316.65	4.33	316.69	4.00	317.02	7.82	313.20
OW02B	321.55	2.94	318.61	3.05	318.50	7.10	314.45	8.53	313.02
OW03B	321.55	3.89	317.66	3.90	317.65	6.90	314.65	7.40	314.15
OW04B	320.17	3.07	317.10	3.41	316.76	7.78	312.39	6.19	313.98
OW05B	319.68	3.08	316.60	3.19	316.49	9.35	310.33	11.78	307.90
OW06B	322.28	3.93	318.35	4.24	318.04	4.80	317.48	7.50	314.78
OW07B	319.69	3.64	316.05	3.71	315.98	8.48	311.21	10.10	309.59
OW08B	318.97	3.35	315.62	3.32	315.65	10.90	308.07	12.06	306.91
OW09B	318.82	2.46	316.36	2.06	316.76	9.35	309.47	12.86	305.96
OW10B	320.13	2.09	318.04	2.02	318.11	7.86	312.27	9.00	311.13
OW11B	319.09	2.00	317.09	2.55	316.54	7.15	311.94	7.29	311.80
OW12B	319.09	3.96	315.13	4.09	315.00	10.63	308.46	13.28	305.81
OW13B	321.09	4.62	316.47	4.45	316.64	7.65	313.44	9.90	311.19
OW15B	320.12	3.69	316.43	3.83	316.29	8.40	311.72	10.10	310.02
OW17B	320.29	5.49	314.80	4.39	315.90	6.65	313.64	8.40	311.89
OW18B	320.76	5.60	315.16	5.44	315.32	8.10	312.66	8.71	312.05

Table 10
2020 Water Level Measurements

Well No.	Reference Elevation (ft)	1st Quarter		2nd Quarter		3rd Quarter		4th Quarter	
		(02/26/20)		(05/04/20)		(08/20/20)		10/13/20	
		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									
A55	320.60	8.05	312.55	7.54	313.06	5.85	314.75	10.99	309.61
A56	322.30	8.89	313.41	10.30	312.00	9.70	312.60	11.99	310.31
A57	321.40	3.85	317.55	3.80	317.60	3.80	317.60	12.40	309.00
B02W19D	319.90	4.57	315.33	4.09	315.81	5.82	314.08	7.50	312.40
B02W20D	322.00	5.65	316.35	5.16	316.84	6.52	315.48	8.54	313.46
BH15	320.16	5.11	315.05	4.46	315.70	5.83	314.33	7.98	312.18
BH48	322.04	6.24	315.80	5.06	316.98	6.80	315.24	8.80	313.24
BH49	320.23	7.28	312.95	6.64	313.59	8.50	311.73	10.94	309.29
BH5	321.32	7.43	313.89	6.82	314.50	8.61	312.71	10.98	310.34
BH51	321.24	6.21	315.03	5.62	315.62	7.20	314.04	9.47	311.77
BH59	321.45	6.45	315.00	5.88	315.57	7.30	314.15	9.47	311.98
BH61	318.50	4.75	313.75	4.10	314.40	9.55	308.95	12.70	305.80
BH63	323.01	7.07	315.94	6.53	316.48	8.00	315.01	10.19	312.82
BH70	321.29	6.62	314.67	6.15	315.14	7.45	313.84	9.58	311.71
MW228	320.85	4.15	316.70	3.91	316.94	7.62	313.23	9.50	311.35
MW229	320.61	5.47	315.14	5.01	315.60	6.13	314.48	8.12	312.49
MW861	319.92	5.98	313.94	5.50	314.42	7.05	312.87	9.34	310.58
MW863	319.61	4.93	314.68	4.50	315.11	5.65	313.96	7.67	311.94
MW949	320.96	6.80	314.16	6.20	314.76	8.64	312.32	11.34	309.62
OW02A	321.50	7.39	314.11	6.75	314.75	8.50	313.00	10.88	310.62
OW03A	321.67	7.27	314.40	6.80	314.87	8.45	313.22	10.77	310.90
OW04A	320.52	6.31	314.21	5.79	314.73	7.45	313.07	9.75	310.77
OW05A	319.59	5.46	314.13	4.90	314.69	6.45	313.14	9.17	310.42
OW06A	322.34	7.12	315.22	6.51	315.83	7.95	314.39	10.25	312.09
OW07A	319.77	4.66	315.11	4.22	315.55	5.55	314.22	7.68	312.09
OW08A	318.91	4.30	314.61	3.77	315.14	5.30	313.61	7.59	311.32
OW09A	318.66	3.70	314.96	3.21	315.45	4.55	314.11	6.70	311.96
OW10A	320.01	4.88	315.13	4.62	315.39	6.05	313.96	7.75	312.26
OW11A	319.05	3.69	315.36	3.22	315.83	4.40	314.65	6.47	312.58
OW12A	320.42	5.06	315.36	4.57	315.85	5.80	314.62	7.94	312.48
OW13A	321.54	6.31	315.23	5.77	315.77	7.20	314.34	9.54	312.00
OW14A	320.52	6.55	313.97	5.92	314.60	7.60	312.92	10.03	310.49
OW15A	320.30	6.55	313.75	5.83	314.47	7.55	312.75	9.96	310.34
OW16A	320.63	6.30	314.33	5.70	314.93	7.10	313.53	9.40	311.23
OW17A	320.31	5.49	314.82	5.01	315.30	6.92	313.39	8.48	311.83
OW18A	321.09	5.49	315.60	5.00	316.09	6.25	314.84	8.48	312.61

NOTES:

*Frozen

**Under Development

Dry/Bottom of W

Table 11
2020 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)	Volume Purged (Liters) ⁱ	Discharge milliter PM ^j
OW04A ¹	2/26/2020	42.2	8.44	169	1.40	22.4	5.87	7.2	240
OW04B ¹	2/26/2020	43.5	7.08	35	1.67	16.5	0.68	7.3	235
505	5/7/2020	52.3	6.76	-92	6.18	16.3	0.71	3.5	120
302A	5/6/2020	56.1	6.85	-68	3.59	2.1	1.03	5.1	145
411A	5/6/2020	49.8	6.9	3	2.72	9.5	1.10	6.0	200
A42	5/6/2020	59.6	6.76	-3	1.29	0.0	0.39	5.7	191
A43	5/4/2020	57.1	6.91	28	1.77	122**	1.67	4.8	151
A45	5/4/2020	55.2	6.8	37	1.63	0.2	3.72	6.0	200
A50R	5/6/2020	56.7	7.11	113	1.67	7.5	1.66	4.5	148
A55R	5/4/2020	61.1	8.29	112	2.63	5.6	2.17	5.1	168
BH49R	5/6/2020	55.8	12.15	-275	4.75	28.4	0.77	3.3	110
BH49AR	5/7/2020	51.3	7.30	188	1.77	0.0	3.06	4.8	159
MW862	5/7/2020	55.2	6.92	34	1.85	1.3	1.59	4.5	150
MW863	5/7/2020	60.5	8.08	74	1.78	3.4	5.11	3.6	120
MW921	5/5/2020	48.8	6.64	220	5.07	2.0	3.05	6.0	200
MW934	5/6/2020	49.3	6.85	173	4.43	13.4	0.98	4.8	160
MW935	5/5/2020	49.1	7.06	-128	1.20	12.5	4.35	5.1	170
MW938	5/5/2020	48.1	6.96	-80	2.36	1.6	1.79	6.0	200
MW943	5/6/2020	51.3	7.02	203	2.11	0.0	5.25	3.4	114
MW944	5/5/2020	47.3	6.56	230	1.32	6.9	2.39	4.8	160
MW945	5/5/2020	47.5	6.51	220	3.02	3.0	1.54	5.3	150
MW946	5/5/2020	48.6	6.87	66	6.60	0.0	5.28	4.9	163
MW947	5/5/2020	51.2	6.66	-28	1.69	0.0	0.61	3.9	130
MW948	5/5/2020	51.3	6.94	190	4.48	11.2	2.68	6.3	210
MW949	5/5/2020	51.5	7.71	-152	3.29	3.2	1.41	6.3	210
MW950	5/5/2020	53.0	6.87	196	3.39	0.7	7.23	4.6	154
MW951	5/7/2020	53.4	6.85	81	1.83	0.0	0.60	5.5	158
MW952	5/7/2020	52.5	7.12	186	1.12	44.8	2.60	4.9	163
MW953R ^{3,7,9}	5/12/2020	49.8	7.34	210	1.75	129.0	3.70		
MW954	5/4/2020	53.7	7.19	124	1.96	0.9	1.65	3.8	125
MW955	5/5/2020	52.6	7.08	188	1.66	3.3	6.86	5.0	167
MW956	5/5/2020	51.1	6.86	81	2.35	1.6	1.91	3.8	125
MW957	5/7/2020	55.0	6.99	215	1.88	126.0	1.95	6.0	200
MW958	5/7/2020	54.4	7.16	-134	1.27	0.0	0.79	4.5	149.2
MW959	5/5/2020	49.4	6.98	196	1.83	2.7	2.89	5.4	178.3
MW960	5/5/2020	50.6	6.63	143	1.41	0.7	7.73	4.5	135
OW03A	5/7/2020	54.3	7.24	40	2.00	0.0	2.58	3.8	125
OW03B	5/5/2020	51.2	7.37	185	1.96	0.0	2.22	4.5	150
OW04A	5/7/2020	56.9	8.44	71	1.25	5.1	4.19	3.5	115
OW04B	5/11/2020	47.9	7.08	2	1.60	0.4	1.19	3.6	120
OW05A	5/6/2020	53.1	7.53	-51	1.39	0.1	4.57	4.8	160
OW05B	5/6/2020	53.6	8.27	-8	1.83	0.6	1.79	4.1	137
OW06A	5/11/2020	48.2	7.37	-19	1.94	17.0	2.86	7.1	157
OW06B	5/5/2020	51.1	7.04	189	1.75	14.2	1.25	3.8	125
OW07A	5/4/2020	53.2	8.12	184	1.97	0.0	3.81	4.8	160
OW07B	5/5/2020	48.9	7.28	177	2.04	24.7	2.43	6.3	210
OW11A	5/7/2020	56.0	8.19	187	1.41	0.0	2.41	6.0	200
OW11B	5/7/2020	51.7	7.45	235	1.79	0.0	1.90	6.1	202
OW12A	5/5/2020	51.5	7.25	-79	1.74	0.0	0.90	5.0	166
OW12B	5/5/2020	47.6	7.65	8	1.18	0.0	0.75	5.1	169
OW13A	5/4/2020	52.8	7.41	-120	2.02	0.1	1.20	4.8	160
OW13BR	5/7/2020	53.1	7.21	43	1.77	0.0	1.31	4.5	148
OW15A	5/4/2020	53.5	7.48	-100	2.27	0.0	0.55	6.0	200
OW15BR	5/6/2020	54.7	7.34	166	1.93	16.5	2.66	6.0	200
OW17AR	5/4/2020	52.9	7.54	-174	2.44	0.2	0.51	4.8	160
OW17BR	5/4/2020	52.3	7.48	171	1.34	0.4	1.62	3.0	100
OW18B	5/4/2020	51.5	7.55	124	2.20	0.7	1.82	3.8	125
OW04A ¹	8/20/2020	60.9	7.92	-102	1.22	0.0	0.69	9.0	300
OW04B ¹	8/20/2020	66.0	7.15	-26	1.51	0.0	0.84	9.0	300

Table 11
2020 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)	Volume Purged (Liters ⁱ)	Discharge milliliter PM ^j
505 ⁵	10/21/2021								
302A ²	10/21/2020	60.9	6.95	-157	5.00	117.0	1.18	0.5	90
411A	10/22/2020	58.3	6.69	-106	4.25	4.4	0.52	3.0	100
A42	10/20/2020	59.1	6.87	-25	1.39	0.0	4.48	3.8	128
A43	10/15/2020	60.7	6.71	26	1.82	3.3	1.01	3.6	120
A45	10/16/2020	59.8	6.82	-9	1.84	2.5	1.03	3.8	125
A50R	10/16/2020	56.1	7.23	-34	1.63	1.4	0.64	3.8	125
A55R	10/15/2020	56.7	7.72	-33	3.11	0.1	0.52	2.7	90
BH49R	10/16/2020	58.2	12.13	-325	2.62	0.0	0.63	4.2	140
BH49AR	10/22/2020	55.7	7.17	-57	2.00	0.0	0.54	4.0	133
MW862	10/16/2020	58.9	6.84	94	1.78	0.0	0.54	2.4	80
MW863	10/19/2020	58.5	7.38	78	1.93	16.5	0.50	3.5	100
MW921 ⁵	10/20/2020								
MW934	10/22/2020	58.0	6.71	-18	4.29	0.0	0.81	3.2	90
MW935	10/14/2020	65.7	7.18	-131	1.63	0.2	0.62	3.1	102
MW938	10/14/2020	61.9	7.17	-193	2.82	0.8	0.44	3.2	106
MW943 ^{3,7}	10/20/2020	57.8	7.90	74	2.48	96.6	6.89		
MW944 ⁵	10/20/2020								
MW945 ⁵	10/20/2020								
MW922 ⁴	10/20/2020	57.4	6.96	125	4.86	9.9	1.31	3.5	117
MW946 ⁵	10/14/2020								
808A ⁸	10/14/2020	60.3	7.02	16	5.65	2.1	0.80	2.6	87
MW947 ⁵	10/22/2020								
MW423 ⁶	10/22/2020	56.4	6.89	18	1.95	0.0	2.30	3.1	102
MW948	10/22/2020	55.8	6.63	72	4.76	0.0	1.23	3.0	100
MW949	10/22/2020	55.2	7.42	-208	3.37	0.0	0.53	3.3	110
MW950	10/20/2020	56.2	6.80	28	4.06	3.7	0.54	3.0	100
MW951	10/21/2020	61.1	6.68	-8	2.03	8.8	0.44	3.3	110
MW952	10/19/2020	58.7	6.81	140	1.64	31.0	6.34	3.0	100
MW953R	10/21/2020	60.1	7.29	144	1.25	6.0	3.05	4.6	152
MW954 ^{3,7}	10/19/2020	55.5	6.88	-116	2.21	35.8	8.70	4.1	137
MW955	10/19/2020	55.6	6.90	187	1.77	28.0	2.23	3.0	100
MW956	10/20/2020	55.2	6.69	35	2.24	2.2	0.64	3.0	120
MW957	10/22/2020	59.3	6.66	233	2.18	1.5	2.37	3.8	127
MW958 ^{3,7}	10/21/2020	64.7	6.59	-92	1.52	112.0	8.51		
MW959	10/20/2020	58.1	6.95	59	1.84	2.0	1.13	3.8	125
MW960	10/20/2020	57.5	6.67	17	1.21	0.4	7.70	3.9	130
OW03A	10/21/2020	60.4	7.08	-157	2.09	0.2	0.56	4.0	132
OW03B	10/19/2020	55.9	7.12	124	1.91	18.0	0.69	3.0	100
OW04A	10/14/2020	57.3	8.06	-83	1.31	2.8	0.76	2.9	97
OW04B	10/14/2020	62.2	7.29	5	1.58	3.8	0.52	3.0	100
OW05A	10/16/2020	57.9	7.53	-64	1.33	9.2	1.48	2.7	90
OW05B	10/16/2020	58.2	7.13	11	1.67	0.0	1.29	3.3	110
OW06A	10/21/2020	63.3	7.62	-163	1.82	0.6	1.34	3.3	110
OW06B	10/19/2020	56.7	6.88	-82	1.79	19.2	0.50	3.0	100
OW07A	10/20/2020	55.5	7.47	-132	2.05	1.0	0.68	3.6	120
OW07B	10/20/2020	58.2	7.04	-5	1.92	0.4	4.85	3.0	100
OW11A	10/21/2020	64.4	7.59	-64	1.56	2.4	0.50	3.0	100
OW11B	10/21/2020	64.4	7.06	134	1.84	1.7	1.02	3.5	100
OW12A	10/20/2020	58.3	7.25	-100	1.67	0.3	0.50	3.8	125
OW12B ^{3,7}	10/20/2020	57.5	7.12	94	1.29	19.0	3.64		
OW13A	10/16/2020	59.5	7.24	-89	2.07	0.0	0.87	3.5	117
OW13BR	10/21/2020	65.0	7.07	-18	1.65	1.1	0.60	4.9	122
OW15A	10/14/2020	59.5	7.42	-103	2.28	0.0	5.72	3.2	90
OW15BR	10/21/2020	62.9	7.07	-164	1.90	10.2	0.64	4.0	100
OW17AR	10/14/2020	60.6	7.44	-141	2.34	0.0	0.77	5.2	130
OW17BR	10/14/2020	65.0	7.42	-127	1.34	18.4	0.60	3.9	130
OW18BR	10/15/2020	59.2	7.16	-78	2.30	10.8	1.65	2.7	90

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.

i. 1-Liter = 0.26 gallons

j. Milliliter PM = milliliter per minute

(1000ml = 1.0 liter) -averaged rate

NA - Not Applicable

*Parameter not taken/meter malfunction

**Potential micro bubbles inside of turbidity probe causing elevated readings

¹ Quarterly sampling.

² Well purged dry and/or began to purge dry during sampling

³ Grab sample (-G)

⁴Substitute well for wells: 505, MW921, MW944 and MW945

⁵Insufficient volume for sample and/or dry

⁶Substitute well for well: MW947

⁷Low well volume

⁸Substitute well for: MW946

⁹Well redeveloped 5/5/20, low recovery resulted with limited volume on 2/12/20, additional grab sample taken on 5/21/20

NOTE: Wells with 'R' at the end such as MW###R or OW###R indicates wells were reinstalled in 2018

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 :			05/06/20	10/21/20	05/06/20	10/22/20	05/07/20
Parameter	Units	Criteria ¹					
MISCELLANEOUS							
ALKALINITY, TOTAL	MG/L	500	504	561	841	570	965
BROMIDE	MG/L	2	0.66	1.1	0.24	0.6 J-	3.2
CHLORIDE (AS CL)	MG/L	250	171	Not Analyzed	23.2	59.3	298
DISSOLVED SOLIDS, TOTAL	MG/L	1000	2,720	4,720	1,780	3,960	5,980
FLUORIDE	MG/L	1.5	0.28	0.14 J	0.44	0.22	0.3
NITROGEN, NITRATE (AS N)	MG/L	10	0.04 J	0.2	0.3	0.05 U	0.02 U
NITROGEN, NITRITE (AS N)	MG/L	1	0.02 U	0.062 U	0.02 U	0.062 U	0.02 U
PHOSPHORUS, TOTAL ORTHOPHOSPHATE (AS PO ₄)	MG/L	-	0.0029 U	0.0097 J+	0.0029 U	0.0078 J+	0.0029 U
SULFATE	MG/L	250	1,520	2,670	806	2,070	3,740

Concentration Exceeds Criteria

(1) - Technical and Operational Guidance Series (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: The analyte was not detected and was reported as less than the limit of detection (LOD) or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

J: The reported result was an estimated value with an unknown bias.

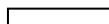
J+: The result was an estimated quantity, but the result may be biased high.

J-: The result was an estimated quantity, but the result may be biased low.

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 :			10/14/20	05/06/20	10/20/20	05/04/20	10/15/20
Parameter	Units	Criteria ¹					
MISCELLANEOUS							
ALKALINITY, TOTAL	MG/L	500	566	433	397	688	560
BROMIDE	MG/L	2	3	0.36	0.5	0.52	0.56
CHLORIDE (AS CL)	MG/L	250	310	30.5	39.5	29.1	27.5
DISSOLVED SOLIDS, TOTAL	MG/L	1000	5,160	962	968	1,610	1,600
FLUORIDE	MG/L	1.5	0.3	0.12 J	0.08 J	0.24	0.2
NITROGEN, NITRATE (AS N)	MG/L	10	0.05 U	0.02 U	0.08 J	0.08 J	0.05 U
NITROGEN, NITRITE (AS N)	MG/L	1	0.062 U	0.02 U	0.062 U	0.02 U	0.062 U
PHOSPHORUS, TOTAL ORTHOPHOSPHATE (AS PO4)	MG/L	-	0.016 J+	0.0029 U	0.014 J+	0.0029 U	0.0078 J+
SULFATE	MG/L	250	3,360	365	366	743	702



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: The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

J: The reported result was an estimated value with an unknown bias.

J+: The result was an estimated quantity, but the result may be biased high.

J-: The result was an estimated quantity, but the result may be biased low.

NOTE: The detection limits shown are MDL.

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

Location Identifier :			A45	A45	A50R	A50R	A55R
Field Sample Identifier :			A45	A45	A50R	A50R	A55R
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			05/04/20	10/16/20	05/06/20	10/16/20	05/04/20
Parameter	Units	Criteria ¹					
MISCELLANEOUS							
ALKALINITY, TOTAL	MG/L	500	503	463	371	352	67
BROMIDE	MG/L	2	0.28	0.2	0.34	0.34	0.42
CHLORIDE (AS CL)	MG/L	250	58.9	52.3	26.7	25.7	34.2
DISSOLVED SOLIDS, TOTAL	MG/L	1000	1,530	1,590	1,260	1,270	2,590
FLUORIDE	MG/L	1.5	0.14 J-	0.08 J	0.22	0.18 J	0.2
NITROGEN, NITRATE (AS N)	MG/L	10	0.22	0.05 U	0.16 J	0.06 J	0.14 J
NITROGEN, NITRITE (AS N)	MG/L	1	0.02 U	0.062 U	0.02 U	0.062 U	0.02 U
PHOSPHORUS, TOTAL ORTHOPHOSPHATE (AS PO4)	MG/L	-	0.0029 U	0.005 U	0.0029 U	0.0097 J+	0.0029 U
SULFATE	MG/L	250	708	726	656	629	1,990



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: The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

J: The reported result was an estimated value with an unknown bias.

J+: The result was an estimated quantity, but the result may be biased high.

J-: The result was an estimated quantity, but the result may be biased low.

NOTE: The detection limits shown are MDL.

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

Location Identifier :			A55R	BH49AR	BH49AR	BH49R	BH49R
Field Sample Identifier :			A55R	BH49AR	BH49AR	BH49R	BH49R
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			10/15/20	05/07/20	10/22/20	05/06/20	10/16/20
Parameter	Units	Criteria ¹					
MISCELLANEOUS							
ALKALINITY, TOTAL	MG/L	500	67	367	331	757	521
BROMIDE	MG/L	2	0.44	0.3	0.4 J-	0.3	0.38
CHLORIDE (AS CL)	MG/L	250	34.3	42.9	40.1	32.9	39.6
DISSOLVED SOLIDS, TOTAL	MG/L	1000	2,680	1,450	1,360	787	684
FLUORIDE	MG/L	1.5	0.16 J	0.28	0.18 J	0.3	0.26
NITROGEN, NITRATE (AS N)	MG/L	10	0.05 U	0.04 J	0.08 J	0.04 J	0.08 J
NITROGEN, NITRITE (AS N)	MG/L	1	0.062 U	0.02 U	0.062 U	0.02 U	0.062 U
PHOSPHORUS, TOTAL ORTHOPHOSPHATE (AS PO4)	MG/L	-	0.012 J+	0.0035 J	0.016 J+	0.0029 U	0.005 U
SULFATE	MG/L	250	1,950	652	664	77	141



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: The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

J: The reported result was an estimated value with an unknown bias.

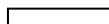
J+: The result was an estimated quantity, but the result may be biased high.

J-: The result was an estimated quantity, but the result may be biased low.

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 :			10/22/20	05/07/20	10/16/20	05/07/20	10/19/20
Parameter	Units	Criteria ¹					
MISCELLANEOUS							
ALKALINITY, TOTAL	MG/L	500	675	767	600	216	226
BROMIDE	MG/L	2	0.32 J-	0.62	0.46	0.42	0.52
CHLORIDE (AS CL)	MG/L	250	10.4	71.2	63.3	30.9	32
DISSOLVED SOLIDS, TOTAL	MG/L	1000	1,190	1,250	1,280	1,610	1,620
FLUORIDE	MG/L	1.5	0.28	0.22	0.2	0.22	0.18 J
NITROGEN, NITRATE (AS N)	MG/L	10	0.05 U	0.02 U	0.16 J	0.4	0.2
NITROGEN, NITRITE (AS N)	MG/L	1	0.062 U	0.02 U	0.062 U	0.02 U	0.062 U
PHOSPHORUS, TOTAL ORTHOPHOSPHATE (AS PO4)	MG/L	-	0.016 J+	0.0029 U	0.005 U	0.0029 U	0.0097 J+
SULFATE	MG/L	250	408	378	386	934	954



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: The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

J: The reported result was an estimated value with an unknown bias.

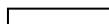
J+: The result was an estimated quantity, but the result may be biased high.

J-: The result was an estimated quantity, but the result may be biased low.

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 :			05/05/20	10/20/20	05/06/20	10/22/20	05/05/20
Parameter	Units	Criteria ¹					
MISCELLANEOUS							
ALKALINITY, TOTAL	MG/L	500	749	414	727	786	490
BROMIDE	MG/L	2	2.5	0.68	0.66	0.8 J-	0.04 U
CHLORIDE (AS CL)	MG/L	250	271 J+	29.4	62.3	58.5	6.1
DISSOLVED SOLIDS, TOTAL	MG/L	1000	4,320	4,460	3,730	3,740	850
FLUORIDE	MG/L	1.5	0.3	0.18 J	0.34	0.24	0.42
NITROGEN, NITRATE (AS N)	MG/L	10	0.02 U	0.14 J	0.06 J	0.1 J	0.1 J
NITROGEN, NITRITE (AS N)	MG/L	1	0.02 U	0.062 U	0.02 U	0.062 U	0.02 U
PHOSPHORUS, TOTAL ORTHOPHOSPHATE (AS PO4)	MG/L	-	0.0029 U	0.014 J+	0.0029 U	0.0097 J+	0.0069 J
SULFATE	MG/L	250	2,720	2,810	2,380	1,920	294



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: The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

J: The reported result was an estimated value with an unknown bias.

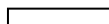
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NOTE: The detection limits shown are MDL.

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-G
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			10/14/20	05/05/20	10/14/20	05/06/20	10/20/20
Parameter	Units	Criteria ¹					
MISCELLANEOUS							
ALKALINITY, TOTAL	MG/L	500	570	834	909	478	430
BROMIDE	MG/L	2	0.12 J	0.2	0.2	0.32	0.4
CHLORIDE (AS CL)	MG/L	250	13.2	12.5	20.2	77.7	78.9
DISSOLVED SOLIDS, TOTAL	MG/L	1000	1,300	1,710	1,870	1,530	1,350
FLUORIDE	MG/L	1.5	0.36	0.38	0.32	0.42	0.36
NITROGEN, NITRATE (AS N)	MG/L	10	0.05 U	0.04 J	0.06 J	0.04 J	0.05 U
NITROGEN, NITRITE (AS N)	MG/L	1	0.062 U	0.02 U	0.062 U	0.02 U	0.062 U
PHOSPHORUS, TOTAL ORTHOPHOSPHATE (AS PO4)	MG/L	-	0.0097 J+	0.0035 J	0.018 J+	0.0029 U	0.005 U
SULFATE	MG/L	250	526	704	857	754	592



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: The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

J: The reported result was an estimated value with an unknown bias.

J+: The result was an estimated quantity, but the result may be biased high.

J-: The result was an estimated quantity, but the result may be biased low.

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 :			05/05/20	05/05/20	05/05/20	05/05/20	05/05/20
Parameter	Units	Criteria ¹					
MISCELLANEOUS							
ALKALINITY, TOTAL	MG/L	500	692	710	635	853	627
BROMIDE	MG/L	2	0.2	1.8	2.1	0.1 J	0.66
CHLORIDE (AS CL)	MG/L	250	9.9	163	321 J+	13.6	86.3
DISSOLVED SOLIDS, TOTAL	MG/L	1000	928	2,430	6,120	1,050	4,030
FLUORIDE	MG/L	1.5	0.12 J	0.28	0.38	0.34	0.38
NITROGEN, NITRATE (AS N)	MG/L	10	0.04 J	0.06 J	0.16 J	0.02 U	0.08 J
NITROGEN, NITRITE (AS N)	MG/L	1	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
PHOSPHORUS, TOTAL ORTHOPHOSPHATE (AS PO4)	MG/L	-	0.0029 U	0.0029 U	0.0087 J	0.0029 U	0.0029 U
SULFATE	MG/L	250	223	1,130	4,490	228	2,650

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: The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

J: The reported result was an estimated value with an unknown bias.

J+: The result was an estimated quantity, but the result may be biased high.

J-: The result was an estimated quantity, but the result may be biased low.

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	MW950	MW950
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			10/22/20	05/05/20	10/22/20	05/05/20	10/20/20
Parameter	Units	Criteria ¹					
MISCELLANEOUS							
ALKALINITY, TOTAL	MG/L	500	605	114	99	572	502
BROMIDE	MG/L	2	0.78 J-	0.94	1 J-	0.74	0.84
CHLORIDE (AS CL)	MG/L	250	85.4	89.3	89.3	58.5	61.2
DISSOLVED SOLIDS, TOTAL	MG/L	1000	4,320	2,670	2,720	3,180	3,550
FLUORIDE	MG/L	1.5	0.22	0.2	0.12 J	0.32	0.22
NITROGEN, NITRATE (AS N)	MG/L	10	0.05 U	0.1 J	0.05 U	0.04 J	0.1 J
NITROGEN, NITRITE (AS N)	MG/L	1	0.062 U	0.02 U	0.062 U	0.02 U	0.062 U
PHOSPHORUS, TOTAL ORTHOPHOSPHATE (AS PO ₄)	MG/L	-	0.012 J+	0.0029 U	0.005 U	0.0029 U	0.012 J+
SULFATE	MG/L	250	2,170	1,820	1,590	1,980	2,070



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: The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

J: The reported result was an estimated value with an unknown bias.

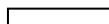
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J-: The result was an estimated quantity, but the result may be biased low.

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 :			MW951	MW951	MW951-D	MW952	MW952
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			05/07/20	10/21/20	10/21/20	05/07/20	10/19/20
Parameter	Units	Criteria ¹			Field Duplicate		
MISCELLANEOUS							
ALKALINITY, TOTAL	MG/L	500	581	788	619	327	368
BROMIDE	MG/L	2	0.22	0.38	0.34	0.14 J	0.34
CHLORIDE (AS CL)	MG/L	250	79.4	83.2	81.2	24	29.5
DISSOLVED SOLIDS, TOTAL	MG/L	1000	1,350	1,430	1,300	1,210	1,350
FLUORIDE	MG/L	1.5	0.3	0.24	0.24	0.28	0.22
NITROGEN, NITRATE (AS N)	MG/L	10	0.02 U	0.06 J	0.1 J	0.28	0.06 J
NITROGEN, NITRITE (AS N)	MG/L	1	0.02 U	0.062 U	0.062 U	0.02 U	0.062 U
PHOSPHORUS, TOTAL ORTHOPHOSPHATE (AS PO4)	MG/L	-	0.0029 U	0.012 J+	0.012 J	0.0029 U	0.005 U
SULFATE	MG/L	250	461	478	490	542	681



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: The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

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NOTE: The detection limits shown are MDL.

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

Location Identifier :			MW953R	MW953R	MW954	MW954	MW955
Field Sample Identifier :			MW953R	MW953R	MW954	MW954	MW955
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			05/12/20	10/21/20	05/04/20	10/19/20	05/05/20
Parameter	Units	Criteria ¹					
MISCELLANEOUS							
ALKALINITY, TOTAL	MG/L	500	383	272	393	427	413
BROMIDE	MG/L	2	0.34	0.28	0.12 J	0.18 J	0.2
CHLORIDE (AS CL)	MG/L	250	27.4	22.2	29	30.1	25
DISSOLVED SOLIDS, TOTAL	MG/L	1000	1,320	772	1,550	1,610	1,290
FLUORIDE	MG/L	1.5	0.28	0.24	0.32	0.3	0.3
NITROGEN, NITRATE (AS N)	MG/L	10	0.42	0.4	0.18 J	0.05 U	0.06 J
NITROGEN, NITRITE (AS N)	MG/L	1	0.02 U	0.062 U	0.02 U	0.062 U	0.02 U
PHOSPHORUS, TOTAL ORTHOPHOSPHATE (AS PO4)	MG/L	-	0.0029 U	0.018 J+	0.0029 U	0.005 U	0.0029 U
SULFATE	MG/L	250	629	335	865	934	645



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

Location Identifier :			MW955	MW956	MW957	MW957	MW957
Field Sample Identifier :			MW955	MW956	MW957	MW957-D	MW957
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			10/19/20	10/20/20	05/07/20	05/07/20	10/22/20
Parameter	Units	Criteria ¹				Field Duplicate	
MISCELLANEOUS							
ALKALINITY, TOTAL	MG/L	500	435	505	701	634	570
BROMIDE	MG/L	2	0.34	0.56	0.26	0.26	0.4 J-
CHLORIDE (AS CL)	MG/L	250	24.7	36.7	12.7	13.3	14.8
DISSOLVED SOLIDS, TOTAL	MG/L	1000	1,360	1,750	1,400	1,590	1,740
FLUORIDE	MG/L	1.5	0.24	0.24	0.46	0.42	0.4
NITROGEN, NITRATE (AS N)	MG/L	10	0.06 J	0.06 J	0.08 J	0.08 J	0.2
NITROGEN, NITRITE (AS N)	MG/L	1	0.062 U	0.062 U	0.02 U	0.02 U	0.062 U
PHOSPHORUS, TOTAL ORTHOPHOSPHATE (AS PO4)	MG/L	-	0.005 U	0.0097 J+	0.0029 U	0.0029 U	0.012 J+
SULFATE	MG/L	250	620	792	600	620	615



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: The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

J: The reported result was an estimated value with an unknown bias.

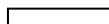
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NOTE: The detection limits shown are MDL.

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

Location Identifier :			MW958	MW959	MW960	MW960	OW03A
Field Sample Identifier :			MW958-D	MW959	MW960	MW960	OW03A
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			05/07/20	10/20/20	05/05/20	10/20/20	05/07/20
Parameter	Units	Criteria ¹	Field Duplicate				
MISCELLANEOUS							
ALKALINITY, TOTAL	MG/L	500	543	528	641	508	548
BROMIDE	MG/L	2	0.14 J	0.44	0.08 J	0.3	0.36
CHLORIDE (AS CL)	MG/L	250	34.6	39.2	44.3	42.4	29.5
DISSOLVED SOLIDS, TOTAL	MG/L	1000	808	1,390	1,030	840	1,620
FLUORIDE	MG/L	1.5	0.3	0.32	0.24	0.2	0.22
NITROGEN, NITRATE (AS N)	MG/L	10	0.02 U	0.08 J	0.02 U	0.52	0.06 J
NITROGEN, NITRITE (AS N)	MG/L	1	0.02 U	0.062 U	0.02 U	0.062 U	0.02 U
PHOSPHORUS, TOTAL ORTHOPHOSPHATE (AS PO4)	MG/L	-	0.0029 U	0.018 J+	0.0029 U	0.016 J+	0.0029 U
SULFATE	MG/L	250	207	613	295	205	736



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: The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

J: The reported result was an estimated value with an unknown bias.

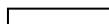
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J-: The result was an estimated quantity, but the result may be biased low.

NOTE: The detection limits shown are MDL.

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

Location Identifier :			OW03A	OW03B	OW03B	OW04A	OW04A
Field Sample Identifier :			OW03A	OW03B	OW03B	OW04A	OW04A
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			10/21/20	05/05/20	10/19/20	02/26/20	05/07/20
Parameter	Units	Criteria ¹					
MISCELLANEOUS							
ALKALINITY, TOTAL	MG/L	500	587	494	522	170	167
BROMIDE	MG/L	2	0.46	0.24	0.34	0.38	0.4
CHLORIDE (AS CL)	MG/L	250	31.7	30.5	33.8	33.5	28.6
DISSOLVED SOLIDS, TOTAL	MG/L	1000	1,510	1,430	1,290	770	930
FLUORIDE	MG/L	1.5	0.16 J	0.3	0.24	0.16 J	0.22
NITROGEN, NITRATE (AS N)	MG/L	10	0.12 J	0.06 J	0.14 J	0.24	0.06 J
NITROGEN, NITRITE (AS N)	MG/L	1	0.062 U	0.02 U	0.062 U	0.02 U	0.02 U
PHOSPHORUS, TOTAL ORTHOPHOSPHATE (AS PO4)	MG/L	-	0.0078 J+	0.0029 U	0.014 J+	0.0029 U	0.0029 U
SULFATE	MG/L	250	709	689	570	525	473



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: The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

J: The reported result was an estimated value with an unknown bias.

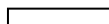
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J-: The result was an estimated quantity, but the result may be biased low.

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-D	OW04A	OW04A	OW04B	OW04B
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			05/07/20	08/20/20	10/14/20	02/26/20	05/11/20
Parameter	Units	Criteria ¹	Field Duplicate				
MISCELLANEOUS							
ALKALINITY, TOTAL	MG/L	500	169	167	170	322	331
BROMIDE	MG/L	2	0.38	0.46	0.38	0.04 U	0.04 U
CHLORIDE (AS CL)	MG/L	250	29.5	30.9	33.2	78.4	77 J+
DISSOLVED SOLIDS, TOTAL	MG/L	1000	934	962	894	1,190	1,320
FLUORIDE	MG/L	1.5	0.22	0.22	0.22	0.24	0.4
NITROGEN, NITRATE (AS N)	MG/L	10	0.06 J	0.02 U	0.05 U	0.08 J	0.02 U
NITROGEN, NITRITE (AS N)	MG/L	1	0.02 U	0.02 U	0.062 U	0.02 U	0.02 U
PHOSPHORUS, TOTAL ORTHOPHOSPHATE (AS PO4)	MG/L	-	0.0029 U	0.015 J+	0.0097 J+	0.0029 U	0.0029 U
SULFATE	MG/L	250	489	532	507	566	560



Concentration Exceeds Criteria

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

U: The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

J: The reported result was an estimated value with an unknown bias.

J+: The result was an estimated quantity, but the result may be biased high.

J-: The result was an estimated quantity, but the result may be biased low.

NOTE: The detection limits shown are MDL.

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

Location Identifier :			OW04B	OW04B	OW04B	OW05A	OW05A
Field Sample Identifier :			OW04B	OW04B	OW04B-D	OW05A	OW05A
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			08/20/20	10/14/20	10/14/20	05/06/20	10/16/20
Parameter	Units	Criteria ¹			Field Duplicate		
MISCELLANEOUS							
ALKALINITY, TOTAL	MG/L	500	341	339	338	268	255
BROMIDE	MG/L	2	0.14 J	0.16 J	0.14 J	0.46	0.44
CHLORIDE (AS CL)	MG/L	250	63.8	73.8	73.7	38.2	38.7
DISSOLVED SOLIDS, TOTAL	MG/L	1000	1,200	1,200	1,210	950	916
FLUORIDE	MG/L	1.5	0.36	0.38	0.38	0.28	0.24
NITROGEN, NITRATE (AS N)	MG/L	10	0.02 U	0.08 J	0.05 U	0.02 U	0.05 U
NITROGEN, NITRITE (AS N)	MG/L	1	0.02 U	0.062 U	0.062 U	0.02 U	0.062 U
PHOSPHORUS, TOTAL ORTHOPHOSPHATE (AS PO4)	MG/L	-	0.0091 J+	0.0097 J+	0.0097 J+	0.0029 U	0.012 J+
SULFATE	MG/L	250	529	537	537	438	439



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: The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

J: The reported result was an estimated value with an unknown bias.

J+: The result was an estimated quantity, but the result may be biased high.

J-: The result was an estimated quantity, but the result may be biased low.

NOTE: The detection limits shown are MDL.

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

Location Identifier :			OW05B	OW05B	OW06A	OW06A	OW06B
Field Sample Identifier :			OW05B	OW05B	OW06A	OW06A	OW06B
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			05/06/20	10/16/20	05/11/20	10/21/20	05/05/20
Parameter	Units	Criteria ¹					
MISCELLANEOUS							
ALKALINITY, TOTAL	MG/L	500	474	478	261	271	462
BROMIDE	MG/L	2	0.16 J	0.1 J	0.46	0.48	0.3
CHLORIDE (AS CL)	MG/L	250	16.1	16.5	32.9 J+	31.7	64.9
DISSOLVED SOLIDS, TOTAL	MG/L	1000	1,110	1,230	1,490	1,290	1,230
FLUORIDE	MG/L	1.5	0.2	0.22	0.28	0.2	0.28
NITROGEN, NITRATE (AS N)	MG/L	10	0.02 U	0.08 J	0.12 J+	0.05 U	0.02 U
NITROGEN, NITRITE (AS N)	MG/L	1	0.02 U	0.062 U	0.02 U	0.062 U	0.02 U
PHOSPHORUS, TOTAL ORTHOPHOSPHATE (AS PO4)	MG/L	-	0.0052 J	0.0097 J+	0.0029 U	0.0097 J+	0.0035 J
SULFATE	MG/L	250	548	548	805	749	449



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: The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

J: The reported result was an estimated value with an unknown bias.

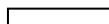
J+: The result was an estimated quantity, but the result may be biased high.

J-: The result was an estimated quantity, but the result may be biased low.

NOTE: The detection limits shown are MDL.

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

Location Identifier :			OW06B	OW07A	OW07A	OW07B	OW11A
Field Sample Identifier :			OW06B	OW07A	OW07A	OW07B	OW11A
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			10/19/20	05/04/20	10/20/20	10/20/20	05/07/20
Parameter	Units	Criteria ¹					
MISCELLANEOUS							
ALKALINITY, TOTAL	MG/L	500	460	178	185	476	246
BROMIDE	MG/L	2	0.46	0.6	0.72	0.28	0.36
CHLORIDE (AS CL)	MG/L	250	65.7	41	42.1	23.9	25.4
DISSOLVED SOLIDS, TOTAL	MG/L	1000	1,200	1,590	1,570	1,460	1,090
FLUORIDE	MG/L	1.5	0.22	0.22	0.22	0.24	0.22
NITROGEN, NITRATE (AS N)	MG/L	10	0.05 U	0.16 J	0.18 J	0.05 U	0.62
NITROGEN, NITRITE (AS N)	MG/L	1	0.062 U	0.02 U	0.062 U	0.062 U	0.02 U
PHOSPHORUS, TOTAL ORTHOPHOSPHATE (AS PO4)	MG/L	-	0.012 J+	0.0029 U	0.016 J+	0.018 J+	0.0029 U
SULFATE	MG/L	250	429	977	915	693	561



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: The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

J: The reported result was an estimated value with an unknown bias.

J+: The result was an estimated quantity, but the result may be biased high.

J-: The result was an estimated quantity, but the result may be biased low.

NOTE: The detection limits shown are MDL.

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

Location Identifier :			OW11A	OW11B	OW11B	OW12A	OW12B
Field Sample Identifier :			OW11A	OW11B	OW11B	OW12A	OW12B
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			10/21/20	05/07/20	10/21/20	05/05/20	05/05/20
Parameter	Units	Criteria ¹					
MISCELLANEOUS							
ALKALINITY, TOTAL	MG/L	500	234	357	379	215	318
BROMIDE	MG/L	2	0.38	0.2	0.34	0.32	0.04 U
CHLORIDE (AS CL)	MG/L	250	27.6	37.8	37.9	26	4.4
DISSOLVED SOLIDS, TOTAL	MG/L	1000	1,060	1,470	1,370	1,280	924
FLUORIDE	MG/L	1.5	0.16 J	0.22	0.2	0.28	0.34
NITROGEN, NITRATE (AS N)	MG/L	10	0.18 J	0.1 J	0.1 J	0.02 U	5.1
NITROGEN, NITRITE (AS N)	MG/L	1	0.062 U	0.02 U	0.062 U	0.02 U	0.02 U
PHOSPHORUS, TOTAL ORTHOPHOSPHATE (AS PO4)	MG/L	-	0.014 J+	0.0029 U	0.014 J+	0.0029 U	0.0029 U
SULFATE	MG/L	250	561	708	676	806	359



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: The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

J: The reported result was an estimated value with an unknown bias.

J+: The result was an estimated quantity, but the result may be biased high.

J-: The result was an estimated quantity, but the result may be biased low.

NOTE: The detection limits shown are MDL.

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

Location Identifier :			OW12B	OW13A	OW13A	OW13BR	OW13BR
Field Sample Identifier :			OW12B	OW13A	OW13A	OW13BR	OW13BR
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			10/20/20	05/04/20	10/16/20	05/07/20	10/21/20
Parameter	Units	Criteria ¹					
MISCELLANEOUS							
ALKALINITY, TOTAL	MG/L	500	217	200	203	457	532
BROMIDE	MG/L	2	0.36	0.5	0.5	0.3	0.36
CHLORIDE (AS CL)	MG/L	250	25.5	41.5	41.1	24.9	25.7
DISSOLVED SOLIDS, TOTAL	MG/L	1000	1,290	1,630	1,700	1,270	1,290
FLUORIDE	MG/L	1.5	0.2	0.26 J-	0.2	0.26	0.2
NITROGEN, NITRATE (AS N)	MG/L	10	0.05 U	0.08 J	0.05 U	0.12 J	0.05 U
NITROGEN, NITRITE (AS N)	MG/L	1	0.062 U	0.02 U	0.062 U	0.02 U	0.062 U
PHOSPHORUS, TOTAL ORTHOPHOSPHATE (AS PO4)	MG/L	-	0.0097 J+	0.0029 U	0.005 U	0.0029 U	0.039
SULFATE	MG/L	250	724	1,000	1,010	640	589

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: The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

J: The reported result was an estimated value with an unknown bias.

J+: The result was an estimated quantity, but the result may be biased high.

J-: The result was an estimated quantity, but the result may be biased low.

NOTE: The detection limits shown are MDL.

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

Location Identifier :			OW15A	OW15A	OW15BR	OW15BR	OW17A
Field Sample Identifier :			OW15A	OW15A	OW15BR	OW15BR	OW17A
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			05/04/20	10/14/20	05/06/20	10/21/20	05/04/20
Parameter	Units	Criteria ¹					
MISCELLANEOUS							
ALKALINITY, TOTAL	MG/L	500	94	96	492	636	118
BROMIDE	MG/L	2	0.8	0.8	0.22	0.22	0.4
CHLORIDE (AS CL)	MG/L	250	70.7	69.8	21.4	20.9	37.2
DISSOLVED SOLIDS, TOTAL	MG/L	1000	1,780	1,890	1,380	1,160	1,950
FLUORIDE	MG/L	1.5	0.28	0.26	0.26	0.2	0.24
NITROGEN, NITRATE (AS N)	MG/L	10	0.04 J	0.05 U	0.16 J	0.1 J	0.02 U
NITROGEN, NITRITE (AS N)	MG/L	1	0.02 U	0.062 U	0.02 U	0.062 U	0.02 U
PHOSPHORUS, TOTAL ORTHOPHOSPHATE (AS PO4)	MG/L	-	0.0029 U	0.005 U	0.0029 U	0.0097 J+	0.0029 U
SULFATE	MG/L	250	1,130	1,140	652	593	1,470

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: The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

J: The reported result was an estimated value with an unknown bias.

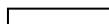
J+: The result was an estimated quantity, but the result may be biased high.

J-: The result was an estimated quantity, but the result may be biased low.

NOTE: The detection limits shown are MDL.

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

Location Identifier :			OW17A	OW17BR	OW17BR	OW18BR	OW18BR
Field Sample Identifier :			OW17A	OW17BR	OW17BR	OW18BR	OW18BR
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			10/14/20	05/04/20	10/14/20	05/04/20	10/15/20
Parameter	Units	Criteria ¹					
MISCELLANEOUS							
ALKALINITY, TOTAL	MG/L	500	130	209	209	335	303
BROMIDE	MG/L	2	0.38	0.2	0.16 J	0.36	0.38
CHLORIDE (AS CL)	MG/L	250	34.7	21.8	21.8	32.8	33.4
DISSOLVED SOLIDS, TOTAL	MG/L	1000	1,830	1,040	1,050	1,650	1,670
FLUORIDE	MG/L	1.5	0.2	0.2	0.18 J	0.22	0.2
NITROGEN, NITRATE (AS N)	MG/L	10	0.08 J	0.24	0.05 U	0.16 J	0.05 U
NITROGEN, NITRITE (AS N)	MG/L	1	0.062 U	0.02 U	0.062 U	0.02 U	0.062 U
PHOSPHORUS, TOTAL ORTHOPHOSPHATE (AS PO4)	MG/L	-	0.014 J+	0.0029 U	0.016 J+	0.0029 U	0.018 J+
SULFATE	MG/L	250	1,240	562	555	1,060	980



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: The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

J: The reported result was an estimated value with an unknown bias.

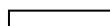
J+: The result was an estimated quantity, but the result may be biased high.

J-: The result was an estimated quantity, but the result may be biased low.

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 :			05/06/20	10/21/20	05/06/20	10/22/20	05/07/20
Parameter	Units	Criteria ¹					
RADIONUCLIDES							
RADIUM-226	PCI/L	3	0.23 U	0 U	0.32	0 U	0.36
TOTAL URANIUM	UG/L	30	46	69.6	15.1	22.3	35.1
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

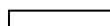
(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

U: The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

NOTE: The detection limits shown are MDL.

TABLE 13
GROUNDWATER ANALYTICAL RESULTS - RADIONUCLIDES
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 :			10/14/20	05/06/20	10/20/20	05/04/20	10/15/20
Parameter	Units	Criteria ¹					
RADIONUCLIDES							
RADIUM-226	PCI/L	3	0 U	0.36	0 U	0.4 U	0 U
TOTAL URANIUM	UG/L	30	42.4	41.2	40.9	45.5	37.8
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

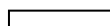
(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

U: The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

NOTE: The detection limits shown are MDL.

TABLE 13
GROUNDWATER ANALYTICAL RESULTS - RADIONUCLIDES
NIAGARA FALLS STORAGE SITE

Location Identifier :			A45	A45	A50R	A50R	A55R
Field Sample Identifier :			A45	A45	A50R	A50R	A55R
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			05/04/20	10/16/20	05/06/20	10/16/20	05/04/20
Parameter	Units	Criteria ¹					
RADIONUCLIDES							
RADIUM-226	PCI/L	3	0.33 U	0.4	0.42 U	0 U	0.36 U
TOTAL URANIUM	UG/L	30	37.5	32.3	11.9	10.1	3.06
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

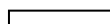
(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

U: The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

NOTE: The detection limits shown are MDL.

TABLE 13
GROUNDWATER ANALYTICAL RESULTS - RADIONUCLIDES
NIAGARA FALLS STORAGE SITE

Location Identifier :			A55R	BH49AR	BH49AR	BH49R	BH49R
Field Sample Identifier :			A55R	BH49AR	BH49AR	BH49R	BH49R
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			10/15/20	05/07/20	10/22/20	05/06/20	10/16/20
Parameter	Units	Criteria ¹					
RADIONUCLIDES							
RADIUM-226	PCI/L	3	0 U	0.3 U	0 U	0.38 U	0 U
TOTAL URANIUM	UG/L	30	4.13	17.9	16.2	0.152 U	0.081 U
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: The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

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 :			10/22/20	05/07/20	10/16/20	05/07/20	10/19/20
Parameter	Units	Criteria ¹					
RADIONUCLIDES							
RADIUM-226	PCI/L	3	0 U	0.29 U	0 U	0.26 U	0.26
TOTAL URANIUM	UG/L	30	20.5	22.4	21.1	3.12	2.96
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: The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

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 :			05/05/20	10/20/20	05/06/20	10/22/20	05/05/20
Parameter	Units	Criteria ¹					
RADIONUCLIDES							
RADIUM-226	PCI/L	3	0.27 U	0 U	0.31 U	0 U	0.62 U
TOTAL URANIUM	UG/L	30	42.8	30.9	37.6	33.4	12.3
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: The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

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-G
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			10/14/20	05/05/20	10/14/20	05/06/20	10/20/20
Parameter	Units	Criteria ¹					
RADIONUCLIDES							
RADIUM-226	PCI/L	3	0 U	0.35 U	0 U	0.32 U	0 U
TOTAL URANIUM	UG/L	30	14.4	23.1	22.8	22.5	20.6
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: The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

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 :			05/05/20	05/05/20	05/05/20	05/05/20	05/05/20
Parameter	Units	Criteria ¹					
RADIONUCLIDES							
RADIUM-226	PCI/L	3	0.26 U	0.47 U	0.35 U	0.54 U	0.44 U
TOTAL URANIUM	UG/L	30	6.39	14.6	46.8	13.9	38.9
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

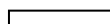
(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

U: The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

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 :			10/22/20	05/05/20	10/22/20	05/05/20	10/20/20
Parameter	Units	Criteria ¹					
RADIONUCLIDES							
RADIUM-226	PCI/L	3	0 U	0.32 U	0 U	0.34 U	0 U
TOTAL URANIUM	UG/L	30	33.3	0.922	0.424	36.2	35.4
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	35.7	32.7



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: The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

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	MW951-D	MW951	MW952
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			05/07/20	10/21/20	10/21/20	10/22/20	05/07/20
Parameter	Units	Criteria ¹			Field Duplicate		
RADIONUCLIDES							
RADIUM-226	PCI/L	3	0.26 U	0 U	0 U	Not Analyzed	0.37 U
TOTAL URANIUM	UG/L	30	2,747	Not Analyzed	2,790	2,832	159
RADIONUCLIDES (FILTERED)							
RADIUM-226	PCI/L	3	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed
TOTAL URANIUM	UG/L	30	2,721	2,776	Not Analyzed	Not Analyzed	Not Analyzed

Concentration Exceeds Criteria

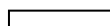
(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

U: The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

NOTE: The detection limits shown are MDL.

TABLE 13
GROUNDWATER ANALYTICAL RESULTS - RADIONUCLIDES
NIAGARA FALLS STORAGE SITE

Location Identifier :			MW952	MW953R	MW953R	MW953R	MW954
Field Sample Identifier :			MW952	MW953R	MW953R-G	MW953R	MW954
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			10/19/20	05/12/20	05/21/20	10/21/20	05/04/20
Parameter	Units	Criteria ¹					
RADIONUCLIDES							
RADIUM-226	PCI/L	3	Not Analyzed	Not Analyzed	0.46 U	0 U	0.48 U
TOTAL URANIUM	UG/L	30	Not Analyzed	107	Not Analyzed	56.6	561
RADIONUCLIDES (FILTERED)							
RADIUM-226	PCI/L	3	0 U	Not Analyzed	0.29 U	Not Analyzed	Not Analyzed
TOTAL URANIUM	UG/L	30	129	110	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: The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

NOTE: The detection limits shown are MDL.

TABLE 13
GROUNDWATER ANALYTICAL RESULTS - RADIONUCLIDES
NIAGARA FALLS STORAGE SITE

Location Identifier :			MW954	MW955	MW955	MW956	MW956
Field Sample Identifier :			MW954	MW955	MW955	MW956	MW956
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			10/19/20	05/05/20	10/19/20	05/05/20	10/20/20
Parameter	Units	Criteria ¹					
RADIONUCLIDES							
RADIUM-226	PCI/L	3	0 U	0.25 U	0 U	0.42 U	0 U
TOTAL URANIUM	UG/L	30	469	31.7	29	71.1	57.4
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	72.4	50.8

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: The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

NOTE: The detection limits shown are MDL.

TABLE 13
GROUNDWATER ANALYTICAL RESULTS - RADIONUCLIDES
NIAGARA FALLS STORAGE SITE

Location Identifier :			MW957	MW957	MW957	MW958	MW959
Field Sample Identifier :			MW957	MW957-D	MW957	MW958	MW959
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			05/07/20	05/07/20	10/22/20	05/07/20	05/05/20
Parameter	Units	Criteria ¹		Field Duplicate			
RADIONUCLIDES							
RADIUM-226	PCI/L	3	0.25 U	0.24 U	0 U	0.55 U	0.26 U
TOTAL URANIUM	UG/L	30	2,719	2,648	2,537	195	142
RADIONUCLIDES (FILTERED)							
RADIUM-226	PCI/L	3	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed
TOTAL URANIUM	UG/L	30	2,734	Not Analyzed	1,903	167	138

Concentration Exceeds Criteria

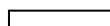
(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

U: The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

NOTE: The detection limits shown are MDL.

TABLE 13
GROUNDWATER ANALYTICAL RESULTS - RADIONUCLIDES
NIAGARA FALLS STORAGE SITE

Location Identifier :			MW959	MW959	MW960	MW960	OW03A
Field Sample Identifier :			MW959	MW959-G	MW960	MW960	OW03A
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			10/20/20	10/21/20	05/05/20	10/20/20	05/07/20
Parameter	Units	Criteria ¹					
RADIONUCLIDES							
RADIUM-226	PCI/L	3	0 U	Not Analyzed	0.3 U	0 U	0.29 U
TOTAL URANIUM	UG/L	30	101	Not Analyzed	1,090	943	9.88
RADIONUCLIDES (FILTERED)							
RADIUM-226	PCI/L	3	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed
TOTAL URANIUM	UG/L	30	84.2	204	Not Analyzed	Not Analyzed	Not Analyzed



Concentration Exceeds Criteria

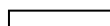
(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

U: The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

NOTE: The detection limits shown are MDL.

TABLE 13
GROUNDWATER ANALYTICAL RESULTS - RADIONUCLIDES
NIAGARA FALLS STORAGE SITE

Location Identifier :			OW03A	OW03B	OW03B	OW04A	OW04A
Field Sample Identifier :			OW03A	OW03B	OW03B	OW04A	OW04A
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			10/21/20	05/05/20	10/19/20	02/26/20	05/07/20
Parameter	Units	Criteria ¹					
RADIONUCLIDES							
RADIUM-226	PCI/L	3	0.23	0.3 U	0 U	0.59 U	0.33 U
TOTAL URANIUM	UG/L	30	9.64	18.9	16.2	1.87	2.05
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: The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

NOTE: The detection limits shown are MDL.

TABLE 13
GROUNDWATER ANALYTICAL RESULTS - RADIONUCLIDES
NIAGARA FALLS STORAGE SITE

Location Identifier :			OW04A	OW04A	OW04A	OW04B	OW04B
Field Sample Identifier :			OW04A-D	OW04A	OW04A	OW04B	OW04B
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			05/07/20	08/20/20	10/14/20	02/26/20	05/11/20
Parameter	Units	Criteria ¹	Field Duplicate				
RADIONUCLIDES							
RADIUM-226	PCI/L	3	Not Analyzed	0 U	0 U	0.42 U	0.48 U
TOTAL URANIUM	UG/L	30	1.96	1.76	1.7	37.9	35
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

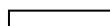
(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

U: The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

NOTE: The detection limits shown are MDL.

TABLE 13
GROUNDWATER ANALYTICAL RESULTS - RADIONUCLIDES
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 :			05/11/20	08/20/20	10/14/20	10/14/20	05/06/20
Parameter	Units	Criteria ¹	Field Duplicate			Field Duplicate	
RADIONUCLIDES							
RADIUM-226	PCI/L	3	0.26	0.91	0 U	0 U	0.4 U
TOTAL URANIUM	UG/L	30	35.3	28.1	30.6	31.9	2.01
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

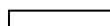
(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

U: The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

NOTE: The detection limits shown are MDL.

TABLE 13
GROUNDWATER ANALYTICAL RESULTS - RADIONUCLIDES
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 :			10/16/20	05/06/20	10/16/20	05/11/20	10/21/20
Parameter	Units	Criteria ¹					
RADIONUCLIDES							
RADIUM-226	PCI/L	3	0 U	0.29 U	0 U	0.23 U	0 U
TOTAL URANIUM	UG/L	30	1.65	3.94	14	1.59	1.64
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: The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

NOTE: The detection limits shown are MDL.

TABLE 13
GROUNDWATER ANALYTICAL RESULTS - RADIONUCLIDES
NIAGARA FALLS STORAGE SITE

Location Identifier :			OW06B	OW06B	OW07A	OW07A	OW07B
Field Sample Identifier :			OW06B	OW06B	OW07A	OW07A	OW07B
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			05/05/20	10/19/20	05/04/20	10/20/20	05/05/20
Parameter	Units	Criteria ¹					
RADIONUCLIDES							
RADIUM-226	PCI/L	3	0.24 U	0 U	0.4 U	0 U	0.41 U
TOTAL URANIUM	UG/L	30	20.3	18.1	1.54	1.39	21.2
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	20.3

Concentration Exceeds Criteria

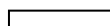
(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

U: The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

NOTE: The detection limits shown are MDL.

TABLE 13
GROUNDWATER ANALYTICAL RESULTS - RADIONUCLIDES
NIAGARA FALLS STORAGE SITE

Location Identifier :			OW07B	OW11A	OW11A	OW11B	OW11B
Field Sample Identifier :			OW07B	OW11A	OW11A	OW11B	OW11B
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			10/20/20	05/07/20	10/21/20	05/07/20	10/21/20
Parameter	Units	Criteria ¹					
RADIONUCLIDES							
RADIUM-226	PCI/L	3	0 U	0.32 U	0 U	0.37 U	0 U
TOTAL URANIUM	UG/L	30	18.2	1.48	1.48	401	189
RADIONUCLIDES (FILTERED)							
RADIUM-226	PCI/L	3	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed
TOTAL URANIUM	UG/L	30	18.1	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed



Concentration Exceeds Criteria

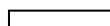
(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

U: The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

NOTE: The detection limits shown are MDL.

TABLE 13
GROUNDWATER ANALYTICAL RESULTS - RADIONUCLIDES
NIAGARA FALLS STORAGE SITE

Location Identifier :			OW12A	OW12A	OW12B	OW12B	OW13A
Field Sample Identifier :			OW12A	OW12A	OW12B	OW12B	OW13A
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			05/05/20	10/20/20	05/05/20	10/20/20	05/04/20
Parameter	Units	Criteria ¹					
RADIONUCLIDES							
RADIUM-226	PCI/L	3	0.36 U	0 U	0.44 U	Not Analyzed	0.31 U
TOTAL URANIUM	UG/L	30	3.83	3.5	45.7	39.6	2.37
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: The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

NOTE: The detection limits shown are MDL.

TABLE 13
GROUNDWATER ANALYTICAL RESULTS - RADIONUCLIDES
NIAGARA FALLS STORAGE SITE

Location Identifier :			OW13A	OW13BR	OW13BR	OW15A	OW15A
Field Sample Identifier :			OW13A	OW13BR	OW13BR	OW15A	OW15A
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			10/16/20	05/07/20	10/21/20	05/04/20	10/14/20
Parameter	Units	Criteria ¹					
RADIONUCLIDES							
RADIUM-226	PCI/L	3	0 U	0.3 U	0 U	0.52	0 U
TOTAL URANIUM	UG/L	30	2.54	14.8	12.9	0.32	0.242 U
RADIONUCLIDES (FILTERED)							
RADIUM-226	PCI/L	3	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed
TOTAL URANIUM	UG/L	30	Not Analyzed	14.3	12.6	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: The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

NOTE: The detection limits shown are MDL.

TABLE 13
GROUNDWATER ANALYTICAL RESULTS - RADIONUCLIDES
NIAGARA FALLS STORAGE SITE

Location Identifier :			OW15BR	OW15BR	OW17A	OW17A	OW17BR
Field Sample Identifier :			OW15BR	OW15BR	OW17A	OW17A	OW17BR
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			05/06/20	10/21/20	05/04/20	10/14/20	05/04/20
Parameter	Units	Criteria ¹					
RADIONUCLIDES							
RADIUM-226	PCI/L	3	0.42 U	0.35	0.32 U	0 U	0.5 U
TOTAL URANIUM	UG/L	30	25.6	21.9	1.01	0.939	4.5
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

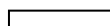
(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

U: The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

NOTE: The detection limits shown are MDL.

TABLE 13
GROUNDWATER ANALYTICAL RESULTS - RADIONUCLIDES
NIAGARA FALLS STORAGE SITE

Location Identifier :			OW17BR	OW18BR	OW18BR
Field Sample Identifier :			OW17BR	OW18BR	OW18BR
Sample Type :			Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-
Date of Sample :			10/14/20	05/04/20	10/15/20
Parameter	Units	Criteria ¹			
RADIONUCLIDES					
RADIUM-226	PCI/L	3	0 U	0.34 U	0 U
TOTAL URANIUM	UG/L	30	3.52	10.6	8.81
RADIONUCLIDES (FILTERED)					
RADIUM-226	PCI/L	3	Not Analyzed	Not Analyzed	Not Analyzed
TOTAL URANIUM	UG/L	30	Not Analyzed	Not Analyzed	Not Analyzed



Concentration Exceeds Criteria

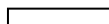
(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

U: The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

NOTE: The detection limits shown are MDL.

TABLE 14
GROUNDWATER ANALYTICAL RESULTS - VOLATILES
NIAGARA FALLS STORAGE SITE

Location Identifier :			411A	411A	411A	MW423	MW934
Field Sample Identifier :			411A	411A	411A-D	MW423	MW934
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			05/06/20	10/22/20	10/22/20	10/22/20	05/06/20
Parameter	Units	Criteria ¹			Field Duplicate		
VOLATILE ORGANIC ANALYSES							
1,1,2,2-TETRACHLOROETHANE	UG/L	5	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	UG/L	5	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U
1,1,2-TRICHLOROETHANE	UG/L	1	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U
1,1-DICHLOROETHANE	UG/L	5	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U
1,1-DICHLOROETHENE	UG/L	5	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U
1,2,3-TRICHLOROBENZENE	UG/L	5	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U
1,2,4-TRICHLOROBENZENE	UG/L	5	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U
1,2-DIBROMO-3-CHLOROPROPANE	UG/L	0.04	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U
1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	UG/L	0.006	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U
1,2-DICHLOROBENZENE	UG/L	3	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U
1,2-DICHLOROETHANE	UG/L	0.6	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U
1,2-DICHLOROPROPANE	UG/L	1	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U
1,3-DICHLOROBENZENE	UG/L	3	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U
1,4-DICHLOROBENZENE	UG/L	3	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U
2-HEXANONE	UG/L	50	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U
ACETONE	UG/L	50	4.1 J	1.6 U	3.9 J	3.1 J	3.2 J
BENZENE	UG/L	1	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U
BROMOCHLOROMETHANE	UG/L	5	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U
BROMODICHLOROMETHANE	UG/L	50	0.33 U	0.33 U	0.33 U	0.33 U	0.33 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: The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

J: The reported result was an estimated value with an unknown bias.

NOTE: The detection limits shown are MDL.

TABLE 14
GROUNDWATER ANALYTICAL RESULTS - VOLATILES
NIAGARA FALLS STORAGE SITE

Location Identifier :			411A	411A	411A	MW423	MW934
Field Sample Identifier :			411A	411A	411A-D	MW423	MW934
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			05/06/20	10/22/20	10/22/20	10/22/20	05/06/20
Parameter	Units	Criteria ¹			Field Duplicate		
VOLATILE ORGANIC ANALYSES							
BROMOFORM	UG/L	50	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U
BROMOMETHANE	UG/L	5	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U
CARBON DISULFIDE	UG/L	60	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U
CARBON TETRACHLORIDE	UG/L	5	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U
CHLOROBENZENE	UG/L	5	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U
CHLOROETHANE	UG/L	5	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U
CHLOROFORM	UG/L	7	0.33 U	0.33 U	0.33 U	0.33 U	1.6
CHLOROMETHANE	UG/L	5	0.33 U	0.33 U	0.33 U	0.47 J	0.33 U
CIS-1,2-DICHLOROETHYLENE	UG/L	5	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U
CIS-1,3-DICHLOROPROPENE	UG/L	0.4	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U
CYCLOHEXANE	UG/L	-	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U
DIBROMOCHLOROMETHANE	UG/L	50	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U
DICHLORODIFLUOROMETHANE	UG/L	5	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U
ETHYLBENZENE	UG/L	5	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U
ISOPROPYLBENZENE (CUMENE)	UG/L	5	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U
M+P-XYLENE	UG/L	5	0.66 U	0.66 U	0.66 U	0.66 U	0.66 U
METHYL ACETATE	UG/L	-	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U
METHYL ETHYL KETONE (2-BUTANONE)	UG/L	50	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U
METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	UG/L	-	1.6 U	1.6 U	1.6 U	1.6 U	1.6 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: The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

J: The reported result was an estimated value with an unknown bias.

NOTE: The detection limits shown are MDL.

TABLE 14
GROUNDWATER ANALYTICAL RESULTS - VOLATILES
NIAGARA FALLS STORAGE SITE

Location Identifier :			411A	411A	411A	MW423	MW934
Field Sample Identifier :			411A	411A	411A-D	MW423	MW934
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			05/06/20	10/22/20	10/22/20	10/22/20	05/06/20
Parameter	Units	Criteria ¹			Field Duplicate		
VOLATILE ORGANIC ANALYSES							
METHYLCYCLOHEXANE	UG/L	-	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U
METHYLENE CHLORIDE	UG/L	5	0.55 J	0.33 U	0.33 U	0.33 U	0.54 J
O-XYLENE (1,2-DIMETHYLBENZENE)	UG/L	5	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U
STYRENE	UG/L	5	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U
TERT-BUTYL METHYL ETHER	UG/L	10	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U
TETRACHLOROETHYLENE(PCE)	UG/L	5	0.33 U	0.64 J	0.58 J	0.33 U	1.3
TOLUENE	UG/L	5	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U
TRANS-1,2-DICHLOROETHENE	UG/L	5	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U
TRANS-1,3-DICHLOROPROPENE	UG/L	0.4	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U
TRICHLOROETHANE	UG/L	5	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U
TRICHLOROETHYLENE (TCE)	UG/L	5	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U
TRICHLOROFLUOROMETHANE	UG/L	5	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U
VINYL CHLORIDE	UG/L	2	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U
XYLENES, TOTAL	UG/L	-	1 U	1 U	1 U	1 U	1 U

Concentration Exceeds Criteria

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

U: The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

J: The reported result was an estimated value with an unknown bias.

NOTE: The detection limits shown are MDL.

TABLE 14
GROUNDWATER ANALYTICAL RESULTS - VOLATILES
NIAGARA FALLS STORAGE SITE

Location Identifier :			MW934	MW947	MW948	MW948	MW948
Field Sample Identifier :			MW934	MW947	MW948	MW948-D	MW948
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			10/22/20	05/05/20	05/05/20	05/05/20	10/22/20
Parameter	Units	Criteria ¹				Field Duplicate	
VOLATILE ORGANIC ANALYSES							
1,1,2,2-TETRACHLOROETHANE	UG/L	5	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	UG/L	5	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U
1,1,2-TRICHLOROETHANE	UG/L	1	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U
1,1-DICHLOROETHANE	UG/L	5	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U
1,1-DICHLOROETHENE	UG/L	5	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U
1,2,3-TRICHLOROBENZENE	UG/L	5	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U
1,2,4-TRICHLOROBENZENE	UG/L	5	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U
1,2-DIBROMO-3-CHLOROPROPANE	UG/L	0.04	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U
1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	UG/L	0.006	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U
1,2-DICHLOROBENZENE	UG/L	3	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U
1,2-DICHLOROETHANE	UG/L	0.6	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U
1,2-DICHLOROPROPANE	UG/L	1	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U
1,3-DICHLOROBENZENE	UG/L	3	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U
1,4-DICHLOROBENZENE	UG/L	3	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U
2-HEXANONE	UG/L	50	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U
ACETONE	UG/L	50	5 J	4 J	4.2 J	5.7	1.6 U
BENZENE	UG/L	1	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U
BROMOCHLOROMETHANE	UG/L	5	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U
BROMODICHLOROMETHANE	UG/L	50	0.33 U	0.33 U	0.33 U	0.33 U	0.33 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).

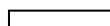
U: The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

J: The reported result was an estimated value with an unknown bias.

NOTE: The detection limits shown are MDL.

TABLE 14
GROUNDWATER ANALYTICAL RESULTS - VOLATILES
NIAGARA FALLS STORAGE SITE

Location Identifier :			MW934	MW947	MW948	MW948	MW948
Field Sample Identifier :			MW934	MW947	MW948	MW948-D	MW948
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			10/22/20	05/05/20	05/05/20	05/05/20	10/22/20
Parameter	Units	Criteria ¹				Field Duplicate	
VOLATILE ORGANIC ANALYSES							
BROMOFORM	UG/L	50	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U
BROMOMETHANE	UG/L	5	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U
CARBON DISULFIDE	UG/L	60	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U
CARBON TETRACHLORIDE	UG/L	5	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U
CHLOROBENZENE	UG/L	5	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U
CHLOROETHANE	UG/L	5	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U
CHLOROFORM	UG/L	7	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U
CHLOROMETHANE	UG/L	5	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U
CIS-1,2-DICHLOROETHYLENE	UG/L	5	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U
CIS-1,3-DICHLOROPROPENE	UG/L	0.4	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U
CYCLOHEXANE	UG/L	-	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U
DIBROMOCHLOROMETHANE	UG/L	50	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U
DICHLORODIFLUOROMETHANE	UG/L	5	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U
ETHYLBENZENE	UG/L	5	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U
ISOPROPYLBENZENE (CUMENE)	UG/L	5	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U
M+P-XYLENE	UG/L	5	0.66 U	0.66 U	0.66 U	0.66 U	0.66 U
METHYL ACETATE	UG/L	-	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U
METHYL ETHYL KETONE (2-BUTANONE)	UG/L	50	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U
METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	UG/L	-	1.6 U	1.6 U	1.6 U	1.6 U	1.6 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: The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

J: The reported result was an estimated value with an unknown bias.

NOTE: The detection limits shown are MDL.

TABLE 14
GROUNDWATER ANALYTICAL RESULTS - VOLATILES
NIAGARA FALLS STORAGE SITE

Location Identifier :			MW934	MW947	MW948	MW948	MW948
Field Sample Identifier :			MW934	MW947	MW948	MW948-D	MW948
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			10/22/20	05/05/20	05/05/20	05/05/20	10/22/20
Parameter	Units	Criteria ¹				Field Duplicate	
VOLATILE ORGANIC ANALYSES							
METHYLCYCLOHEXANE	UG/L	-	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U
METHYLENE CHLORIDE	UG/L	5	0.33 U	0.58 J	0.52 J	0.5 J	0.33 U
O-XYLENE (1,2-DIMETHYLBENZENE)	UG/L	5	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U
STYRENE	UG/L	5	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U
TERT-BUTYL METHYL ETHER	UG/L	10	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U
TETRACHLOROETHYLENE(PCE)	UG/L	5	0.64 J	0.33 U	0.33 U	0.33 U	0.33 U
TOLUENE	UG/L	5	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U
TRANS-1,2-DICHLOROETHENE	UG/L	5	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U
TRANS-1,3-DICHLOROPROPENE	UG/L	0.4	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U
TRICHLOROETHANE	UG/L	5	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U
TRICHLOROETHYLENE (TCE)	UG/L	5	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U
TRICHLOROFLUOROMETHANE	UG/L	5	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U
VINYL CHLORIDE	UG/L	2	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U
XYLENES, TOTAL	UG/L	-	1 U	1 U	1 U	1 U	1 U

Concentration Exceeds Criteria

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

U: The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

J: The reported result was an estimated value with an unknown bias.

NOTE: The detection limits shown are MDL.

TABLE 14
GROUNDWATER ANALYTICAL RESULTS - VOLATILES
NIAGARA FALLS STORAGE SITE

Location Identifier :			MW949	MW949	MW949
Field Sample Identifier :			MW949	MW949	MW949-D
Sample Type :			Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-
Date of Sample :			05/05/20	10/22/20	10/22/20
Parameter	Units	Criteria ¹			Field Duplicate
VOLATILE ORGANIC ANALYSES					
1,1,2,2-TETRACHLOROETHANE	UG/L	5	0.33 U	0.33 U	0.33 U
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	UG/L	5	0.33 U	0.33 U	0.33 U
1,1,2-TRICHLOROETHANE	UG/L	1	0.33 U	0.33 U	0.33 U
1,1-DICHLOROETHANE	UG/L	5	0.33 U	0.33 U	0.33 U
1,1-DICHLOROETHENE	UG/L	5	0.33 U	0.33 U	0.33 U
1,2,3-TRICHLOROBENZENE	UG/L	5	0.33 U	0.33 U	0.33 U
1,2,4-TRICHLOROBENZENE	UG/L	5	0.33 U	0.33 U	0.33 U
1,2-DIBROMO-3-CHLOROPROPANE	UG/L	0.04	1.6 U	1.6 U	1.6 U
1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	UG/L	0.006	0.33 U	0.33 U	0.33 U
1,2-DICHLOROBENZENE	UG/L	3	0.33 U	0.33 U	0.33 U
1,2-DICHLOROETHANE	UG/L	0.6	0.33 U	0.33 U	0.33 U
1,2-DICHLOROPROPANE	UG/L	1	0.33 U	0.33 U	0.33 U
1,3-DICHLOROBENZENE	UG/L	3	0.33 U	0.33 U	0.33 U
1,4-DICHLOROBENZENE	UG/L	3	0.33 U	0.33 U	0.33 U
2-HEXANONE	UG/L	50	1.6 U	1.6 U	1.6 U
ACETONE	UG/L	50	1.6 U	3.4 J	1.6 U
BENZENE	UG/L	1	0.33 U	0.33 U	0.33 U
BROMOCHLOROMETHANE	UG/L	5	0.33 U	0.33 U	0.33 U
BROMODICHLOROMETHANE	UG/L	50	0.33 U	0.33 U	0.33 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: The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

J: The reported result was an estimated value with an unknown bias.

NOTE: The detection limits shown are MDL.

TABLE 14
GROUNDWATER ANALYTICAL RESULTS - VOLATILES
NIAGARA FALLS STORAGE SITE

Location Identifier :			MW949	MW949	MW949
Field Sample Identifier :			MW949	MW949	MW949-D
Sample Type :			Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-
Date of Sample :			05/05/20	10/22/20	10/22/20
Parameter	Units	Criteria ¹			Field Duplicate
VOLATILE ORGANIC ANALYSES					
BROMOFORM	UG/L	50	0.33 U	0.33 U	0.33 U
BROMOMETHANE	UG/L	5	0.33 U	0.33 U	0.33 U
CARBON DISULFIDE	UG/L	60	0.33 U	0.33 U	0.33 U
CARBON TETRACHLORIDE	UG/L	5	0.33 U	0.33 U	0.33 U
CHLOROBENZENE	UG/L	5	0.33 U	0.33 U	0.33 U
CHLOROETHANE	UG/L	5	0.33 U	0.33 U	0.33 U
CHLOROFORM	UG/L	7	0.33 U	0.33 U	0.33 U
CHLOROMETHANE	UG/L	5	0.33 U	0.33 U	0.33 U
CIS-1,2-DICHLOROETHYLENE	UG/L	5	0.33 U	0.33 U	0.33 U
CIS-1,3-DICHLOROPROPENE	UG/L	0.4	0.33 U	0.33 U	0.33 U
CYCLOHEXANE	UG/L	-	0.33 U	0.33 U	0.33 U
DIBROMOCHLOROMETHANE	UG/L	50	0.33 U	0.33 U	0.33 U
DICHLORODIFLUOROMETHANE	UG/L	5	0.33 U	0.33 U	0.33 U
ETHYLBENZENE	UG/L	5	0.33 U	0.33 U	0.33 U
ISOPROPYLBENZENE (CUMENE)	UG/L	5	0.33 U	0.33 U	0.33 U
M+P-XYLENE	UG/L	5	0.66 U	0.66 U	0.66 U
METHYL ACETATE	UG/L	-	0.33 U	0.33 U	0.33 U
METHYL ETHYL KETONE (2-BUTANONE)	UG/L	50	1.6 U	1.6 U	1.6 U
METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	UG/L	-	1.6 U	1.6 U	1.6 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).

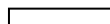
U: The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

J: The reported result was an estimated value with an unknown bias.

NOTE: The detection limits shown are MDL.

TABLE 14
GROUNDWATER ANALYTICAL RESULTS - VOLATILES
NIAGARA FALLS STORAGE SITE

Location Identifier :			MW949	MW949	MW949
Field Sample Identifier :			MW949	MW949	MW949-D
Sample Type :			Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-
Date of Sample :			05/05/20	10/22/20	10/22/20
Parameter	Units	Criteria ¹			Field Duplicate
VOLATILE ORGANIC ANALYSES					
METHYLCYCLOHEXANE	UG/L	-	0.33 U	0.33 U	0.33 U
METHYLENE CHLORIDE	UG/L	5	0.52 J	0.33 U	0.33 U
O-XYLENE (1,2-DIMETHYLBENZENE)	UG/L	5	0.33 U	0.33 U	0.33 U
STYRENE	UG/L	5	0.33 U	0.33 U	0.33 U
TERT-BUTYL METHYL ETHER	UG/L	10	0.33 U	0.33 U	0.33 U
TETRACHLOROETHYLENE(PCE)	UG/L	5	0.33 U	0.33 U	0.33 U
TOLUENE	UG/L	5	0.33 U	0.33 U	0.33 U
TRANS-1,2-DICHLOROETHENE	UG/L	5	0.33 U	0.33 U	0.33 U
TRANS-1,3-DICHLOROPROPENE	UG/L	0.4	0.33 U	0.33 U	0.33 U
TRICHLOROETHANE	UG/L	5	0.33 U	0.33 U	0.33 U
TRICHLOROETHYLENE (TCE)	UG/L	5	0.33 U	0.33 U	0.33 U
TRICHLOROFLUOROMETHANE	UG/L	5	0.33 U	0.33 U	0.33 U
VINYL CHLORIDE	UG/L	2	0.33 U	0.33 U	0.33 U
XYLENES, TOTAL	UG/L	-	1 U	1 U	1 U



Concentration Exceeds Criteria

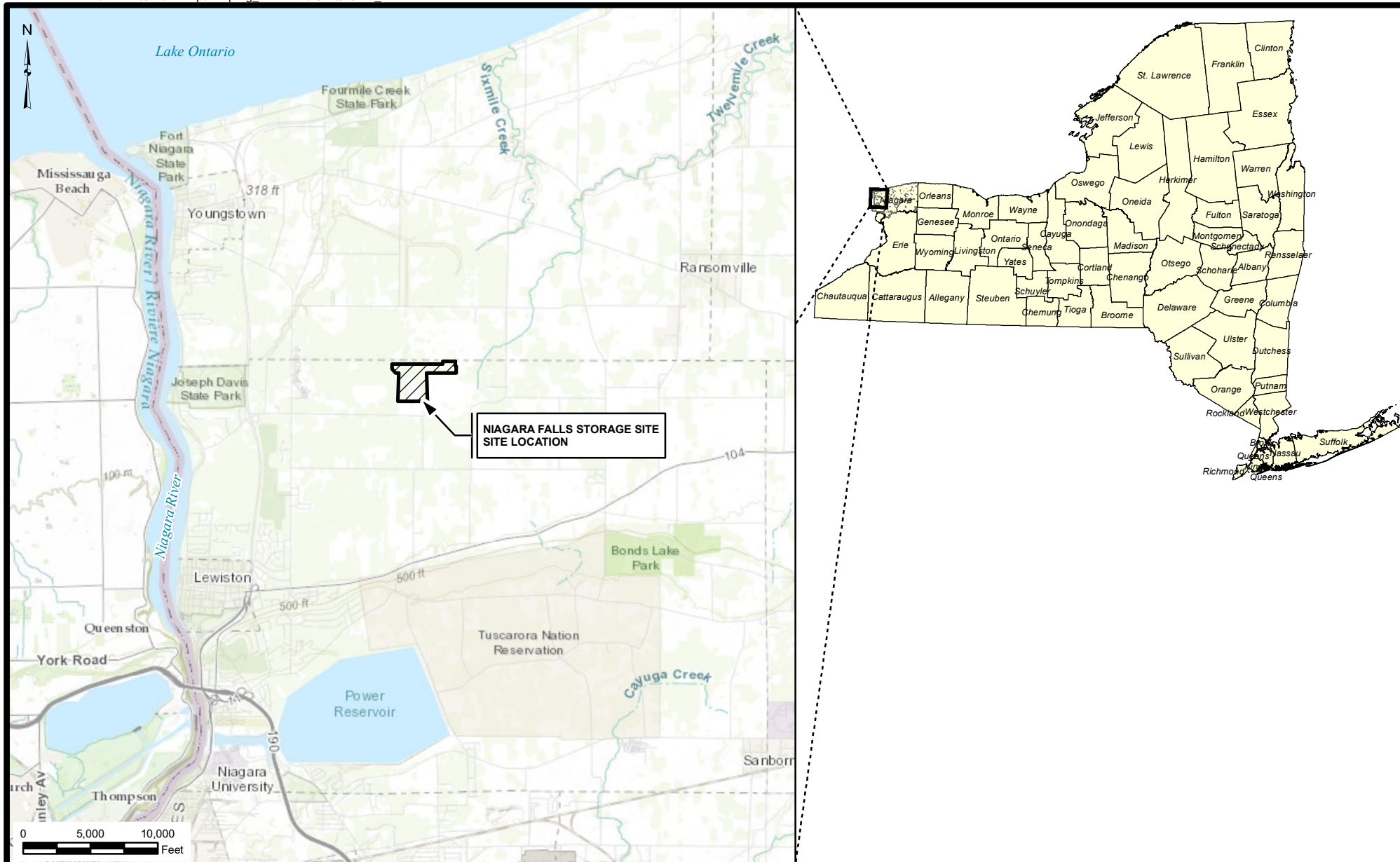
(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

U: The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

J: The reported result was an estimated value with an unknown bias.

NOTE: The detection limits shown are MDL.

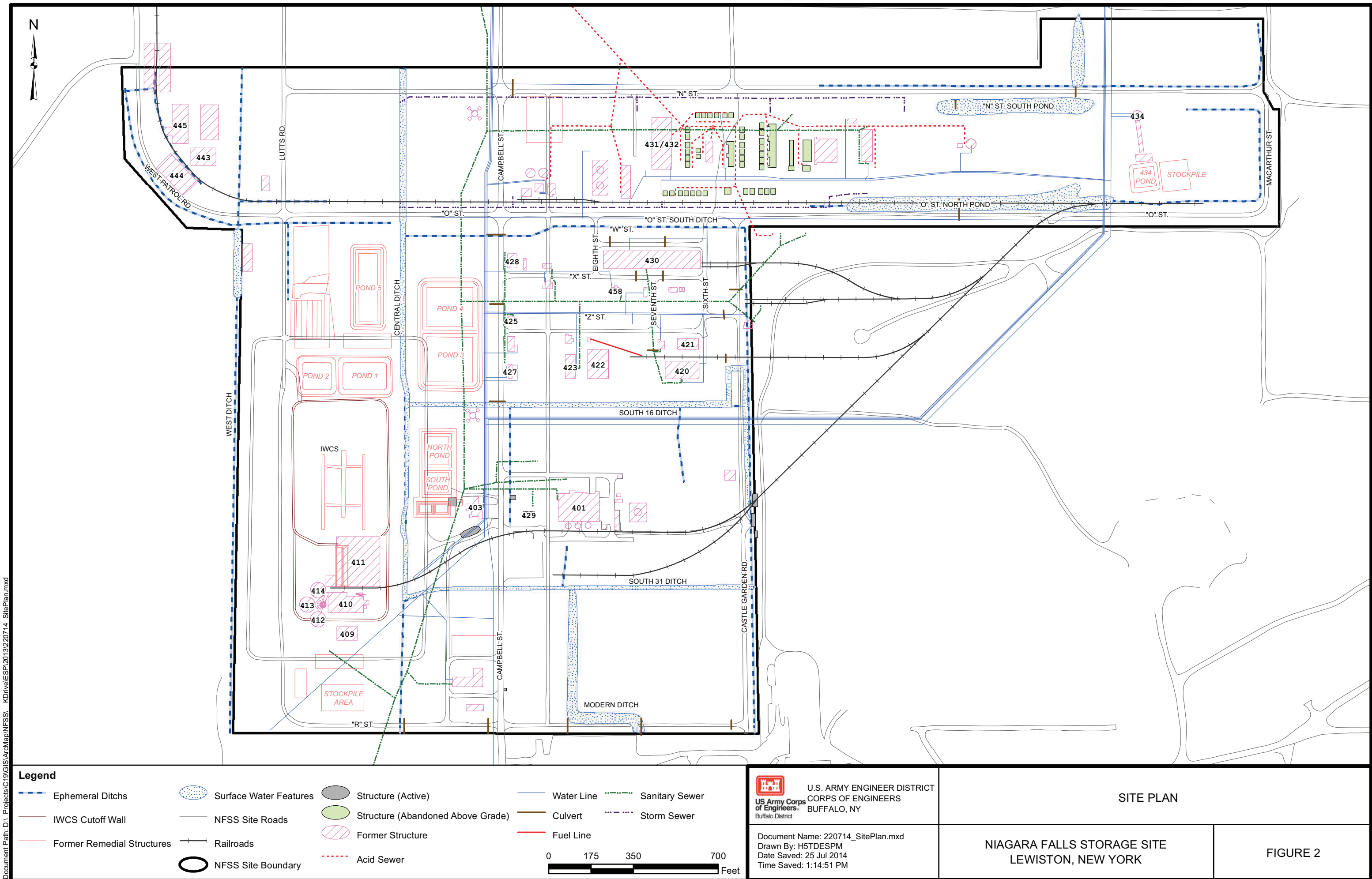
FIGURES

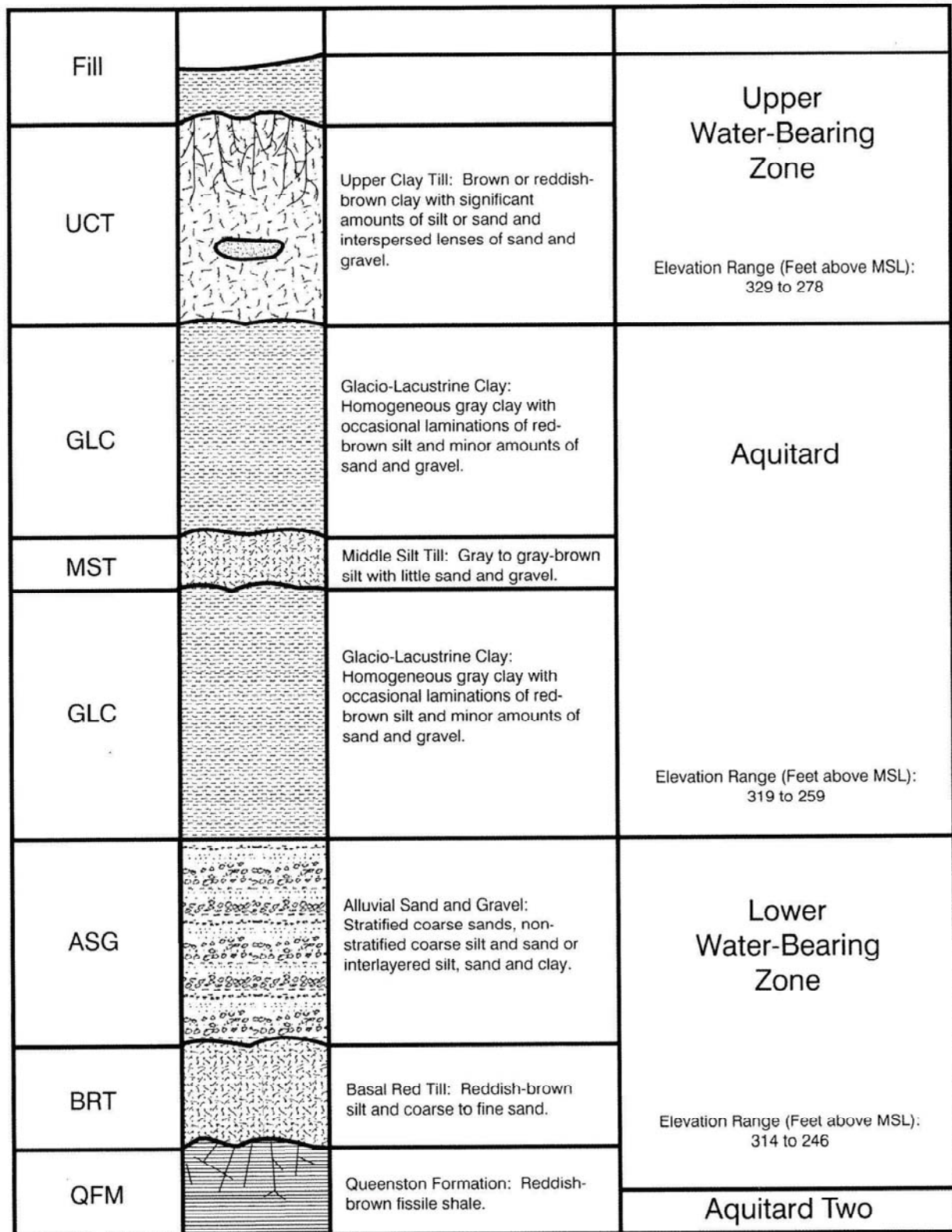


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SITE LOCATION MAP

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MSL - mean sea level



US Army Corps
of Engineers
Buffalo District

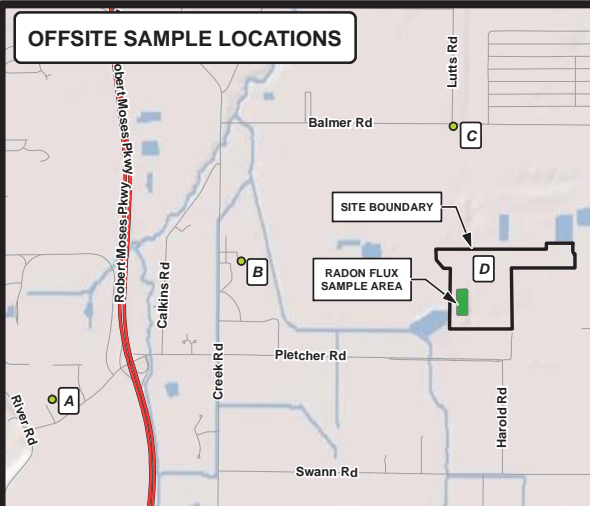
U.S. ARMY ENGINEER DISTRICT
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BUFFALO, NY

SCHEMATIC OF CONCEPTUALIZED HYDROSTRATIGRAPHY

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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.



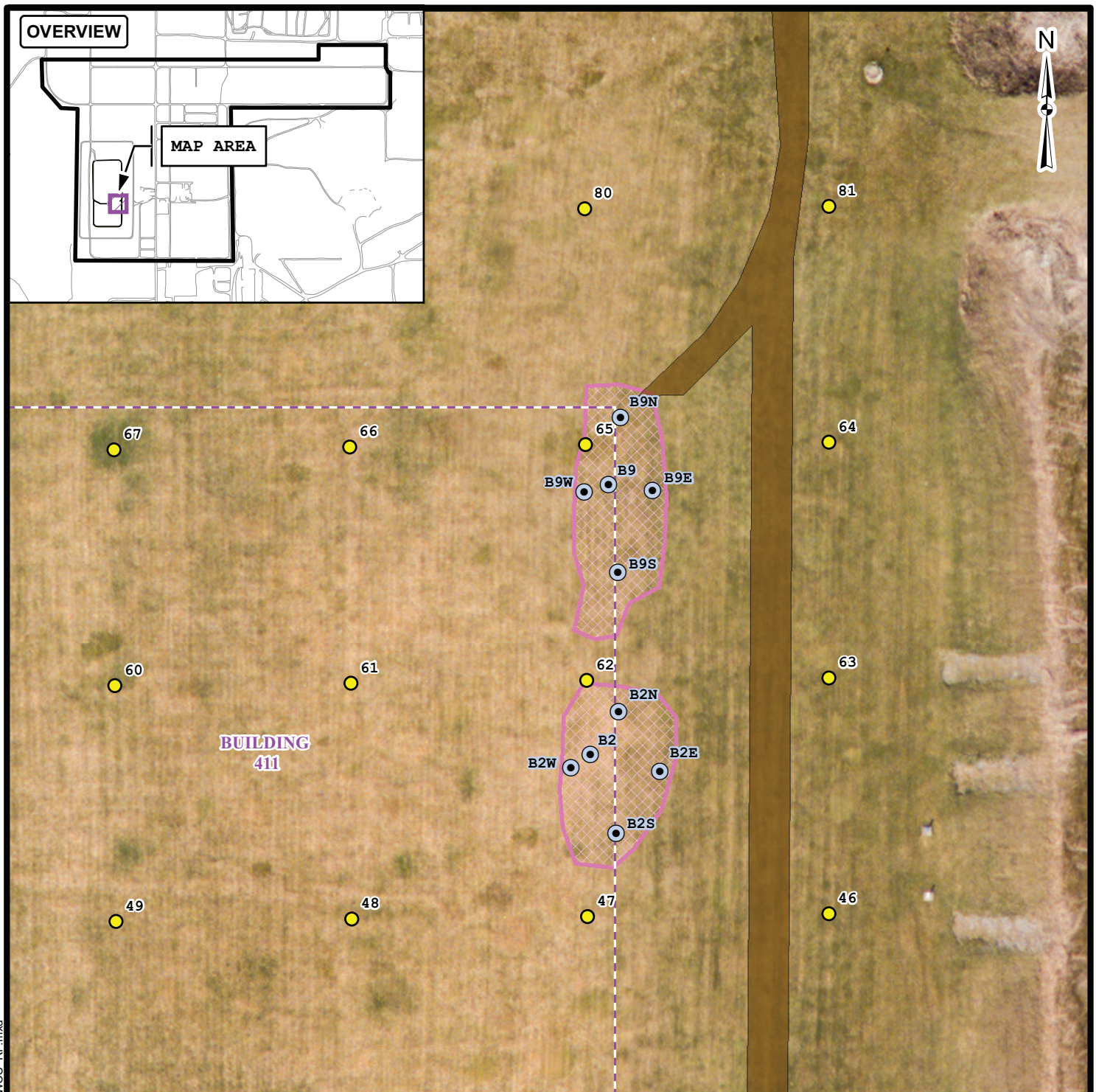
U.S. ARMY ENGINEER DISTRICT
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BUFFALO, NY

LOCATIONS OF RADON FLUX MEASUREMENTS ON THE IWCS

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Date Saved: 23 Jul 2014
Time Saved: 9:52:36 AM

NIAGARA FALLS STORAGE SITE
LEWISTON, NEW YORK

FIGURE 4



Legend

-  Monthly Radon Flux Sample Location
-  Annual Radon Flux Sample Location
-  IWCS Clay Dike
-  Area of Additional Topsoil Placement (2020)
-  Former Building

0 15 30 60
Feet



U.S. ARMY ENGINEER DISTRICT
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Buffalo District

LOCATION OF ANNUAL AND MONTHLY RADON FLUX SAMPLES (2020)

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NIAGARA FALLS STORAGE SITE
LEWISTON, NEW YORK

FIGURE 4A

Document Path: K:\NFSSP\GIS\AerialMap\Sampling Locations\2015\200415 ESPSampleWells Aerial.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.



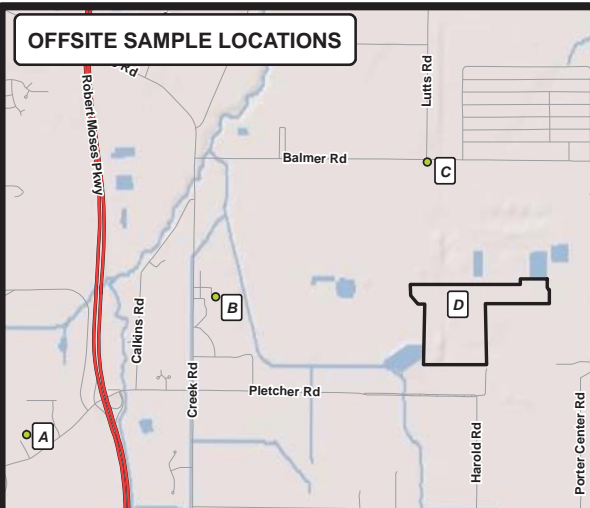
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MONITORING WELL LOCATION MAP

NIAGARA FALLS STORAGE SITE
LEWISTON, NEW YORK

FIGURE 5



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.



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

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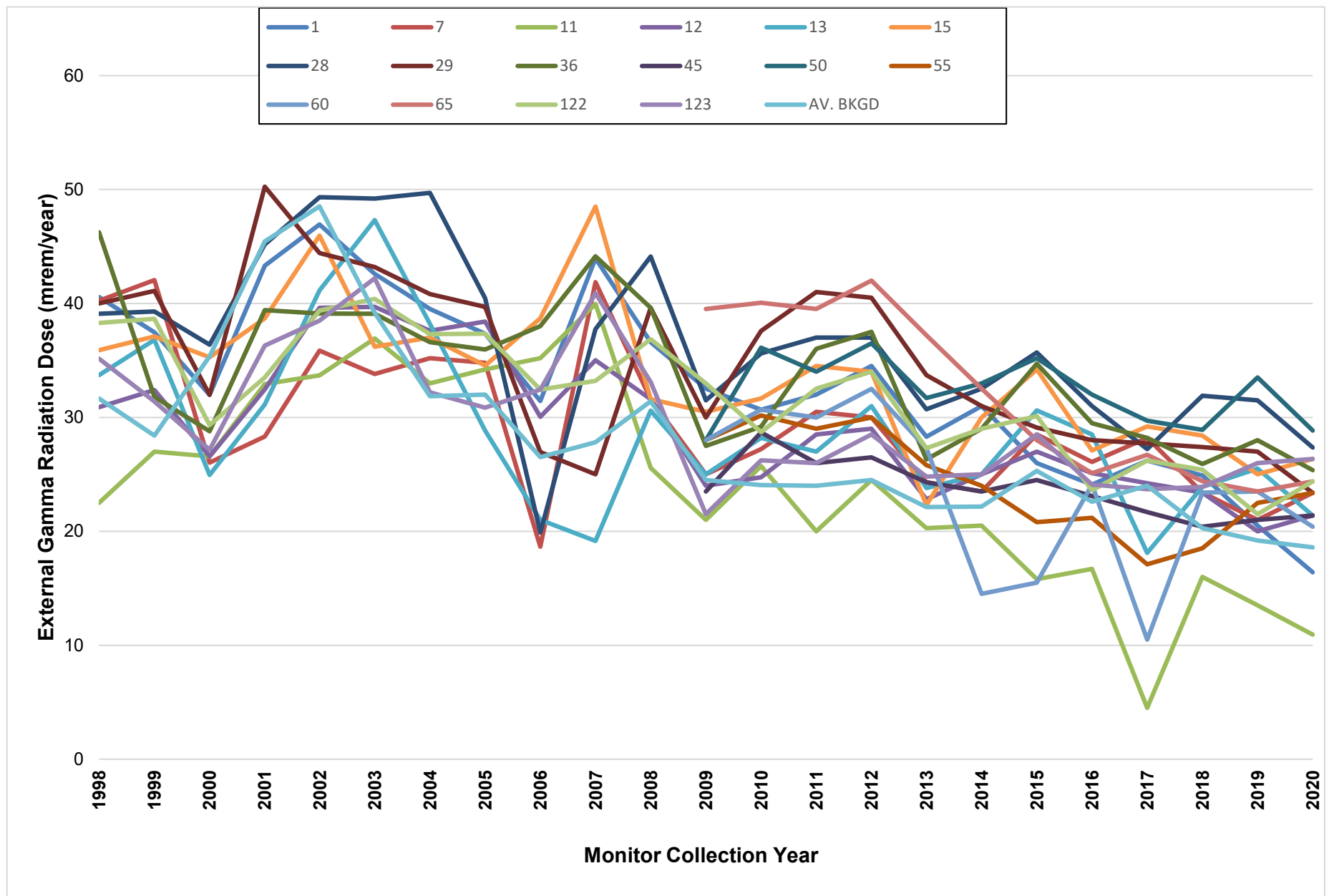
NIAGARA FALLS STORAGE SITE
 LEWISTON, NEW YORK

FIGURE 6

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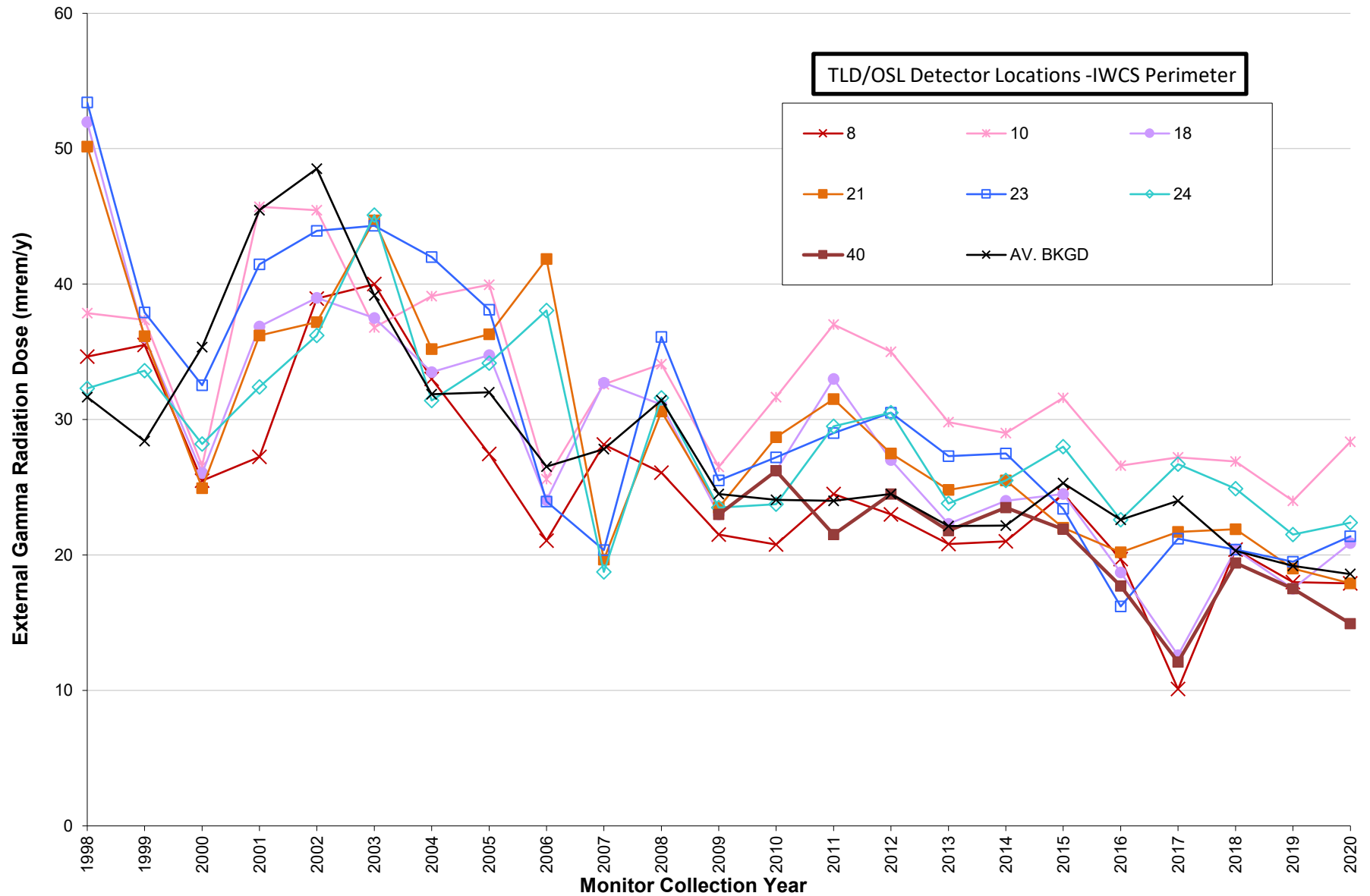


FIGURE 8
EXTERNAL GAMMA RADIATION DOSE RATES AT NFSS PERIMETER

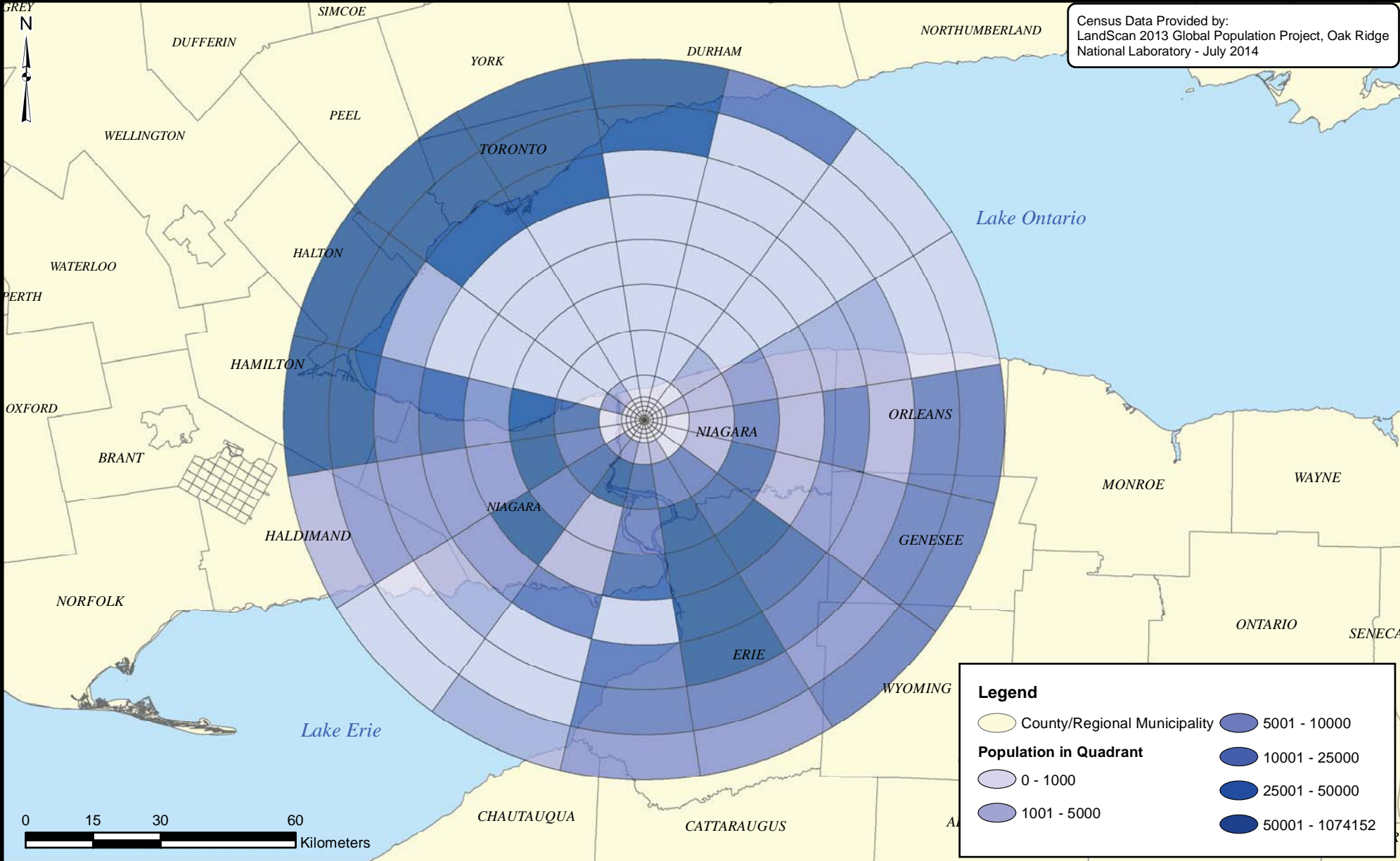


*USDOE limit for external gamma radiation is 100 mrem/year above background but the value for each detector location includes background. Select 2016 and 2017 OSL results may be biased low as a result of laboratory detection sensitivity.

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.



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CENSUS DATA

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Time Saved: 1:48:47 PM

NIAGARA FALLS STORAGE SITE
LEWISTON, NEW YORK

FIGURE 10

FIGURE 11
RADIUM-226 CONCENTRATIONS IN SEDIMENT
1997 - 2020

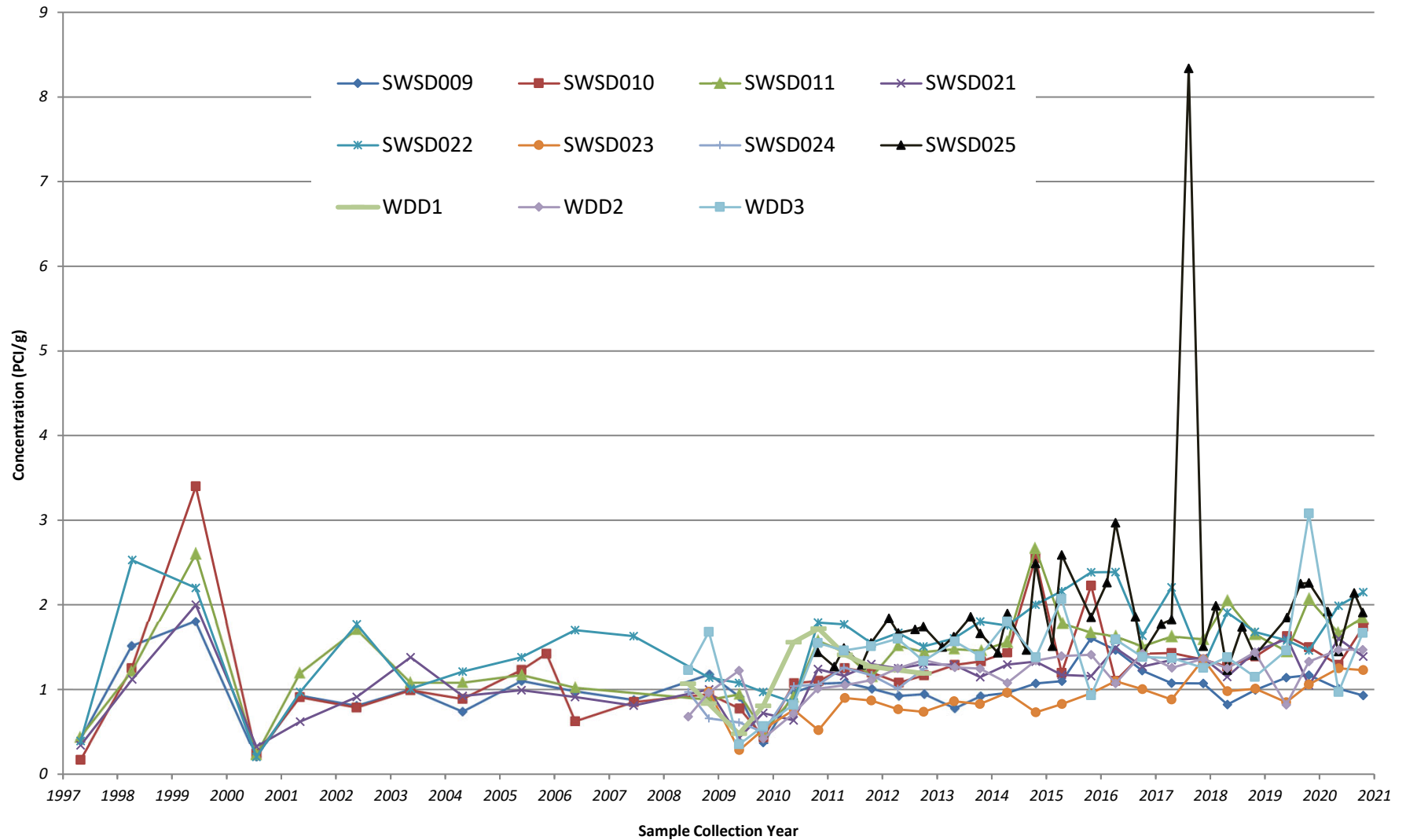
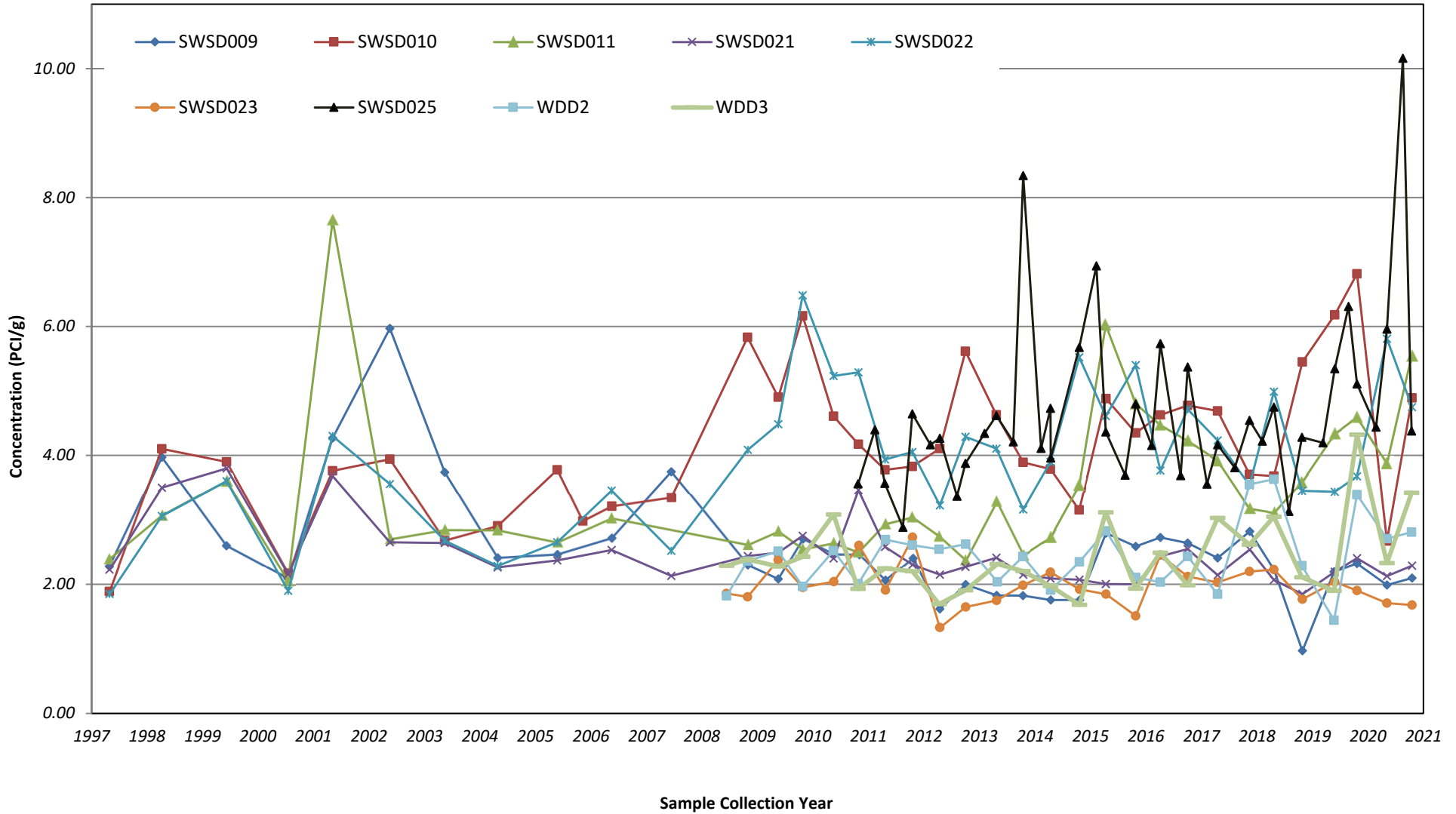


FIGURE 12
TOTAL URANIUM CONCENTRATIONS IN SEDIMENT
1997 - 2020

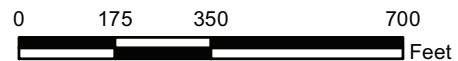



Document Path: D:\Projects\GIS\ArdMap\NFSS\2021\ESP\210721_LWBZ_High.mxd



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

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



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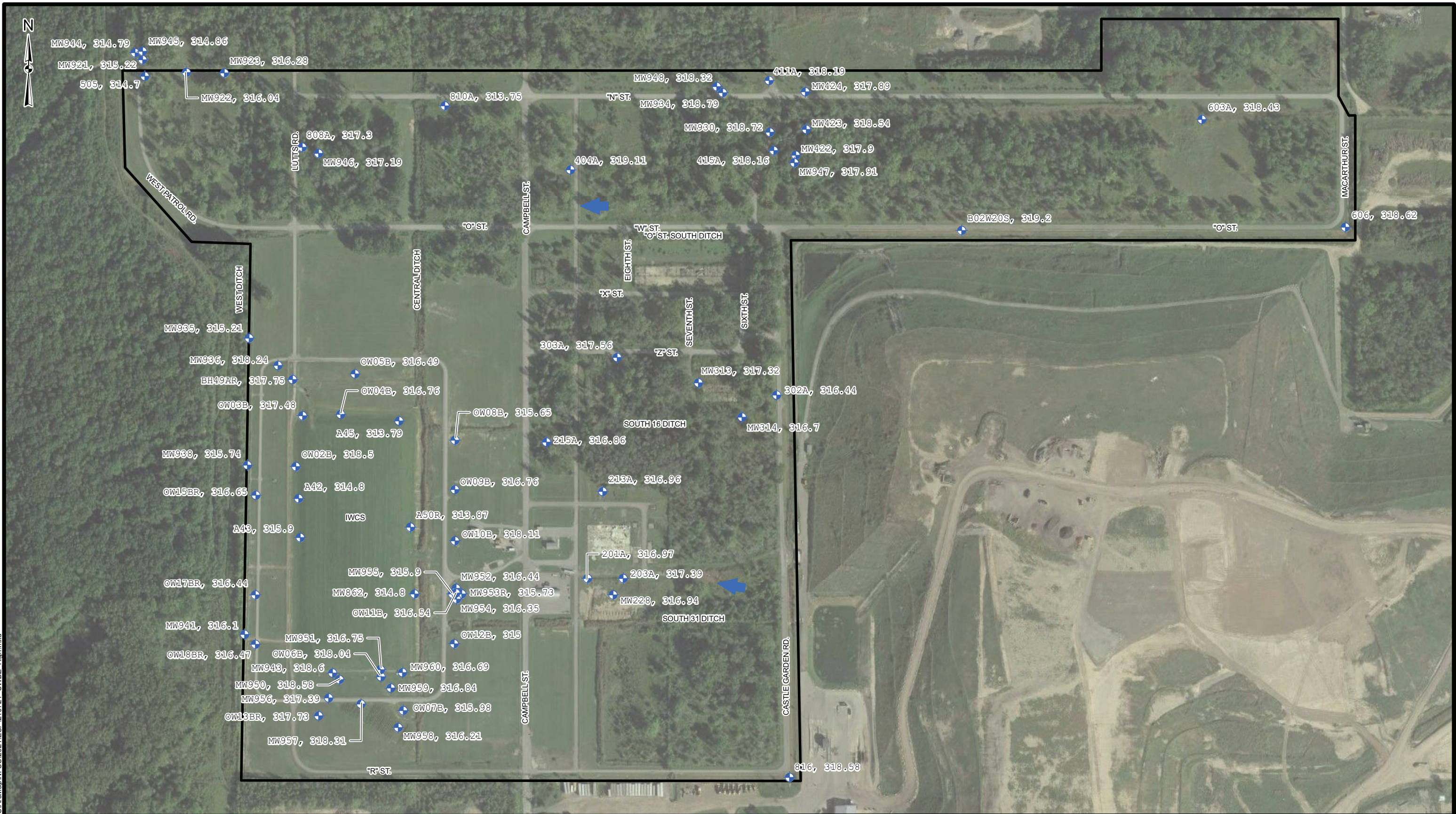
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GROUNDWATER ELEVATION MEASUREMENTS FOR
THE LOWER WATER BEARING ZONE
(MAY 4, 2020 - SEASONAL HIGH)

NIAGARA FALLS STORAGE SITE
LEWISTON, NEW YORK

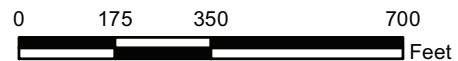
FIGURE 13


Document Path: D:\Projects\GIS\ArdMap\NFSS\2021\ESP\210721_UWBZ_High.mxd



- Legend**
- Monitoring Well (Upper Water Bearing Zone)
 - Groundwater Flow Direction
 - NFSS Site Boundary

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



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GROUNDWATER ELEVATION MEASUREMENTS FOR
THE UPPER WATER BEARING ZONE
(MAY 4, 2020 - SEASONAL HIGH)

NIAGARA FALLS STORAGE SITE
LEWISTON, NEW YORK

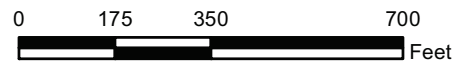
FIGURE 14




Document Path: D:\Projects\GIS\ArdMap\NFS\2021\ESP\210721_LWBZ_Low.mxd

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

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



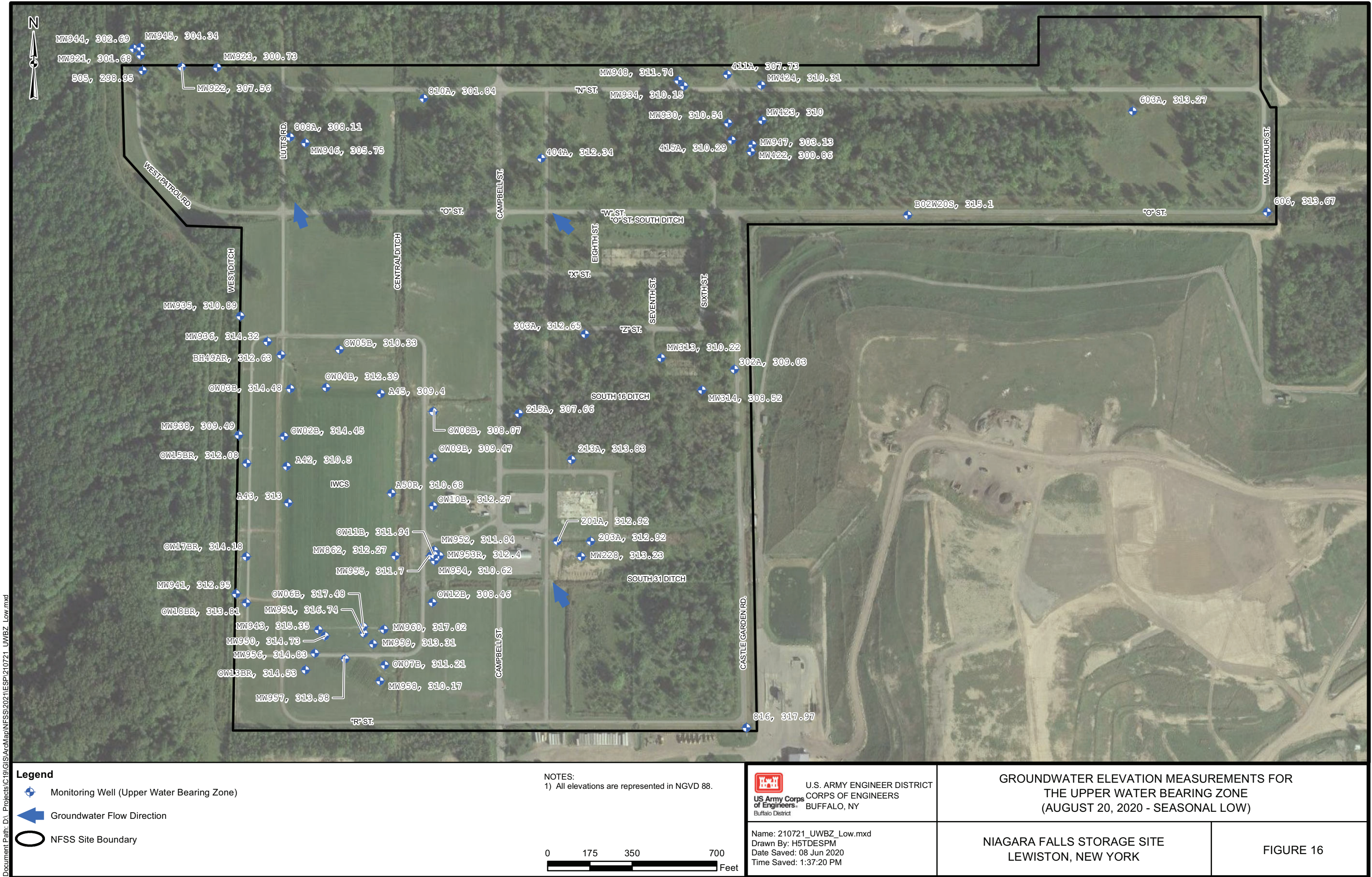
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Date Saved: 21 Jul 2021
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GROUNDWATER ELEVATION MEASUREMENTS FOR
THE LOWER WATER BEARING ZONE
(FEBRUARY 26, 2020 - SEASONAL LOW)

NIAGARA FALLS STORAGE SITE
LEWISTON, NEW YORK

FIGURE 15



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	SWSD010	SWSD010
Field Sample Identifier		SWSD009	SWSD009-D	SWSD009	SWSD010	SWSD010
Sample Matrix		Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
Depth Interval (ft)		-	-	-	-	-
Date of Sample		05/04/20	05/04/20	10/14/20	05/06/20	10/15/20
Parameter	Units		Field Duplicate			
SEMI-VOLATILE ORGANIC ANALYSES						
ACENAPHTHENE	UG/L	0.24 U	0.24 U	0.24 U	0.23 U	0.24 U
ACENAPHTHYLENE	UG/L	0.24 U	0.24 U	0.24 U	0.23 U	0.24 U
ANTHRACENE	UG/L	0.24 U	0.24 U	0.24 U	0.23 U	0.24 U
BENZO(A)ANTHRACENE	UG/L	0.24 U	0.24 U	0.24 U	0.23 U	0.24 U
BENZO(A)PYRENE	UG/L	0.24 U	0.24 U	0.24 U	0.23 U	0.24 U
BENZO(B)FLUORANTHENE	UG/L	0.24 U	0.24 U	0.24 U	0.23 U	0.24 U
BENZO(G,H,I)PERYLENE	UG/L	0.24 U	0.24 U	0.24 U	0.23 U	0.24 U
BENZO(K)FLUORANTHENE	UG/L	0.24 U	0.24 U	0.24 U	0.23 U	0.24 U
CHRYSENE	UG/L	0.24 U	0.24 U	0.24 U	0.23 U	0.24 U
DIBENZ(A,H)ANTHRACENE	UG/L	0.24 U	0.24 U	0.24 U	0.23 U	0.24 U
FLUORANTHENE	UG/L	0.4 J	0.32 J	0.24 U	0.23 U	0.24 U
FLUORENE	UG/L	0.24 U	0.24 U	0.24 U	0.23 U	0.24 U
INDENO(1,2,3-C,D)PYRENE	UG/L	0.24 U	0.24 U	0.24 U	0.23 U	0.24 U
NAPHTHALENE	UG/L	0.24 U	0.24 U	0.24 U	0.23 U	0.24 U
PHENANTHRENE	UG/L	0.24 U	0.24 U	0.24 U	0.23 U	0.24 U
PYRENE	UG/L	0.24 U	0.24 U	0.24 U	0.23 U	0.24 U

The qualifiers shown were assigned during chemistry validation.

U: The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

J: The reported result was an estimated value with an unknown bias.

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

Location Identifier		SWSD011	SWSD011	SWSD021	SWSD022	SWSD022
Field Sample Identifier		SWSD011	SWSD011	SWSD021	SWSD022	SWSD022
Sample Matrix		Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
Depth Interval (ft)		-	-	-	-	-
Date of Sample		05/06/20	10/15/20	05/06/20	05/06/20	10/15/20
Parameter	Units					
SEMI-VOLATILE ORGANIC ANALYSES						
ACENAPHTHENE	UG/L	0.25 U	0.23 U	0.24 U	0.23 U	0.23 U
ACENAPHTHYLENE	UG/L	0.25 U	0.23 U	0.24 U	0.23 U	0.23 U
ANTHRACENE	UG/L	0.25 U	0.23 U	0.24 U	0.23 U	0.23 U
BENZO(A)ANTHRACENE	UG/L	0.25 U	0.23 U	0.24 U	0.23 U	0.23 U
BENZO(A)PYRENE	UG/L	0.25 U	0.23 U	0.24 U	0.23 U	0.23 U
BENZO(B)FLUORANTHENE	UG/L	0.25 U	0.23 U	0.24 U	0.23 U	0.23 U
BENZO(G,H,I)PERYLENE	UG/L	0.25 U	0.23 U	0.24 U	0.23 U	0.23 U
BENZO(K)FLUORANTHENE	UG/L	0.25 U	0.23 U	0.24 U	0.23 U	0.23 U
CHRYSENE	UG/L	0.25 U	0.23 U	0.24 U	0.23 U	0.23 U
DIBENZ(A,H)ANTHRACENE	UG/L	0.25 U	0.23 U	0.24 U	0.23 U	0.23 U
FLUORANTHENE	UG/L	0.25 U	0.23 U	0.24 U	0.23 U	0.23 U
FLUORENE	UG/L	0.25 U	0.23 U	0.24 U	0.23 U	0.23 U
INDENO(1,2,3-C,D)PYRENE	UG/L	0.25 U	0.23 U	0.24 U	0.23 U	0.23 U
NAPHTHALENE	UG/L	0.25 U	0.23 U	0.24 U	0.23 U	0.23 U
PHENANTHRENE	UG/L	0.25 U	0.23 U	0.24 U	0.23 U	0.23 U
PYRENE	UG/L	0.25 U	0.23 U	0.24 U	0.23 U	0.23 U

The qualifiers shown were assigned during chemistry validation.

U: The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

J: The reported result was an estimated value with an unknown bias.

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

Location Identifier		SWSD023	SWSD023	SWSD025	SWSD025	SWSD025
Field Sample Identifier		SWSD023	SWSD023	SWSD025	SWSD025	SWSD025
Sample Matrix		Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
Depth Interval (ft)		-	-	-	-	-
Date of Sample		05/06/20	10/14/20	02/26/20	05/06/20	09/17/20
Parameter	Units					
SEMI-VOLATILE ORGANIC ANALYSES						
ACENAPHTHENE	UG/L	0.23 U	0.24 U	0.23 U	0.24 U	0.0093 U
ACENAPHTHYLENE	UG/L	0.23 U	0.24 U	0.23 U	0.24 U	0.0093 U
ANTHRACENE	UG/L	0.23 U	0.24 U	0.23 U	0.24 U	0.0093 U
BENZO(A)ANTHRACENE	UG/L	0.23 U	0.24 U	0.23 U	0.24 U	0.0093 U
BENZO(A)PYRENE	UG/L	0.23 U	0.24 U	0.23 U	0.24 U	0.0093 U
BENZO(B)FLUORANTHENE	UG/L	0.23 U	0.24 U	0.23 U	0.24 U	0.0093 U
BENZO(G,H,I)PERYLENE	UG/L	0.23 U	0.24 U	0.23 U	0.24 U	0.0093 U
BENZO(K)FLUORANTHENE	UG/L	0.23 U	0.24 U	0.23 U	0.24 U	0.0093 U
CHRYSENE	UG/L	0.23 U	0.24 U	0.23 U	0.24 U	0.0093 U
DIBENZ(A,H)ANTHRACENE	UG/L	0.23 U	0.24 U	0.23 U	0.24 U	0.0093 U
FLUORANTHENE	UG/L	0.23 U	0.24 U	0.23 U	0.24 U	0.0098 J
FLUORENE	UG/L	0.23 U	0.24 U	0.23 U	0.24 U	0.0093 U
INDENO(1,2,3-C,D)PYRENE	UG/L	0.23 U	0.24 U	0.23 U	0.24 U	0.0093 U
NAPHTHALENE	UG/L	0.23 U	0.24 U	0.23 U	0.24 U	0.045 U
PHENANTHRENE	UG/L	0.23 U	0.24 U	0.23 U	0.24 U	0.01 J
PYRENE	UG/L	0.23 U	0.24 U	0.23 U	0.24 U	0.01 J

The qualifiers shown were assigned during chemistry validation.

U: The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

J: The reported result was an estimated value with an unknown bias.

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

Location Identifier		SWSD025	WDD2	WDD2	WDD3	WDD3
Field Sample Identifier		SWSD025	WDD2	WDD2	WDD3	WDD3
Sample Matrix		Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
Depth Interval (ft)		-	-	-	-	-
Date of Sample		10/15/20	05/04/20	10/14/20	05/04/20	10/14/20
Parameter	Units					
SEMI-VOLATILE ORGANIC ANALYSES						
ACENAPHTHENE	UG/L	0.23 U	0.25 U	0.23 U	0.24 U	0.23 U
ACENAPHTHYLENE	UG/L	0.23 U	0.25 U	0.23 U	0.24 U	0.23 U
ANTHRACENE	UG/L	0.23 U	0.25 U	0.23 U	0.24 U	0.23 U
BENZO(A)ANTHRACENE	UG/L	0.23 U	0.25 U	0.23 U	0.24 U	0.23 U
BENZO(A)PYRENE	UG/L	0.23 U	0.25 U	0.23 U	0.24 U	0.23 U
BENZO(B)FLUORANTHENE	UG/L	0.23 U	0.25 U	0.23 U	0.24 U	0.23 U
BENZO(G,H,I)PERYLENE	UG/L	0.23 U	0.25 U	0.23 U	0.24 U	0.23 U
BENZO(K)FLUORANTHENE	UG/L	0.23 U	0.25 U	0.23 U	0.24 U	0.23 U
CHRYSENE	UG/L	0.23 U	0.25 U	0.23 U	0.24 U	0.23 U
DIBENZ(A,H)ANTHRACENE	UG/L	0.23 U	0.25 U	0.23 U	0.24 U	0.23 U
FLUORANTHENE	UG/L	0.23 U	0.25 U	0.23 U	0.24 U	0.23 U
FLUORENE	UG/L	0.23 U	0.25 U	0.23 U	0.24 U	0.23 U
INDENO(1,2,3-C,D)PYRENE	UG/L	0.23 U	0.25 U	0.23 U	0.24 U	0.23 U
NAPHTHALENE	UG/L	0.23 U	0.25 U	0.23 U	0.24 U	0.23 U
PHENANTHRENE	UG/L	0.23 U	0.25 U	0.23 U	0.24 U	0.23 U
PYRENE	UG/L	0.23 U	0.25 U	0.23 U	0.24 U	0.23 U

The qualifiers shown were assigned during chemistry validation.

U: The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

J: The reported result was an estimated value with an unknown bias.

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

Location Identifier		WDD3
Field Sample Identifier		WDD3-D
Sample Matrix		Surface Water
Depth Interval (ft)		-
Date of Sample		10/14/20
Parameter	Units	Field Duplicate
SEMI-VOLATILE ORGANIC ANALYSES		
ACENAPHTHENE	UG/L	0.23 U
ACENAPHTHYLENE	UG/L	0.23 U
ANTHRACENE	UG/L	0.23 U
BENZO(A)ANTHRACENE	UG/L	0.23 U
BENZO(A)PYRENE	UG/L	0.23 U
BENZO(B)FLUORANTHENE	UG/L	0.23 U
BENZO(G,H,I)PERYLENE	UG/L	0.23 U
BENZO(K)FLUORANTHENE	UG/L	0.23 U
CHRYSENE	UG/L	0.23 U
DIBENZ(A,H)ANTHRACENE	UG/L	0.23 U
FLUORANTHENE	UG/L	0.23 U
FLUORENE	UG/L	0.23 U
INDENO(1,2,3-C,D)PYRENE	UG/L	0.23 U
NAPHTHALENE	UG/L	0.23 U
PHENANTHRENE	UG/L	0.23 U
PYRENE	UG/L	0.23 U

The qualifiers shown were assigned during chemistry validation.

U: The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

J: The reported result was an estimated value with an unknown bias.

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

Location Identifier		SWSD009	SWSD009	SWSD009	SWSD010	SWSD010
Field Sample Identifier		SWSD009	SWSD009-D	SWSD009	SWSD010	SWSD010
Sample Matrix		Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
Depth Interval (ft)		-	-	-	-	-
Date of Sample		05/04/20	05/04/20	10/14/20	05/06/20	10/15/20
Parameter	Units		Field Duplicate			
METALS						
ALUMINUM	UG/L	1,300 J	700 J	260	300	210
ANTIMONY	UG/L	6.9	7.5	1.7 J	1.3 J	0.74 U
ARSENIC	UG/L	2.8 J	2.8 J	4.4	1.1 J	1.5 J
BARIUM	UG/L	67	68	140	52	100
BERYLLIUM	UG/L	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
BORON	UG/L	630	630	2,300	490	1,500
CADMIUM	UG/L	0.37 U	0.37 U	0.37 U	0.37 U	0.37 U
CALCIUM	UG/L	92,600	97,500	88,200	98,300	119,000
CHROMIUM, TOTAL	UG/L	2.9	2.7	1.6 J	12	2 J
COBALT	UG/L	1.9 UJ	1.9 U	1.9 U	1.9 U	1.9 U
COPPER	UG/L	17	16	7.1	5 J	4.9 J
IRON	UG/L	1,400	1,400	1,200	420	730
LEAD	UG/L	7.5	7.6	5.9	0.95 J	1.5 J
LITHIUM	UG/L	60 J	49 J	36 U	36 U	36 U
MAGNESIUM	UG/L	47,600	41,900	41,200	44,700	37,700
MANGANESE	UG/L	130	130	180	82	330
MERCURY	UG/L	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U
MOLYBDENUM	UG/L	10	9.9	8.6	3.7	6.2
NICKEL	UG/L	7.8	7	10	3.3 J	6
POTASSIUM	UG/L	18,000	16,800	27,800	7,400	15,900
SELENIUM	UG/L	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U

The qualifiers shown were assigned during chemistry validation.

U: The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

UJ: The analyte was not detected and was reported as less than the LOD or as defined by the customer. However, the associated numerical value is approximate.

J: The reported result was an estimated value with an unknown bias.

J-: The result was an estimated quantity, but the result may be biased low.

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

Location Identifier		SWSD009	SWSD009	SWSD009	SWSD010	SWSD010
Field Sample Identifier		SWSD009	SWSD009-D	SWSD009	SWSD010	SWSD010
Sample Matrix		Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
Depth Interval (ft)		-	-	-	-	-
Date of Sample		05/04/20	05/04/20	10/14/20	05/06/20	10/15/20
Parameter	Units		Field Duplicate			
METALS						
SILVER	UG/L	0.74 U	0.74 U	0.74 U	0.74 UJ	0.74 U
SODIUM	UG/L	193,000 J-	202,000	190,000	85,100	138,000
THALLIUM	UG/L	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
VANADIUM	UG/L	3.7	3	1.9 J	1.5 J	1.1 J
ZINC	UG/L	44	42	22	14	11
METALS (FILTERED)						
ALUMINUM	UG/L	610	Not Analyzed	30 U	Not Analyzed	Not Analyzed
ANTIMONY	UG/L	7.8	Not Analyzed	2 J	Not Analyzed	Not Analyzed
ARSENIC	UG/L	2.7 J	Not Analyzed	2.9 J	Not Analyzed	Not Analyzed
BARIUM	UG/L	71	Not Analyzed	140	Not Analyzed	Not Analyzed
BERYLLIUM	UG/L	0.37 U	Not Analyzed	0.37 U	Not Analyzed	Not Analyzed
BORON	UG/L	640	Not Analyzed	2,300	Not Analyzed	Not Analyzed
CADMIUM	UG/L	0.37 U	Not Analyzed	0.37 U	Not Analyzed	Not Analyzed
CALCIUM	UG/L	101,000	Not Analyzed	78,000	Not Analyzed	Not Analyzed
CHROMIUM, TOTAL	UG/L	2 J	Not Analyzed	0.74 U	Not Analyzed	Not Analyzed
COBALT	UG/L	1.9 U	Not Analyzed	1.9 U	Not Analyzed	Not Analyzed
COPPER	UG/L	14	Not Analyzed	2.4 J	Not Analyzed	Not Analyzed
IRON	UG/L	1,000	Not Analyzed	83	Not Analyzed	Not Analyzed
LEAD	UG/L	5.9	Not Analyzed	0.84 J	Not Analyzed	Not Analyzed
LITHIUM	UG/L	56 J	Not Analyzed	33 J	Not Analyzed	Not Analyzed
MAGNESIUM	UG/L	41,100	Not Analyzed	39,700	Not Analyzed	Not Analyzed

The qualifiers shown were assigned during chemistry validation.

U: The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

UJ: The analyte was not detected and was reported as less than the LOD or as defined by the customer. However, the associated numerical value is approximate.

J: The reported result was an estimated value with an unknown bias.

J-: The result was an estimated quantity, but the result may be biased low.

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

Location Identifier		SWSD009	SWSD009	SWSD009	SWSD010	SWSD010
Field Sample Identifier		SWSD009	SWSD009-D	SWSD009	SWSD010	SWSD010
Sample Matrix		Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
Depth Interval (ft)		-	-	-	-	-
Date of Sample		05/04/20	05/04/20	10/14/20	05/06/20	10/15/20
Parameter	Units		Field Duplicate			
METALS (FILTERED)						
MANGANESE	UG/L	120	Not Analyzed	150	Not Analyzed	Not Analyzed
MERCURY	UG/L	0.03 U	Not Analyzed	0.03 U	Not Analyzed	Not Analyzed
MOLYBDENUM	UG/L	12	Not Analyzed	7.7	Not Analyzed	Not Analyzed
NICKEL	UG/L	7.3	Not Analyzed	8.6	Not Analyzed	Not Analyzed
POTASSIUM	UG/L	16,200	Not Analyzed	26,900	Not Analyzed	Not Analyzed
SELENIUM	UG/L	1.9 U	Not Analyzed	1.9 U	Not Analyzed	Not Analyzed
SILVER	UG/L	0.74 U	Not Analyzed	0.74 U	Not Analyzed	Not Analyzed
SODIUM	UG/L	208,000	Not Analyzed	186,000	Not Analyzed	Not Analyzed
THALLIUM	UG/L	0.37 U	Not Analyzed	0.37 U	Not Analyzed	Not Analyzed
VANADIUM	UG/L	2.5	Not Analyzed	0.74 U	Not Analyzed	Not Analyzed
ZINC	UG/L	34	Not Analyzed	6.5	Not Analyzed	Not Analyzed

The qualifiers shown were assigned during chemistry validation.

U: The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

UU: The analyte was not detected and was reported as less than the LOD or as defined by the customer. However, the associated numerical value is approximate.

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J-: The result was an estimated quantity, but the result may be biased low.

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

Location Identifier		SWSD011	SWSD011	SWSD021	SWSD022	SWSD022
Field Sample Identifier		SWSD011	SWSD011	SWSD021	SWSD022	SWSD022
Sample Matrix		Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
Depth Interval (ft)		-	-	-	-	-
Date of Sample		05/06/20	10/15/20	05/06/20	05/06/20	10/15/20
Parameter	Units					
METALS						
ALUMINUM	UG/L	140	260	1,000	230	160
ANTIMONY	UG/L	0.74 U	1 J	0.74 U	0.81 J	0.95 J
ARSENIC	UG/L	1 U	1 U	1.5 J	1.2 J	1 U
BARIUM	UG/L	50	85	59	51	86
BERYLLIUM	UG/L	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
BORON	UG/L	300	1,400	69 J	390	1,600
CADMIUM	UG/L	0.37 U	0.37 U	0.37 U	0.37 U	0.37 U
CALCIUM	UG/L	103,000	144,000	98,100	108,000	135,000
CHROMIUM, TOTAL	UG/L	3.8	1.5 J	150	4.2	1.5 J
COBALT	UG/L	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U
COPPER	UG/L	3 J	3.4 J	3.6 J	3.7 J	3.4 J
IRON	UG/L	420	440	1,200	510	330
LEAD	UG/L	0.74 U	0.74 U	0.74 U	0.74 U	0.74 U
LITHIUM	UG/L	36 U	36 U	36 U	36 U	36 U
MAGNESIUM	UG/L	43,500	40,500	45,800	40,700	38,200
MANGANESE	UG/L	100	330	110	110	150
MERCURY	UG/L	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U
MOLYBDENUM	UG/L	1.8 J	8.5	3.1	2.2 J	9.8
NICKEL	UG/L	2 J	4.7 J	2.1 J	2.8 J	4.9 J
POTASSIUM	UG/L	4,200	10,200	3,200	4,800	10,900
SELENIUM	UG/L	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U

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UJ: The analyte was not detected and was reported as less than the LOD or as defined by the customer. However, the associated numerical value is approximate.

J: The reported result was an estimated value with an unknown bias.

J-: The result was an estimated quantity, but the result may be biased low.

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

Location Identifier		SWSD011	SWSD011	SWSD021	SWSD022	SWSD022
Field Sample Identifier		SWSD011	SWSD011	SWSD021	SWSD022	SWSD022
Sample Matrix		Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
Depth Interval (ft)		-	-	-	-	-
Date of Sample		05/06/20	10/15/20	05/06/20	05/06/20	10/15/20
Parameter	Units					
METALS						
SILVER	UG/L	0.74 UJ	0.74 U	0.74 UJ	0.74 UJ	0.74 U
SODIUM	UG/L	39,200	126,000	39,900	48,900	129,000
THALLIUM	UG/L	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
VANADIUM	UG/L	0.74 U	0.95 J	0.74 J	1.2 J	0.78 J
ZINC	UG/L	7.1	11	5.8	8.5	11
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

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

Location Identifier		SWSD011	SWSD011	SWSD021	SWSD022	SWSD022
Field Sample Identifier		SWSD011	SWSD011	SWSD021	SWSD022	SWSD022
Sample Matrix		Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
Depth Interval (ft)		-	-	-	-	-
Date of Sample		05/06/20	10/15/20	05/06/20	05/06/20	10/15/20
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

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

Location Identifier		SWSD023	SWSD023	SWSD025	SWSD025	SWSD025
Field Sample Identifier		SWSD023	SWSD023	SWSD025	SWSD025	SWSD025
Sample Matrix		Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
Depth Interval (ft)		-	-	-	-	-
Date of Sample		05/06/20	10/14/20	02/26/20	05/06/20	08/20/20
Parameter	Units					
METALS						
ALUMINUM	UG/L	110	59 J	590	370	49 J
ANTIMONY	UG/L	0.84 J	0.74 U	1.2 J	0.94 J	11
ARSENIC	UG/L	1 U	1.3 J	1.3 J	1 U	1.3 J-
BARIUM	UG/L	56	57	55	50	110
BERYLLIUM	UG/L	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
BORON	UG/L	180	190	420	410	1,100
CADMIUM	UG/L	0.37 U	0.37 U	0.37 U	0.37 U	0.37 U
CALCIUM	UG/L	111,000	127,000	110,000	103,000	159,000
CHROMIUM, TOTAL	UG/L	0.74 U	0.74 U	6.5	3.8	0.74 U
COBALT	UG/L	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U
COPPER	UG/L	6.8	5.1 J	5.1 J	3.9 J	7.7
IRON	UG/L	460	900	1,100	630	130
LEAD	UG/L	0.74 U	1.3 J	1.1 J	0.74 U	0.74 U
LITHIUM	UG/L	36 U	36 U	36 U	36 U	36 U
MAGNESIUM	UG/L	49,700	33,600	32,900	42,400	42,600
MANGANESE	UG/L	130	550	63	120	100
MERCURY	UG/L	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U
MOLYBDENUM	UG/L	3.2	5.2	4.1	2.5	11
NICKEL	UG/L	2.5 J	2.7 J	2.4 J	2.9 J	3.7 J
POTASSIUM	UG/L	4,100	7,300	4,100	5,800	8,100
SELENIUM	UG/L	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U

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

Location Identifier		SWSD023	SWSD023	SWSD025	SWSD025	SWSD025
Field Sample Identifier		SWSD023	SWSD023	SWSD025	SWSD025	SWSD025
Sample Matrix		Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
Depth Interval (ft)		-	-	-	-	-
Date of Sample		05/06/20	10/14/20	02/26/20	05/06/20	08/20/20
Parameter	Units					
METALS						
SILVER	UG/L	0.74 UJ	8	0.74 U	0.74 UJ	0.74 U
SODIUM	UG/L	99,800	84,100	43,000	58,800	105,000
THALLIUM	UG/L	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
VANADIUM	UG/L	0.74 U	0.74 U	1.6 J	0.8 J	1 J
ZINC	UG/L	16	13	13	8.6	14
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

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

Location Identifier		SWSD023	SWSD023	SWSD025	SWSD025	SWSD025
Field Sample Identifier		SWSD023	SWSD023	SWSD025	SWSD025	SWSD025
Sample Matrix		Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
Depth Interval (ft)		-	-	-	-	-
Date of Sample		05/06/20	10/14/20	02/26/20	05/06/20	08/20/20
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

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

Location Identifier		SWSD025	WDD2	WDD2	WDD3	WDD3
Field Sample Identifier		SWSD025	WDD2	WDD2	WDD3	WDD3
Sample Matrix		Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
Depth Interval (ft)		-	-	-	-	-
Date of Sample		10/15/20	05/04/20	10/14/20	05/04/20	10/14/20
Parameter	Units					
METALS						
ALUMINUM	UG/L	110	370	40 J	420	230
ANTIMONY	UG/L	0.98 J	0.74 U	0.74 U	1 J	0.74 U
ARSENIC	UG/L	1.2 J	1.5 J	1.4 J	2.1 J	1.7 J
BARIUM	UG/L	88	36	47	37	40
BERYLLIUM	UG/L	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
BORON	UG/L	1,500	150	56 J	150	66 J
CADMIUM	UG/L	0.37 U	0.37 U	0.37 U	0.37 U	0.37 U
CALCIUM	UG/L	135,000	91,900	67,600	89,500	68,200
CHROMIUM, TOTAL	UG/L	1.2 J	0.96 J	0.74 U	0.98 J	1.2 J
COBALT	UG/L	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U
COPPER	UG/L	3.2 J	2.9 J	1.9 U	2.7 J	1.9 U
IRON	UG/L	410	760	380	860	450
LEAD	UG/L	0.74 U	0.74 U	0.74 U	0.74 U	0.74 U
LITHIUM	UG/L	36 U	36 U	36 U	36 U	36 U
MAGNESIUM	UG/L	38,800	39,800	17,800	38,800	20,500
MANGANESE	UG/L	290	180	350	140	260
MERCURY	UG/L	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U
MOLYBDENUM	UG/L	11	2 J	5.2	1.6 J	7.6
NICKEL	UG/L	4.8 J	2.8 J	1.9 U	2.8 J	1.9 U
POTASSIUM	UG/L	10,800	5,700	6,500	5,600	7,700
SELENIUM	UG/L	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U

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

Location Identifier		SWSD025	WDD2	WDD2	WDD3	WDD3
Field Sample Identifier		SWSD025	WDD2	WDD2	WDD3	WDD3
Sample Matrix		Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
Depth Interval (ft)		-	-	-	-	-
Date of Sample		10/15/20	05/04/20	10/14/20	05/04/20	10/14/20
Parameter	Units					
METALS						
SILVER	UG/L	0.74 U	0.74 UJ	0.74 U	0.74 UJ	0.74 U
SODIUM	UG/L	132,000	54,900	20,200	52,900	20,700
THALLIUM	UG/L	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
VANADIUM	UG/L	0.74 U	0.94 J	0.74 U	1 J	0.74 U
ZINC	UG/L	8.1	7	4.9 J	6.7	6.3
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

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

Location Identifier		SWSD025	WDD2	WDD2	WDD3	WDD3
Field Sample Identifier		SWSD025	WDD2	WDD2	WDD3	WDD3
Sample Matrix		Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
Depth Interval (ft)		-	-	-	-	-
Date of Sample		10/15/20	05/04/20	10/14/20	05/04/20	10/14/20
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

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

Location Identifier		WDD3
Field Sample Identifier		WDD3-D
Sample Matrix		Surface Water
Depth Interval (ft)		-
Date of Sample		10/14/20
Parameter	Units	Field Duplicate
METALS		
ALUMINUM	UG/L	150
ANTIMONY	UG/L	0.74 U
ARSENIC	UG/L	1.4 J
BARIUM	UG/L	42
BERYLLIUM	UG/L	0.3 U
BORON	UG/L	66 J
CADMIUM	UG/L	0.37 U
CALCIUM	UG/L	71,300
CHROMIUM, TOTAL	UG/L	0.74 U
COBALT	UG/L	1.9 U
COPPER	UG/L	1.9 U
IRON	UG/L	260
LEAD	UG/L	0.74 U
LITHIUM	UG/L	36 U
MAGNESIUM	UG/L	20,100
MANGANESE	UG/L	280
MERCURY	UG/L	0.16 U
MOLYBDENUM	UG/L	7.5
NICKEL	UG/L	1.9 U
POTASSIUM	UG/L	7,600
SELENIUM	UG/L	1.9 U

The qualifiers shown were assigned during chemistry validation.

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UJ: The analyte was not detected and was reported as less than the LOD or as defined by the customer. However, the associated numerical value is approximate.

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

Location Identifier		WDD3
Field Sample Identifier		WDD3-D
Sample Matrix		Surface Water
Depth Interval (ft)		-
Date of Sample		10/14/20
Parameter	Units	Field Duplicate
METALS		
SILVER	UG/L	0.74 U
SODIUM	UG/L	19,600
THALLIUM	UG/L	0.3 U
VANADIUM	UG/L	0.74 U
ZINC	UG/L	5.7
METALS (FILTERED)		
ALUMINUM	UG/L	Not Analyzed
ANTIMONY	UG/L	Not Analyzed
ARSENIC	UG/L	Not Analyzed
BARIUM	UG/L	Not Analyzed
BERYLLIUM	UG/L	Not Analyzed
BORON	UG/L	Not Analyzed
CADMIUM	UG/L	Not Analyzed
CALCIUM	UG/L	Not Analyzed
CHROMIUM, TOTAL	UG/L	Not Analyzed
COBALT	UG/L	Not Analyzed
COPPER	UG/L	Not Analyzed
IRON	UG/L	Not Analyzed
LEAD	UG/L	Not Analyzed
LITHIUM	UG/L	Not Analyzed
MAGNESIUM	UG/L	Not Analyzed

The qualifiers shown were assigned during chemistry validation.

U: The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

UJ: The analyte was not detected and was reported as less than the LOD or as defined by the customer. However, the associated numerical value is approximate.

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

Location Identifier		WDD3
Field Sample Identifier		WDD3-D
Sample Matrix		Surface Water
Depth Interval (ft)		-
Date of Sample		10/14/20
Parameter	Units	Field Duplicate
METALS (FILTERED)		
MANGANESE	UG/L	Not Analyzed
MERCURY	UG/L	Not Analyzed
MOLYBDENUM	UG/L	Not Analyzed
NICKEL	UG/L	Not Analyzed
POTASSIUM	UG/L	Not Analyzed
SELENIUM	UG/L	Not Analyzed
SILVER	UG/L	Not Analyzed
SODIUM	UG/L	Not Analyzed
THALLIUM	UG/L	Not Analyzed
VANADIUM	UG/L	Not Analyzed
ZINC	UG/L	Not Analyzed

The qualifiers shown were assigned during chemistry validation.

U: The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

UU: The analyte was not detected and was reported as less than the LOD or as defined by the customer. However, the associated numerical value is approximate.

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J-: The result was an estimated quantity, but the result may be biased low.

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

Location Identifier		SWSD009	SWSD009	SWSD009	SWSD010	SWSD010
Field Sample Identifier		SWSD009	SWSD009-D	SWSD009	SWSD010	SWSD010
Sample Matrix		Sediment	Sediment	Sediment	Sediment	Sediment
Depth Interval (ft)		-	-	-	-	-
Date of Sample		05/07/20	05/07/20	10/19/20	05/07/20	10/19/20
Parameter	Units		Field Duplicate			
METALS						
ALUMINUM	MG/KG	9,030	8,340	16,800	42,700	37,400
ANTIMONY	MG/KG	4.5	3.7	7.7 U	7.7	10.6 U
ARSENIC	MG/KG	6.4	6.1	7.7 U	18.4	11.9 J
BARIUM	MG/KG	94.6	89.5	121	314	192
BERYLLIUM	MG/KG	0.65 J	0.62 J	3.8 U	2.7 J	5.3 U
BORON	MG/KG	47.6	40.9	38.4 U	79.5	52.7 U
CADMIUM	MG/KG	1.1	1.1	1.9 U	1.2 J	2.6 U
CALCIUM	MG/KG	50,700	46,100	55,700	114,000	53,200
CHROMIUM, TOTAL	MG/KG	49.2	58	62	218	127
COBALT	MG/KG	10	9.4	9.3 J	39.3	18.2
COPPER	MG/KG	75.4	68.1	90.5	165	137
IRON	MG/KG	21,100	20,100	23,600	90,300	46,300
LEAD	MG/KG	52.1	46.7	55.2	96.8	80.2
LITHIUM	MG/KG	21.6	19.6	38.4 U	96.8	62.9 J
MAGNESIUM	MG/KG	11,900	11,100	14,200	33,300	20,900
MANGANESE	MG/KG	586	639	584	1,970	889
MERCURY	MG/KG	0.46	0.13 U	0.2 J	0.24 U	0.22 J
MOLYBDENUM	MG/KG	2.5 J	2.5 J	7.7 U	3.6 J	10.8 J
NICKEL	MG/KG	25.6	24.7	27.7	94.7	52.6
POTASSIUM	MG/KG	1,300	1,180	4,750	6,330	11,700
SELENIUM	MG/KG	3 U	3 U	19.1 U	5.9 U	26.3 U

The qualifiers shown were assigned during chemistry validation.

U: The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

J: The reported result was an estimated value with an unknown bias.

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

Location Identifier		SWSD009	SWSD009	SWSD009	SWSD010	SWSD010
Field Sample Identifier		SWSD009	SWSD009-D	SWSD009	SWSD010	SWSD010
Sample Matrix		Sediment	Sediment	Sediment	Sediment	Sediment
Depth Interval (ft)		-	-	-	-	-
Date of Sample		05/07/20	05/07/20	10/19/20	05/07/20	10/19/20
Parameter	Units		Field Duplicate			
METALS						
SILVER	MG/KG	0.45 J	0.8 J	1.9 U	1.4 J	2.6 U
SODIUM	MG/KG	462	432	542 J	702	731 J
THALLIUM	MG/KG	1.8 U	1.8 U	11.5 U	3.6 U	15.8 U
VANADIUM	MG/KG	23.8	22.8	41.3	93	79
ZINC	MG/KG	322	319	368	529	510

The qualifiers shown were assigned during chemistry validation.

U: The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

J: The reported result was an estimated value with an unknown bias.

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

Location Identifier		SWSD011	SWSD011	SWSD021	SWSD021	SWSD022
Field Sample Identifier		SWSD011	SWSD011	SWSD021	SWSD021	SWSD022
Sample Matrix		Sediment	Sediment	Sediment	Sediment	Sediment
Depth Interval (ft)		-	-	-	-	-
Date of Sample		05/07/20	10/16/20	05/07/20	10/19/20	05/07/20
Parameter	Units					
METALS						
ALUMINUM	MG/KG	16,100	39,800	11,900	23,800	17,700
ANTIMONY	MG/KG	6.4 J	15 U	8.7	4.5 U	8.3
ARSENIC	MG/KG	10.1	15 U	7.7	6 J	10.5
BARIUM	MG/KG	192	275	118	124	209
BERYLLIUM	MG/KG	1.3 U	7.5 U	0.84 J	2.2 U	1.3 J
BORON	MG/KG	45.3	74.7 U	47.8	22.3 U	46.6
CADMIUM	MG/KG	0.8 J	3.7 U	1.9	1.1 U	1 J
CALCIUM	MG/KG	45,500	44,100	70,100	37,700	42,600
CHROMIUM, TOTAL	MG/KG	79.5	98	70	59.3	76.4
COBALT	MG/KG	16.3	18.4 J	12.4	12.9	17.3
COPPER	MG/KG	71.4	97.1	100	39.2	85.2
IRON	MG/KG	39,300	51,200	26,500	31,900	35,800
LEAD	MG/KG	44.1	35.7 J	73.6	9.4 J	49.8
LITHIUM	MG/KG	37.5 J	74.7 U	27.6	38.7 J	40.7
MAGNESIUM	MG/KG	13,300	18,400	15,400	12,600	14,700
MANGANESE	MG/KG	2,200	2,230	838	596	902
MERCURY	MG/KG	0.28 U	0.27 U	0.13 U	0.092 U	0.25 U
MOLYBDENUM	MG/KG	2.7 U	15 U	3.1 J	4.5 U	6.7 J
NICKEL	MG/KG	38.8	48.9	32.3	33.4	45.9
POTASSIUM	MG/KG	2,840	13,100	1,790	6,620	3,110
SELENIUM	MG/KG	6.6 U	37.2 U	3.9 U	11.1 U	6 U

The qualifiers shown were assigned during chemistry validation.

U: The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

J: The reported result was an estimated value with an unknown bias.

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

Location Identifier		SWSD011	SWSD011	SWSD021	SWSD021	SWSD022
Field Sample Identifier		SWSD011	SWSD011	SWSD021	SWSD021	SWSD022
Sample Matrix		Sediment	Sediment	Sediment	Sediment	Sediment
Depth Interval (ft)		-	-	-	-	-
Date of Sample		05/07/20	10/16/20	05/07/20	10/19/20	05/07/20
Parameter	Units					
METALS						
SILVER	MG/KG	0.66 U	3.7 U	0.49 J	1.1 U	0.6 U
SODIUM	MG/KG	332	759 J	594	225 J	353
THALLIUM	MG/KG	4 U	22.4 U	2.3 U	6.7 U	3.6 U
VANADIUM	MG/KG	38.9	85	32.1	47.8	48.2
ZINC	MG/KG	403	459	483	83.9	360

The qualifiers shown were assigned during chemistry validation.

U: The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

J: The reported result was an estimated value with an unknown bias.

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

Location Identifier		SWSD022	SWSD023	SWSD023	SWSD023	SWSD025
Field Sample Identifier		SWSD022	SWSD023	SWSD023	SWSD023-D	SWSD025
Sample Matrix		Sediment	Sediment	Sediment	Sediment	Sediment
Depth Interval (ft)		-	-	-	-	-
Date of Sample		10/19/20	05/07/20	10/19/20	10/19/20	02/26/20
Parameter	Units				Field Duplicate	
METALS						
ALUMINUM	MG/KG	41,300	7,200	23,200 J	16,000 J	13,000
ANTIMONY	MG/KG	12 U	5.8 J	12.2 J	8.6 J	7.6
ARSENIC	MG/KG	12 U	6.3 J	7.1 J	7.6 J	11.1
BARIUM	MG/KG	261	88.5	154	130	125
BERYLLIUM	MG/KG	6 U	2.5 U	3.5 U	3.7 U	0.98 U
BORON	MG/KG	81.2 J	24.9 U	37 J	37.1 U	32.9
CADMIUM	MG/KG	3 U	1.9 J	1.8 J	2.3 J	0.56 J
CALCIUM	MG/KG	41,900	115,000	109,000	118,000	23,800
CHROMIUM, TOTAL	MG/KG	96.9	22.2	41	34.2	46.4
COBALT	MG/KG	17.7 J	8.2	9.9 J	9.1 J	13.9
COPPER	MG/KG	93.6	84.8	105	106	53.2
IRON	MG/KG	47,200	20,500	26,300	25,300	30,900
LEAD	MG/KG	38.2	101	112	125	32.7
LITHIUM	MG/KG	60.1 U	24.9 U	35.2 U	37.1 U	27.8 J
MAGNESIUM	MG/KG	19,400	45,900	41,700	45,400	9,750
MANGANESE	MG/KG	963	684	811	809	1,130
MERCURY	MG/KG	0.22 U	0.16 J	0.25 J	0.27 J	0.22 U
MOLYBDENUM	MG/KG	12 U	5 U	7.1 J	7.4 U	5.8 J
NICKEL	MG/KG	50.5	24.2	33.5	31.4	33.2
POTASSIUM	MG/KG	14,000	1,280	7,870 J	5,470 J	2,550
SELENIUM	MG/KG	29.9 U	12.4 U	17.5 U	18.5 U	4.9 U

The qualifiers shown were assigned during chemistry validation.

U: The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

J: The reported result was an estimated value with an unknown bias.

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

Location Identifier		SWSD022	SWSD023	SWSD023	SWSD023	SWSD025
Field Sample Identifier		SWSD022	SWSD023	SWSD023	SWSD023-D	SWSD025
Sample Matrix		Sediment	Sediment	Sediment	Sediment	Sediment
Depth Interval (ft)		-	-	-	-	-
Date of Sample		10/19/20	05/07/20	10/19/20	10/19/20	02/26/20
Parameter	Units				Field Duplicate	
METALS						
SILVER	MG/KG	3 U	1.2 U	1.8 U	1.8 U	4
SODIUM	MG/KG	954	302 J	436 J	401 J	298
THALLIUM	MG/KG	18 U	7.5 U	10.6 U	11.1 U	2.9 U
VANADIUM	MG/KG	92	27.3	60.9	51.3	33.6
ZINC	MG/KG	372	424	547	587	248

The qualifiers shown were assigned during chemistry validation.

U: The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

J: The reported result was an estimated value with an unknown bias.

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		05/07/20	08/20/20	10/16/20	05/07/20	10/16/20
Parameter	Units					
METALS						
ALUMINUM	MG/KG	14,800	15,600	30,100	11,300	21,600
ANTIMONY	MG/KG	5.8 J	9.7	10 U	2.4 U	8.3 U
ARSENIC	MG/KG	10.4	11.3	10.8 J	4.9 J	8.3 U
BARIUM	MG/KG	138	175	205	169	244
BERYLLIUM	MG/KG	1.2 U	1.5 U	5 U	1.2 U	4.1 U
BORON	MG/KG	41.4	15.1 U	49.8 U	28.7 J	41.4 U
CADMIUM	MG/KG	0.92 J	1.1 J	2.5 U	0.59 U	2.1 U
CALCIUM	MG/KG	38,000	32,100	43,400	18,500	22,800
CHROMIUM, TOTAL	MG/KG	65.2	64.6	81.7	23.9	31.5
COBALT	MG/KG	15.1	16.2	15.1	9.2	10.8 J
COPPER	MG/KG	73	69.7	76.9	38.5	37.6
IRON	MG/KG	38,500	36,100	44,000	26,000	30,700
LEAD	MG/KG	50.5	43.6	40.8	15.2	11.1 J
LITHIUM	MG/KG	35 J	35.9 J	49.8 U	24 J	41.4 U
MAGNESIUM	MG/KG	14,400	12,500	15,700	7,090	8,650
MANGANESE	MG/KG	986	1,240	1,460	1,560	2,840
MERCURY	MG/KG	0.22 U	0.29 U	0.21 U	0.24 U	0.18 U
MOLYBDENUM	MG/KG	3.9 J	10.3	10 U	2.4 U	8.3 U
NICKEL	MG/KG	37.4	41.5	41.9	20.9	25.5
POTASSIUM	MG/KG	2,810	3,010	9,680	4,180	5,930
SELENIUM	MG/KG	5.9 U	7.5 U	24.8 U	5.9 U	20.6 U

The qualifiers shown were assigned during chemistry validation.

U: The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

J: The reported result was an estimated value with an unknown bias.

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		05/07/20	08/20/20	10/16/20	05/07/20	10/16/20
Parameter	Units					
METALS						
SILVER	MG/KG	0.59 U	0.75 U	2.5 U	5.6	2.1 U
SODIUM	MG/KG	259	683	664 J	228	206 U
THALLIUM	MG/KG	3.5 U	4.5 U	15 U	3.6 U	12.4 U
VANADIUM	MG/KG	40.1	44.3	69.3	23	50.6
ZINC	MG/KG	382	333	334	218	204

The qualifiers shown were assigned during chemistry validation.

U: The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

J: The reported result was an estimated value with an unknown bias.

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		05/07/20	10/16/20
Parameter	Units		
METALS			
ALUMINUM	MG/KG	8,930	35,500
ANTIMONY	MG/KG	1.8 J	7.1 U
ARSENIC	MG/KG	4.2 J	7.1 J
BARIUM	MG/KG	166	218
BERYLLIUM	MG/KG	0.9 U	3.5 U
BORON	MG/KG	21.7 J	35.3 U
CADMIUM	MG/KG	0.45 U	1.8 U
CALCIUM	MG/KG	36,100	19,700
CHROMIUM, TOTAL	MG/KG	18.7	50.8
COBALT	MG/KG	9.6	13.8
COPPER	MG/KG	34.1	54.6
IRON	MG/KG	22,000	38,300
LEAD	MG/KG	12.3	10.3 J
LITHIUM	MG/KG	20.7 J	57.5 J
MAGNESIUM	MG/KG	7,370	11,800
MANGANESE	MG/KG	2,210	1,360
MERCURY	MG/KG	0.19 U	0.12 U
MOLYBDENUM	MG/KG	1.8 U	7.1 U
NICKEL	MG/KG	18.9	34.7
POTASSIUM	MG/KG	1,490	10,400
SELENIUM	MG/KG	4.5 U	17.6 U

The qualifiers shown were assigned during chemistry validation.

U: The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

J: The reported result was an estimated value with an unknown bias.

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		05/07/20	10/16/20
Parameter	Units		
METALS			
SILVER	MG/KG	0.45 U	1.8 U
SODIUM	MG/KG	291	227 J
THALLIUM	MG/KG	2.7 U	10.6 U
VANADIUM	MG/KG	20.5	65
ZINC	MG/KG	156	222

The qualifiers shown were assigned during chemistry validation.

U: The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

J: The reported result was an estimated value with an unknown bias.

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

Location Identifier		SWSD009	SWSD009	SWSD009	SWSD010	SWSD010
Field Sample Identifier		SWSD009	SWSD009-D	SWSD009	SWSD010	SWSD010
Sample Matrix		Sediment	Sediment	Sediment	Sediment	Sediment
Depth Interval (ft)		-	-	-	-	-
Date of Sample		05/07/20	05/07/20	10/19/20	05/07/20	10/19/20
Parameter	Units		Field Duplicate			
SEMI-VOLATILE ORGANIC ANALYSES						
ACENAPHTHENE	UG/KG	34.7 U	34.1 U	40.4 U	63 U	53.4 U
ACENAPHTHYLENE	UG/KG	34.7 U	34.1 U	40.4 U	63 U	53.4 U
ANTHRACENE	UG/KG	34.7 U	43.6 J	52.5 J	63 U	53.4 U
BENZO(A)ANTHRACENE	UG/KG	139 J	109 J	228 J	63 U	93.5 J
BENZO(A)PYRENE	UG/KG	169 J	146 J	275	97.2 J	102 J
BENZO(B)FLUORANTHENE	UG/KG	153 J	138 J	278	124 J	129 J
BENZO(G,H,I)PERYLENE	UG/KG	123 J	104 J	218 J	63 U	103 J
BENZO(K)FLUORANTHENE	UG/KG	141 J	111 J	245	75.7 J	90.2 J
CHRYSENE	UG/KG	152 J	141 J	267	63 U	89.8 J
DIBENZ(A,H)ANTHRACENE	UG/KG	34.7 U	34.1 U	58.5 J	63 U	53.4 U
FLUORANTHENE	UG/KG	223	239	485	135 J	136 J
FLUORENE	UG/KG	34.7 U	34.4 J	40.4 U	63 U	53.4 U
INDENO(1,2,3-C,D)PYRENE	UG/KG	122 J	107 J	200 J	103 J	92.5 J
NAPHTHALENE	UG/KG	34.7 U	34.1 U	40.4 U	63 U	53.4 U
PHENANTHRENE	UG/KG	101 J	136 J	191 J	63 U	53.4 U
PYRENE	UG/KG	218	230	435	137 J	136 J

The qualifiers shown were assigned during chemistry validation.

U: The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

UJ: The analyte was not detected and was reported as less than the LOD or as defined by the customer. However, the associated numerical value is approximate.

J: The reported result was an estimated value with an unknown bias.

J-: The result was an estimated quantity, but the result may be biased low.

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

Location Identifier		SWSD011	SWSD011	SWSD021	SWSD021	SWSD022
Field Sample Identifier		SWSD011	SWSD011	SWSD021	SWSD021	SWSD022
Sample Matrix		Sediment	Sediment	Sediment	Sediment	Sediment
Depth Interval (ft)		-	-	-	-	-
Date of Sample		05/07/20	10/16/20	05/07/20	10/19/20	05/07/20
Parameter	Units					
SEMI-VOLATILE ORGANIC ANALYSES						
ACENAPHTHENE	UG/KG	74.3 U	78.2 U	40.1 U	26.1 U	65.8 U
ACENAPHTHYLENE	UG/KG	74.3 U	78.2 U	40.1 U	26.1 U	65.8 U
ANTHRACENE	UG/KG	74.3 U	78.2 U	40.1 U	26.1 U	65.8 U
BENZO(A)ANTHRACENE	UG/KG	74.3 U	78.2 U	40.1 U	26.1 U	65.8 U
BENZO(A)PYRENE	UG/KG	116 J	78.2 U	40.1 U	26.1 U	65.8 U
BENZO(B)FLUORANTHENE	UG/KG	120 J	84.7 J	40.1 U	26.1 U	65.8 U
BENZO(G,H,I)PERYLENE	UG/KG	102 J	88 J	40.1 U	26.1 U	65.8 U
BENZO(K)FLUORANTHENE	UG/KG	103 J	78.2 U	40.1 U	26.1 U	65.8 U
CHRYSENE	UG/KG	74.3 U	78.2 U	40.1 U	26.1 U	65.8 U
DIBENZ(A,H)ANTHRACENE	UG/KG	74.3 U	78.2 U	40.1 U	26.1 U	65.8 U
FLUORANTHENE	UG/KG	147 J	112 J	40.1 U	28.1 J	65.8 U
FLUORENE	UG/KG	74.3 U	78.2 U	40.1 U	26.1 U	65.8 U
INDENO(1,2,3-C,D)PYRENE	UG/KG	108 J	78.2 U	40.1 U	26.1 U	65.8 U
NAPHTHALENE	UG/KG	74.3 U	78.2 U	40.1 U	26.1 U	65.8 U
PHENANTHRENE	UG/KG	74.3 U	78.2 U	40.1 U	26.1 U	65.8 U
PYRENE	UG/KG	149 J	96.2 J	40.1 U	26.1 U	65.8 U

The qualifiers shown were assigned during chemistry validation.

U: The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

UJ: The analyte was not detected and was reported as less than the LOD or as defined by the customer. However, the associated numerical value is approximate.

J: The reported result was an estimated value with an unknown bias.

J-: The result was an estimated quantity, but the result may be biased low.

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

Location Identifier		SWSD022	SWSD023	SWSD023	SWSD023	SWSD025
Field Sample Identifier		SWSD022	SWSD023	SWSD023	SWSD023-D	SWSD025
Sample Matrix		Sediment	Sediment	Sediment	Sediment	Sediment
Depth Interval (ft)		-	-	-	-	-
Date of Sample		10/19/20	05/07/20	10/19/20	10/19/20	02/26/20
Parameter	Units				Field Duplicate	
SEMI-VOLATILE ORGANIC ANALYSES						
ACENAPHTHENE	UG/KG	65.4 U	26.7 U	38.9 UJ	40.6 U	57.5 U
ACENAPHTHYLENE	UG/KG	65.4 U	26.7 U	38.9 UJ	40.6 U	57.5 U
ANTHRACENE	UG/KG	65.4 U	64.6 J	84.2 J-	74.4 J	57.5 U
BENZO(A)ANTHRACENE	UG/KG	65.4 U	204	391 J-	304	57.5 U
BENZO(A)PYRENE	UG/KG	77 J	203	470 J-	387	61.6 J
BENZO(B)FLUORANTHENE	UG/KG	77.7 J	229	548 J-	438	62.5 J
BENZO(G,H,I)PERYLENE	UG/KG	93 J	180	539 J-	459	67 J
BENZO(K)FLUORANTHENE	UG/KG	69 J	199	435 J-	309 J	57.5 U
CHRYSENE	UG/KG	68.1 J	273	539 J-	447	57.5 U
DIBENZ(A,H)ANTHRACENE	UG/KG	65.4 U	39 J	38.9 UJ	92.4 J	57.5 U
FLUORANTHENE	UG/KG	94.5 J	398	883 J-	728	89.1 J
FLUORENE	UG/KG	65.4 U	27.7 J	42.6 J-	40.6 U	57.5 U
INDENO(1,2,3-C,D)PYRENE	UG/KG	68.2 J	136 J	419 J-	334	57.5 U
NAPHTHALENE	UG/KG	65.4 U	36.3 J	46.3 J-	40.6 U	57.5 U
PHENANTHRENE	UG/KG	65.4 U	141 J	365 J-	289	57.5 U
PYRENE	UG/KG	95.6 J	433	819 J-	673	83.4 J

The qualifiers shown were assigned during chemistry validation.

U: The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

UJ: The analyte was not detected and was reported as less than the LOD or as defined by the customer. However, the associated numerical value is approximate.

J: The reported result was an estimated value with an unknown bias.

J-: The result was an estimated quantity, but the result may be biased low.

TABLE A-4
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		05/07/20	08/20/20	10/16/20	05/07/20	10/16/20
Parameter	Units					
SEMI-VOLATILE ORGANIC ANALYSES						
ACENAPHTHENE	UG/KG	66.1 U	4.3 J	56.1 U	60.5 U	44.1 U
ACENAPHTHYLENE	UG/KG	66.1 U	7.8 J	56.1 U	60.5 U	44.1 U
ANTHRACENE	UG/KG	66.1 U	17.9	56.1 U	60.5 U	44.1 U
BENZO(A)ANTHRACENE	UG/KG	66.1 U	64.1	56.1 U	60.5 U	44.1 U
BENZO(A)PYRENE	UG/KG	66.1 U	81.2	56.1 U	60.5 U	44.1 U
BENZO(B)FLUORANTHENE	UG/KG	66.1 U	86.4	56.1 U	60.5 U	44.1 U
BENZO(G,H,I)PERYLENE	UG/KG	66.1 U	50.6	56.1 U	60.5 U	44.1 U
BENZO(K)FLUORANTHENE	UG/KG	66.1 U	71.1	56.1 U	60.5 U	44.1 U
CHRYSENE	UG/KG	66.1 U	72.6	56.1 U	60.5 U	44.1 U
DIBENZ(A,H)ANTHRACENE	UG/KG	66.1 U	13.5 J	56.1 U	60.5 U	44.1 U
FLUORANTHENE	UG/KG	107 J	113	56.1 U	60.5 U	44.1 U
FLUORENE	UG/KG	66.1 U	11.2 J	56.1 U	60.5 U	44.1 U
INDENO(1,2,3-C,D)PYRENE	UG/KG	66.1 U	54.7	56.1 U	60.5 U	44.1 U
NAPHTHALENE	UG/KG	66.1 U	13.4 J	56.1 U	60.5 U	44.1 U
PHENANTHRENE	UG/KG	107 J	47.4	56.1 U	60.5 U	44.1 U
PYRENE	UG/KG	83.7 J	102	56.1 U	60.5 U	44.1 U

The qualifiers shown were assigned during chemistry validation.

U: The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

UJ: The analyte was not detected and was reported as less than the LOD or as defined by the customer. However, the associated numerical value is approximate.

J: The reported result was an estimated value with an unknown bias.

J-: The result was an estimated quantity, but the result may be biased low.

TABLE A-4
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		05/07/20	10/16/20
Parameter	Units		
SEMI-VOLATILE ORGANIC ANALYSES			
ACENAPHTHENE	UG/KG	52.5 U	34.6 U
ACENAPHTHYLENE	UG/KG	52.5 U	34.6 U
ANTHRACENE	UG/KG	52.5 U	34.6 U
BENZO(A)ANTHRACENE	UG/KG	52.5 U	34.6 U
BENZO(A)PYRENE	UG/KG	52.5 U	34.6 U
BENZO(B)FLUORANTHENE	UG/KG	52.5 U	34.6 U
BENZO(G,H,I)PERYLENE	UG/KG	52.5 U	34.6 U
BENZO(K)FLUORANTHENE	UG/KG	52.5 U	34.6 U
CHRYSENE	UG/KG	52.5 U	34.6 U
DIBENZ(A,H)ANTHRACENE	UG/KG	52.5 U	34.6 U
FLUORANTHENE	UG/KG	52.5 U	34.6 U
FLUORENE	UG/KG	52.5 U	34.6 U
INDENO(1,2,3-C,D)PYRENE	UG/KG	52.5 U	34.6 U
NAPHTHALENE	UG/KG	52.5 U	34.6 U
PHENANTHRENE	UG/KG	52.5 U	34.6 U
PYRENE	UG/KG	52.5 U	34.6 U

The qualifiers shown were assigned during chemistry validation.

U: The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

UJ: The analyte was not detected and was reported as less than the LOD or as defined by the customer. However, the associated numerical value is approximate.

J: The reported result was an estimated value with an unknown bias.

J-: The result was an estimated quantity, but the result may be biased low.

ATTACHMENT B
MANN-KENDALL TEST RESULTS

ATTACHMENT B-1
TOTAL URANIUM IN SURFACE WATER

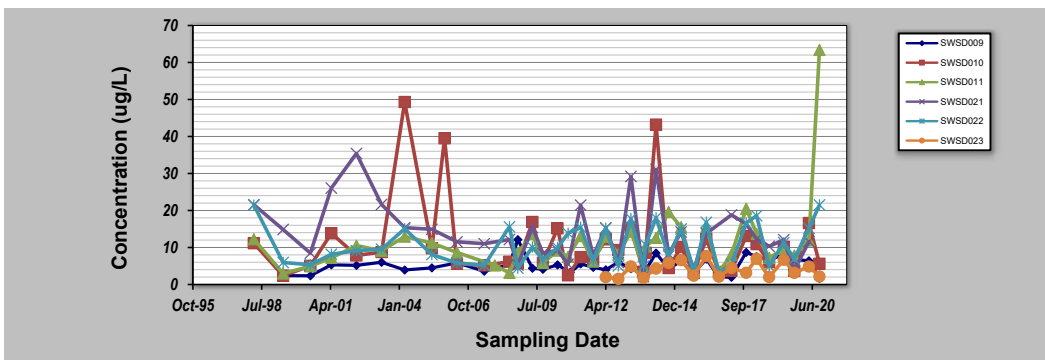
GSI MANN-KENDALL TOOLKIT for Constituent Trend Analysis

Evaluation Date: 15-Jul-21	Job ID: 2020 ESP TM - SW
Facility Name: NFSS	Constituent: total U
Conducted By: J. Staten	Concentration Units: ug/L

Sampling Point ID:		SWSD009	SWSD010	SWSD011	SWSD021	SWSD022	SWSD023
--------------------	--	---------	---------	---------	---------	---------	---------

Sampling Event	Sampling Date	TOTAL U CONCENTRATION (ug/L)					
1	Apr-98	11.6127	11.1375	12.2364	21.5622	21.4434	
2	Jun-99	2.376	2.376	2.97	14.85	5.94	
3	Jul-00	2.36709	5.03118	4.93317	8.48232	5.32224	
4	May-01	5.3163	13.8402	7.1874	26.0469	8.1675	
5	May-02	5.1678	7.8408	10.5	35.4	9.12	
6	May-03	5.9994	8.7615	9.1179	21.6216	9.5337	
7	Apr-04	3.9204	49.302	12.9492	15.3549	15.0579	
8	May-05	4.4847	9.801	11.1969	14.9094	8.0784	
9	Nov-05		39.501				
10	May-06	5.8509	5.5836	8.6427	11.5236	5.8212	
11	Jun-07	3.5937	5.1678		11.0187	5.1678	
12	Nov-07			5.1678			
13	Jun-08	5.3757	6.1479	3.1482	12.1473	15.5925	
14	Oct-08	12.1176	5.7024	8.613	5.2866	4.4253	
15	May-09	4.38075	16.89633	13.65309	15.41727	10.09206	
16	Oct-09	4.11048	5.89545	5.80041	8.39619	6.70626	
17	May-10	5.28957	15.15294	9.16839	9.28125	9.97029	
18	Oct-10		2.47104	7.4844	5.4648	13.8402	
19	Nov-10	3.267					
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
23	Oct-12	6.04	9.3	8.15	5.94	5.04	1.51
24	Apr-13	4.25	15.3	14.3	29.2	17.8	4.86
25	Oct-13	2.92	3.47	4.64	2.11	4.95	1.75
26	Nov-13		8.55	10.3		10.7	
27	Apr-14	8.49	43.2	12.6	31.1	18	4.3
28	Oct-14	4.25	4.44	19.6	8.21	7.69	5.83
29	Apr-15	6.3	10.1	15.5	14.2	15	6.58
30	Oct-15	3.08	3.19	3.43	4.08	3.26	2.37
31	Apr-16	6.86	12.3	15.6	13.8	16.8	7.67
32	Oct-16	2.06	3.37	3.39		3.15	2.12
33	Apr-17	1.95	3.7	8.08	18.8	5.45	4.47
34	Nov-17	8.67	13.1	20.5	16.4	16.6	3.17
35	Apr-18	7.53	10.9	13.7	12.3	18.6	6.93
36	Oct-18	6.66	6.04	7.2	10.3	4.95	2
37	May-19	8.05	10.2	9.65	12.1	11.3	6.68
38	Oct-19	6.76	3.73	7.81	3.83	6.88	3.15
39	May-20	6.4	16.6	11.9	11.6	15.2	4.85
40	Oct-20	1.63	5.61	63.4		21.5	2.16

Coefficient of Variation:	0.46	0.96	0.88	0.57	0.51	0.51
Mann-Kendall Statistic (S):	51	-17	140	-119	70	25
Confidence Factor:	75.1%	57.9%	96.6%	96.0%	81.5%	81.6%
Concentration Trend:	No Trend	Stable	Increasing	Decreasing	No Trend	No Trend



Notes:

- At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
- 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% and S<0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
- 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.

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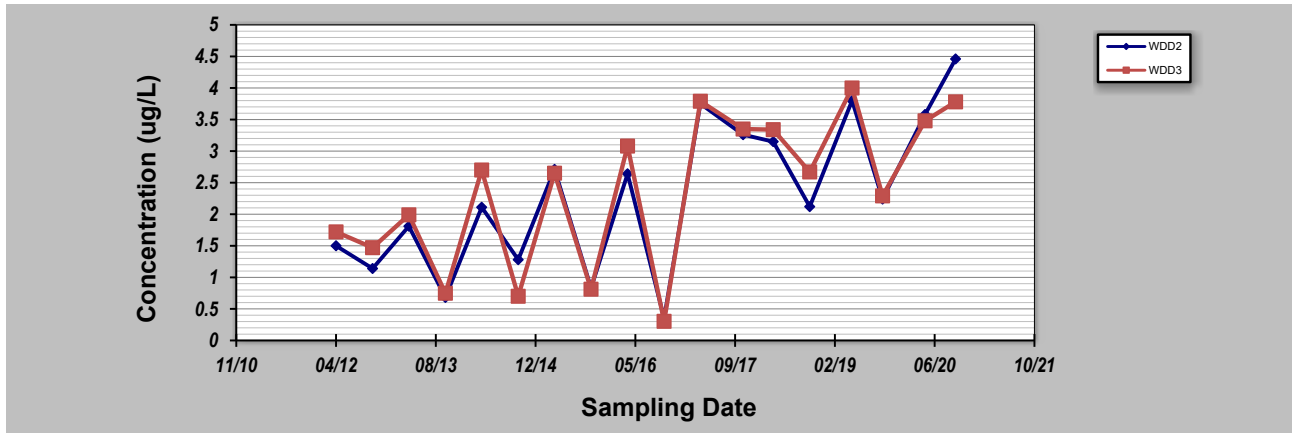
GSI MANN-KENDALL TOOLKIT

for Constituent Trend Analysis

Evaluation Date: **15-Jul-21**
 Facility Name: **NFSS**
 Conducted By: **J. Staten**

Job ID: **2020 ESP TM SW**
 Constituent: **Total U**
 Concentration Units: **ug/L**

Sampling Point ID:		WDD2	WDD3					
Sampling Event	Sampling Date	TOTAL U CONCENTRATION (ug/L)						
1	Apr-12	1.5	1.72					
2	Oct-12	1.14	1.47					
3	Apr-13	1.81	1.99					
4	Oct-13	0.681	0.748					
5	Apr-14	2.11	2.7					
6	Oct-14	1.28	0.7					
7	Apr-15	2.71	2.65					
8	Oct-15	0.831	0.812					
9	Apr-16	2.64	3.08					
10	Oct-16	0.351	0.303					
11	Apr-17	3.75	3.79					
12	Nov-17	3.26	3.35					
13	Apr-18	3.15	3.34					
14	Oct-18	2.12	2.67					
15	May-19	3.8	4					
16	Oct-19	2.24	2.29					
17	May-20	3.58	3.48					
18	Oct-20	4.46	3.78					
19								
20								
Coefficient of Variation:		0.52	0.50					
Mann-Kendall Statistic (S):		75	65					
Confidence Factor:		99.8%	99.3%					
Concentration Trend:		Increasing	Increasing					



Notes:

- At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
- Confidence in Trend = Confidence (in percent) that constituent concentration is increasing ($S > 0$) or decreasing ($S < 0$): $> 95\%$ = Increasing or Decreasing; $\geq 90\%$ = Probably Increasing or Probably Decreasing; $< 90\%$ and $S > 0$ = No Trend; $< 90\%$, $S \leq 0$, and $COV \geq 1$ = No Trend; $< 90\%$ and $COV < 1$ = Stable.
- 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.

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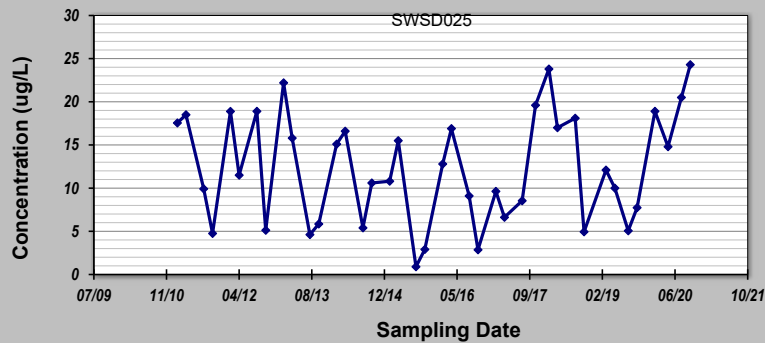
GSI MANN-KENDALL TOOLKIT for Constituent Trend Analysis

Evaluation Date: 15-Jul-21	Job ID: 2020 ESP TM SW
Facility Name: NFSS	Constituent: Total U
Conducted By: J. Staten	Concentration Units: ug/L

Sampling Point ID: **SWSD025**

Sampling Event	Sampling Date	TOTAL U CONCENTRATION (ug/L)					
1	Feb-11	17.5527					
2	Apr-11	18.5031					
3	Aug-11	9.9198					
4	Oct-11	4.752					
5	Feb-12	18.8892					
6	Apr-12	11.5					
7	Aug-12	18.9					
8	Oct-12	5.12					
9	Feb-13	22.2					
10	Apr-13	15.8					
11	Aug-13	4.62					
12	Oct-13	5.85					
13	Feb-14	15.1					
14	Apr-14	16.6					
15	Aug-14	5.4					
16	Oct-14	10.6					
17	Feb-15	10.8					
18	Apr-15	15.5					
19	Aug-15	0.898					
20	Oct-15	2.9					
21	Feb-16	12.8					
22	Apr-16	16.9					
23	Aug-16	9.1					
24	Oct-16	2.86					
25	Feb-17	9.63					
26	Apr-17	6.62					
27	Aug-17	8.54					
28	Nov-17	19.6					
29	Feb-18	23.8					
30	Apr-18	17					
31	Aug-18	18.1					
32	Oct-18	4.94					
33	Mar-19	12.1					
34	May-19	10					
35	Aug-19	5.06					
36	Oct-19	7.74					
37	Feb-20	18.9					
38	May-20	14.8					
39	Aug-20	20.5					
40	Oct-20	24.3					

Coefficient of Variation:	0.52				
Mann-Kendall Statistic (S):	47				
Confidence Factor:	70.3%				
Concentration Trend:	No Trend				



Notes:

- At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
- 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.
- 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.

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ATTACHMENT B-2
RADIUM-226 IN SEDIMENT (901.1 analysis only)

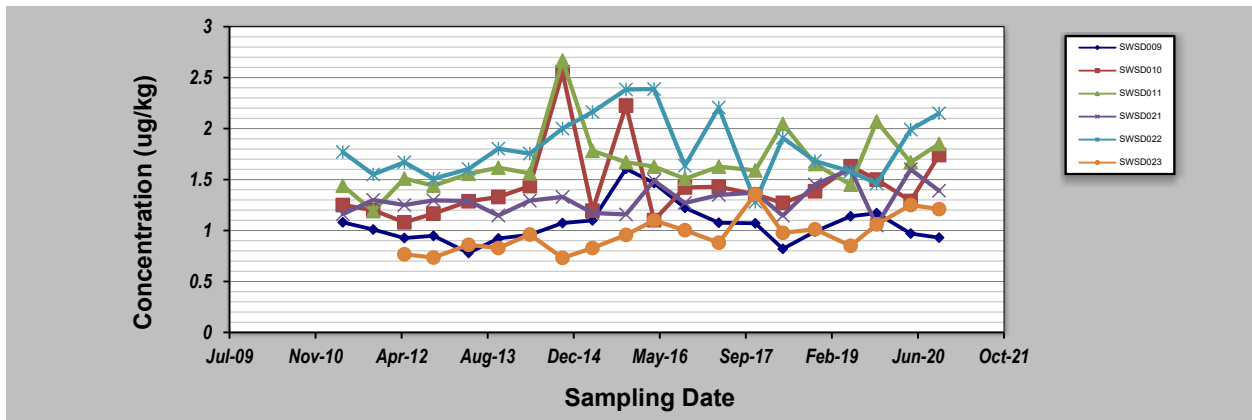
GSI MANN-KENDALL TOOLKIT

for Constituent Trend Analysis

Evaluation Date: **15-Jul-21**
 Facility Name: **NFSS**
 Conducted By: **J. Staten**

Job ID: **2020 ESP TM - SED**
 Constituent: **Ra226**
 Concentration Units: **ug/kg**

Sampling Point ID:		SWSD009	SWSD010	SWSD011	SWSD021	SWSD022	SWSD023
Sampling Event	Sampling Date	RA226 CONCENTRATION (ug/kg)					
1	Apr-11	1.08	1.25	1.44	1.16	1.77	
2	Oct-11	1.01	1.2	1.19	1.3	1.55	
3	Apr-12	0.926	1.08	1.51	1.25	1.67	0.767
4	Oct-12	0.948	1.166	1.44	1.296	1.508	0.735
5	Apr-13	0.78	1.287	1.557	1.29	1.604	0.86
6	Oct-13	0.922	1.329	1.617	1.147	1.803	0.828
7	Apr-14	0.958	1.436	1.561	1.293	1.754	0.961
8	Oct-14	1.073	2.552	2.669	1.33	2	0.731
9	Apr-15	1.099	1.195	1.782	1.172	2.162	0.828
10	Oct-15	1.606	2.226	1.671	1.158	2.384	0.957
11	Apr-16	1.466	1.102	1.627	1.489	2.388	1.099
12	Oct-16	1.223	1.422	1.508	1.27	1.636	1.003
13	Apr-17	1.076	1.43	1.627	1.349	2.207	0.88
14	Nov-17	1.071	1.354	1.59	1.372	1.281	1.358
15	Apr-18	0.82	1.271	2.046	1.146	1.909	0.977
16	Oct-18	0.99	1.385	1.653	1.452	1.681	1.012
17	May-19	1.14	1.63	1.45	1.6	1.58	0.85
18	Oct-19	1.17	1.5	2.07	1.05	1.46	1.06
19	May-20	0.97	1.29	1.67	1.6	1.99	1.25
20	Oct-20	0.93	1.74	1.85	1.39	2.15	1.21
21							
22							
23							
24							
25							
Coefficient of Variation:		0.19	0.25	0.18	0.11	0.17	0.19
Mann-Kendall Statistic (S):		18	66	82	51	22	84
Confidence Factor:		70.7%	98.3%	99.6%	94.8%	75.0%	100.0%
Concentration Trend:		No Trend	Increasing	Increasing	Prob. Increasing	No Trend	Increasing



Notes:

- At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
- 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.
- 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.

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GSI MANN-KENDALL TOOLKIT

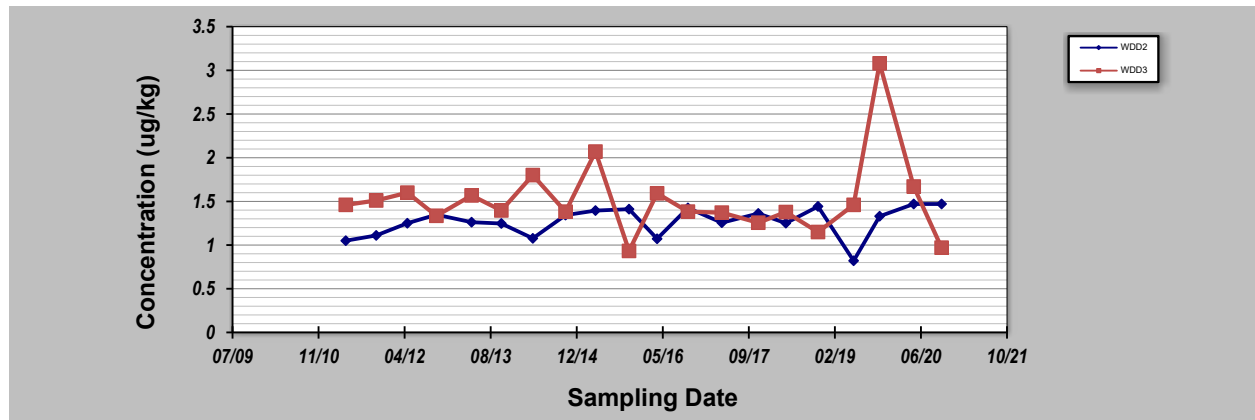
for Constituent Trend Analysis

Evaluation Date: **15-Jul-21**
 Facility Name: **NFSS**
 Conducted By: **J. Staten**

Job ID: **2020 ESP TM SED**
 Constituent: **Ra226**
 Concentration Units: **ug/kg**

Sampling Point ID: **WDD2** **WDD3**

Sampling Event	Sampling Date	RA226 CONCENTRATION (ug/kg)					
1	Apr-11	1.05	1.46				
2	Oct-11	1.11	1.51				
3	Apr-12	1.25	1.6				
4	Oct-12	1.348	1.335				
5	Apr-13	1.262	1.568				
6	Oct-13	1.247	1.396				
7	Apr-14	1.077	1.801				
8	Oct-14	1.343	1.382				
9	Apr-15	1.395	2.07				
10	Oct-15	1.411	0.933				
11	Apr-16	1.072	1.592				
12	Oct-16	1.425	1.383				
13	Apr-17	1.256	1.371				
14	Nov-17	1.362	1.256				
15	Apr-18	1.251	1.378				
16	Oct-18	1.442	1.149				
17	May-19	0.82	1.46				
18	Oct-19	1.33	3.08				
19	May-20	1.47	1.67				
20	Oct-20	1.47	0.97				
21							
22							
23							
24							
25							
Coefficient of Variation:		0.13	0.30				
Mann-Kendall Statistic (S):		71	-25				
Confidence Factor:		98.9%	78.0%				
Concentration Trend:		Increasing	Stable				



Notes:

- At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
- 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.
- 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.

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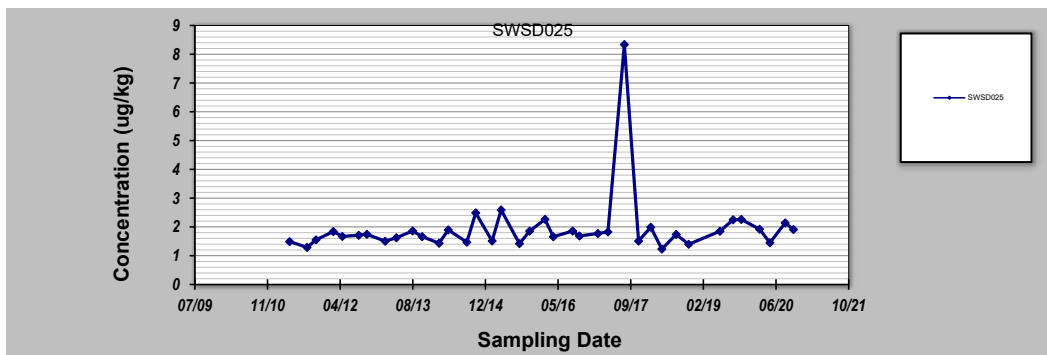
GSI MANN-KENDALL TOOLKIT for Constituent Trend Analysis

Evaluation Date: 15-Jul-21	Job ID: 2020 ESP TM SED
Facility Name: NFSS	Constituent: Ra226
Conducted By: J. Staten	Concentration Units: ug/kg

Sampling Point ID: **SWSD025**

Sampling Event	Sampling Date	RA226 CONCENTRATION (ug/kg)					
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	1.685					
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	May-19	1.85					
33	Aug-19	2.25					
34	Oct-19	2.26					
35	Feb-20	1.92					
36	May-20	1.45					
37	Aug-20	2.14					
38	Oct-20	1.91					
39							
40							

Coefficient of Variation:	0.57				
Mann-Kendall Statistic (S):	153				
Confidence Factor:	97.2%				
Concentration Trend:	Increasing				



Notes:

- At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
- 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.
- 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.

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ATTACHMENT B-3
URANIUM-238 IN SEDIMENT

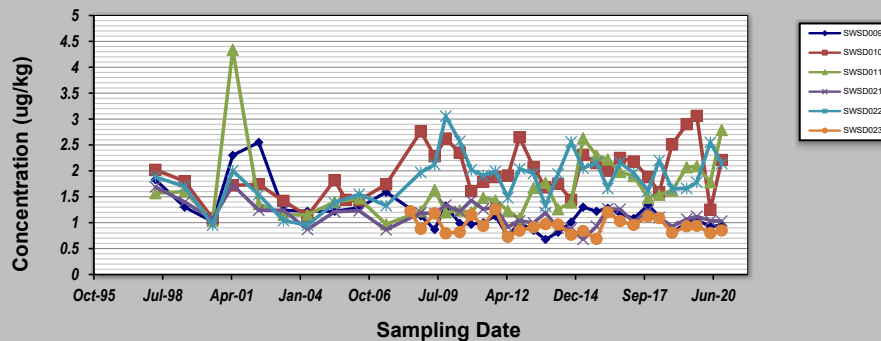
GSI MANN-KENDALL TOOLKIT for Constituent Trend Analysis

Evaluation Date: 15-Jul-21	Job ID: 2020 ESP TM - SED
Facility Name: NFSS	Constituent: U-238
Conducted By: J. Staten	Concentration Units: ug/kg

Sampling Point ID:		SWSD009	SWSD010	SWSD011	SWSD021	SWSD022	SWSD023
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Sampling Event	Sampling Date	U-238 CONCENTRATION (ug/kg)						
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	
13	Oct-08	1.13	2.76	1.22	1.19	1.97	0.88	
14	May-09	0.8679	2.282	1.633	1.173	2.123	1.179	
15	Oct-09	1.32	2.623	1.2	1.338	3.055	0.7944	
16	May-10	0.9876	2.351	1.235	1.215	2.569	0.8181	
17	Nov-10	0.969	1.61	1.2	1.43	2.02	1.15	
18	Apr-11	1	1.79	1.48	1.26	1.91	0.937	
19	Oct-11	1.13	1.88	1.43	1.3	1.99	1.26	
20	Apr-12	0.741	1.91	1.23	0.915	1.48	0.727	
21	Oct-12	0.999	2.65	1.08	1.04	2.04	0.845	
22	Apr-13	0.852	2.07	1.67	0.996	1.95	0.911	
23	Oct-13	0.677	1.68	1.77	1.19	1.32	0.971	
24	Apr-14	0.815	1.75	1.26	0.895	1.94	0.965	
25	Oct-14	1.01	1.44	1.39	0.884	2.56	0.767	
26	Apr-15	1.3	2.31	2.63	0.679	2.05	0.838	
27	Oct-15	1.22	2.15	2.3	0.93	2.16	0.687	
28	Apr-16	1.28	2	2.22	1.27	1.66	1.2	
29	Oct-16	1.18	2.25	1.98	1.26	2.16	1.03	
30	Apr-17	1.08	2.18	1.9	1.01	1.96	0.957	
31	Nov-17	1.34	1.88	1.48	1.24	1.62	1.12	
32	Apr-18	1.12	1.59	1.54	1.1	2.2	1.09	
33	Oct-18	0.802	2.51	1.62	0.925	1.65	0.805	
34	May-19	1.01	2.9	2.07	1.07	1.66	0.93	
35	Oct-19	1.06	3.06	2.09	1.12	1.78	0.94	
36	May-20	0.92	1.25	1.78	1.04	2.55	0.8	
37	Oct-20	0.96	2.21	2.79	1.03	2.14	0.85	
38								
39								
40								

Coefficient of Variation:	0.33	0.25	0.38	0.19	0.25	0.17
Mann-Kendall Statistic (S):	-189	173	230	-161	149	-35
Confidence Factor:	99.7%	99.1%	>99.9%	98.9%	98.3%	77.1%
Concentration Trend:	Decreasing	Increasing	Increasing	Decreasing	Increasing	Stable



Notes:

- At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
- 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.
- 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.

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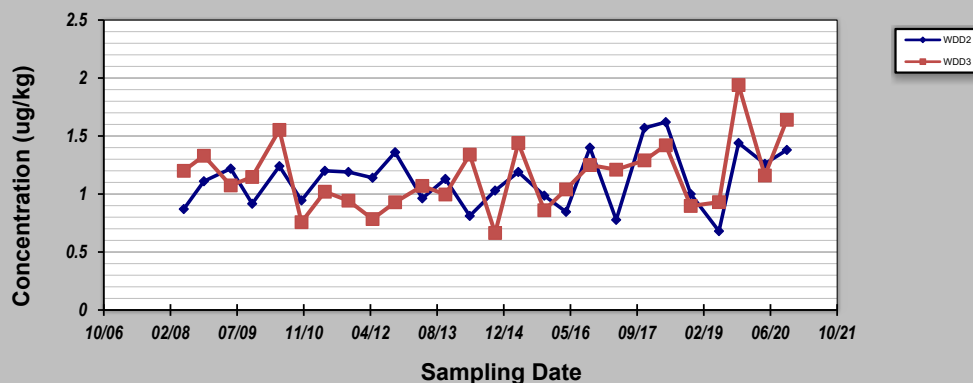
GSI MANN-KENDALL TOOLKIT for Constituent Trend Analysis

Evaluation Date: **15-Jul-21**
 Facility Name: **NFSS**
 Conducted By: **J. Staten**

Job ID: **2020 ESP TM SED**
 Constituent: **U-238**
 Concentration Units: **ug/kg**

Sampling Point ID: **WDD2** **WDD3**

Sampling Event	Sampling Date	U-238 CONCENTRATION (ug/kg)					
1	Jun-08	0.87	1.2				
2	Oct-08	1.11	1.33				
3	May-09	1.219	1.074				
4	Oct-09	0.9161	1.147				
5	May-10	1.24	1.553				
6	Nov-10	0.945	0.757				
7	Apr-11	1.2	1.02				
8	Oct-11	1.19	0.943				
9	Apr-12	1.14	0.784				
10	Oct-12	1.36	0.929				
11	Apr-13	0.963	1.07				
12	Oct-13	1.13	0.996				
13	Apr-14	0.811	1.34				
14	Oct-14	1.03	0.664				
15	Apr-15	1.19	1.44				
16	Oct-15	0.986	0.86				
17	Apr-16	0.846	1.04				
18	Oct-16	1.4	1.25				
19	Apr-17	0.777	1.21				
20	Nov-17	1.57	1.29				
21	Apr-18	1.62	1.42				
22	Oct-18	1	0.897				
23	May-19	0.68	0.93				
24	Oct-19	1.44	1.94				
25	May-20	1.26	1.16				
26	Oct-20	1.38	1.64				
27							
28							
29							
30							
Coefficient of Variation:		0.22	0.26				
Mann-Kendall Statistic (S):		44	45				
Confidence Factor:		82.7%	83.2%				
Concentration Trend:		No Trend	No Trend				



Notes:

- At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
- 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.
- 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.

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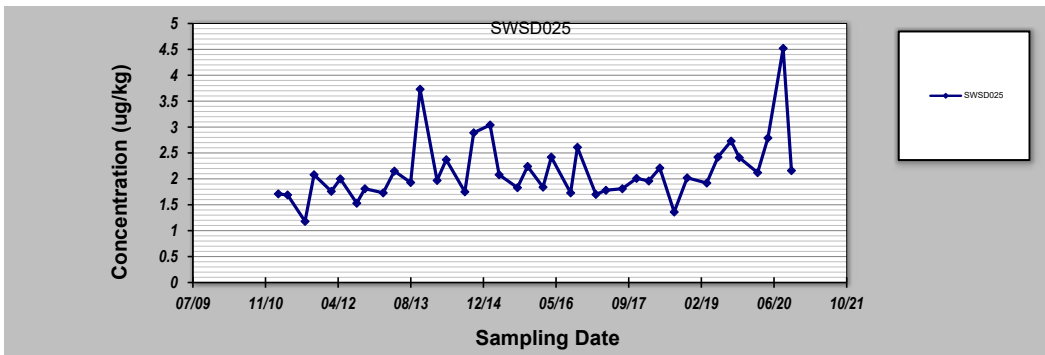
GSI MANN-KENDALL TOOLKIT for Constituent Trend Analysis

Evaluation Date: 15-Jul-21	Job ID: 2020 ESP TM SED
Facility Name: NFSS	Constituent: U-238
Conducted By: J. Staten	Concentration Units: ug/kg

Sampling Point ID: **SWSD025**

Sampling Event	Sampling Date	U-238 CONCENTRATION (ug/kg)					
1	Feb-11	1.71					
2	Apr-11	1.69					
3	Aug-11	1.18					
4	Oct-11	2.08					
5	Feb-12	1.76					
6	Apr-12	2					
7	Aug-12	1.53					
8	Oct-12	1.81					
9	Feb-13	1.73					
10	Apr-13	2.15					
11	Aug-13	1.93					
12	Oct-13	3.73					
13	Feb-14	1.97					
14	Apr-14	2.37					
15	Aug-14	1.75					
16	Oct-14	2.89					
17	Feb-15	3.04					
18	Apr-15	2.08					
19	Aug-15	1.83					
20	Oct-15	2.24					
21	Feb-16	1.84					
22	Apr-16	2.42					
23	Aug-16	1.73					
24	Oct-16	2.61					
25	Feb-17	1.7					
26	Apr-17	1.78					
27	Aug-17	1.81					
28	Nov-17	2.01					
29	Feb-18	1.96					
30	Apr-18	2.21					
31	Aug-18	1.36					
32	Oct-18	2.02					
33	Mar-19	1.92					
34	May-19	2.42					
35	Aug-19	2.73					
36	Oct-19	2.41					
37	Feb-20	2.12					
38	May-20	2.79					
39	Aug-20	4.52					
40	Oct-20	2.16					

Coefficient of Variation:	0.29	
Mann-Kendall Statistic (S):	238	
Confidence Factor:	99.7%	
Concentration Trend:	Increasing	



Notes:

- At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
- 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.
- 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.

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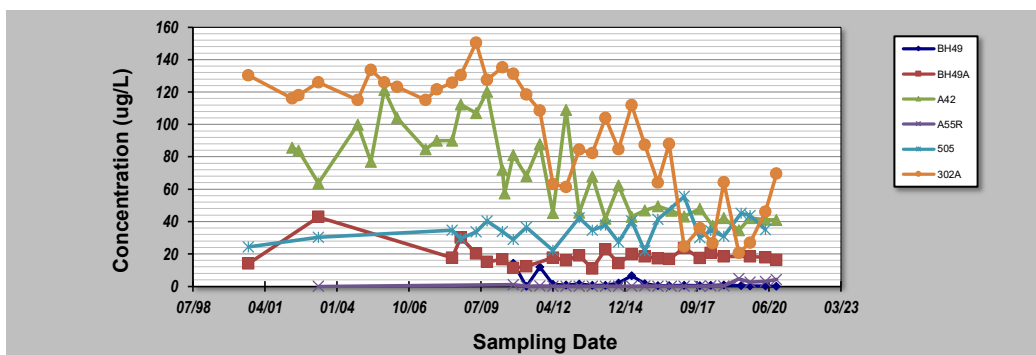
ATTACHMENT B-4
TOTAL URANIUM IN GROUNDWATER

GSI MANN-KENDALL TOOLKIT for Constituent Trend Analysis

Evaluation Date: 19-Jul-21	Job ID: 2020 ESP
Facility Name: NFSS	Constituent: Total Uranium
Conducted By: J. Staten	Concentration Units: ug/L

Sampling Point ID:	BH49	BH49A	A42	A55R	505	302A	
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Sampling Event	Sampling Date	TOTAL URANIUM CONCENTRATION (ug/L)					
1	Sep-00		14			24.4	130.25
2	May-02			85.6			116
3	Aug-02			83.9			118
4	May-03		42.9	63.7	0	30.2	126
5	Nov-04			99.8			115
6	May-05			76.9			133.72
7	Nov-05			121.22			125.86
8	May-06			103.92			123.23
9	Jun-07			84.67			115.18
10	Nov-07			89.95			121.6
11	Jun-08		17.62	89.95		34.6	125.82
12	Oct-08		30.14	112.26		29.53	130.42
13	May-09		20.23	106.88		33.59	150.47
14	Oct-09		15.07	120.21		40.32	127.53
15	May-10		16.72	71.91		33.82	135.23
16	Jun-10			57.39			
17	Oct-10	14.25	11.23	81.07	0.99	28.82	131.3
18	Apr-11	0	12.35	68.11	0.01	36.4	118.54
19	Oct-11	11.84		87.88	0.23		108.48
20	Apr-12	1.23	17.6	45.4	0.129	22.1	63.1
21	Oct-12	0.904	16	109	0.03		61.3
22	Apr-13	1.47	19	45.6	0.111	42.4	84.5
23	Oct-13	0.701	11	67.8	0.107	34.7	82.2
24	Apr-14	0.723	22.7	41.8	0.079	37.8	104
25	Oct-14	1.98	14.3	62.3	0.107	27.4	84.6
26	Apr-15	6.59	19.9	43	0.13	40.4	112
27	Oct-15	1.62	18.4	46.8	0.141	21.9	87.5
28	Apr-16	0.443	17.3	49.5	0.134	41.3	64
29	Sep-16	0.505	16.8				88.1
30	Oct-16			46.7	0.059		
31	Apr-17	0.645	23.5	43.1	0.059	55.5	24.6
32	Nov-17	0.408	17.4	47.9	0.039	30.1	35.9
33	Apr-18	0.638	20.6		0.178	34.4	
34	May-18			37.4			26.5
35	Oct-18	0.742	18.4	42.2	0.226	30.9	64.3
36	May-19			34.7	4.75		20.6
37	Jun-19	0.453				45.2	
38	Oct-19	0.235	18.4	42.2	2.68	43.8	26.9
39	May-20	0.152	17.9	41.2	3.06	35.1	46
40	Oct-20	0.081	16.2	40.9	4.13		69.6
Coefficient of Variation:	1.79	0.34	0.39	1.83	0.22	0.40	
Mann-Kendall Statistic (S):	-104	16	-370	91	78	-342	
Confidence Factor:	99.9%	62.9%	>99.9%	99.5%	97.2%	>99.9%	
Concentration Trend:	Decreasing	No Trend	Decreasing	Increasing	Increasing	Decreasing	



- At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
- 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.
- 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.

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GSI MANN-KENDALL TOOLKIT for Constituent Trend Analysis

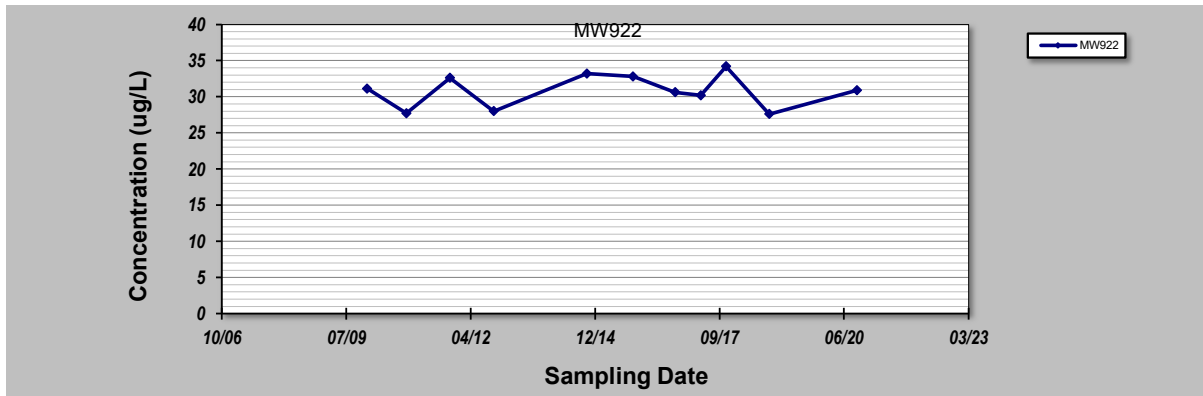
Evaluation Date: **19-Jul-21**
 Facility Name: **NFSS**
 Conducted By: **J. STATEN**

Job ID: **2020 ESP**
 Constituent: **TOTAL URANIUM**
 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	Oct-20	30.9					
28							
29							
30							

Coefficient of Variation:	0.07						
Mann-Kendall Statistic (S):	1						
Confidence Factor:	50.0%						
Concentration Trend:	No Trend						



Notes:

- At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
- 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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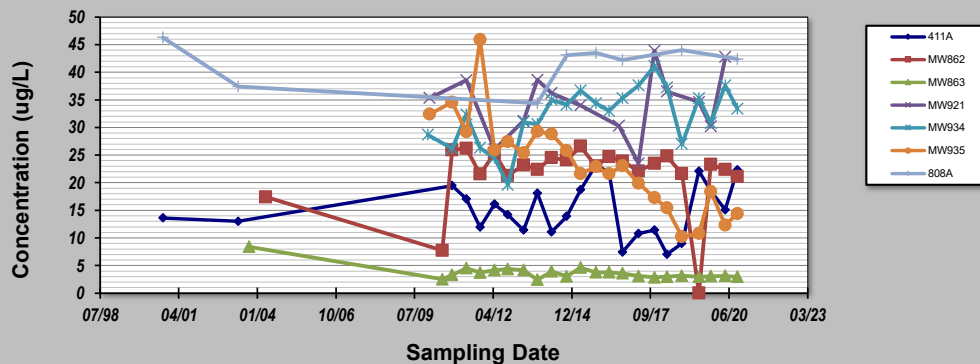
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GSI MANN-KENDALL TOOLKIT for Constituent Trend Analysis

Evaluation Date: **19-Jul-21**
Facility Name: **NFSS**
Conducted By: **J. STATEN**

Job ID: **2020 ESP**
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	13.6						46.3
2	May-03	13						37.4
3	Oct-03			8.39				
4	Apr-04		17.4					
5	Dec-09					28.67		
6	Jan-10				35.34		32.43	
7	Jun-10		7.73	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		33	21.6	
21	Aug-16				30.3			
22	Sep-16	7.45	23.9	3.58		35.3	23.1	42.2
23	Apr-17	10.8	22.1	3.09	23.5	37.6	19.9	
24	Nov-17	11.4	23.5	2.86	43.9	41.1	17.3	
25	Apr-18	7.03	24.8	2.97	36.5	37.3	15.4	
26	Oct-18	9	21.6	3.16		27	10.2	44
27	May-19	22.1	23.4	2.95	34.6	35.3	10.8	
28	Oct-19	18.5	23.3	3.07	30.2	30.8	18.4	
29	May-20	15.1	22.4	3.12	42.8	37.6	12.3	
30	Oct-20	22.3	21.1	2.96		33.4	14.4	42.4
31								
32								
33								
34								
35								
Coefficient of Variation:		0.32	0.17	0.33	0.17	0.16	0.37	0.09
Mann-Kendall Statistic (S):		4	-10	-90	3	99	-176	2
Confidence Factor:		53.2%	59.9%	99.2%	54.3%	99.8%	>99.9%	54.8%
Concentration Trend:		No Trend	Stable	Decreasing	No Trend	Increasing	Decreasing	No Trend



Notes:

- At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
- 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.
- 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.

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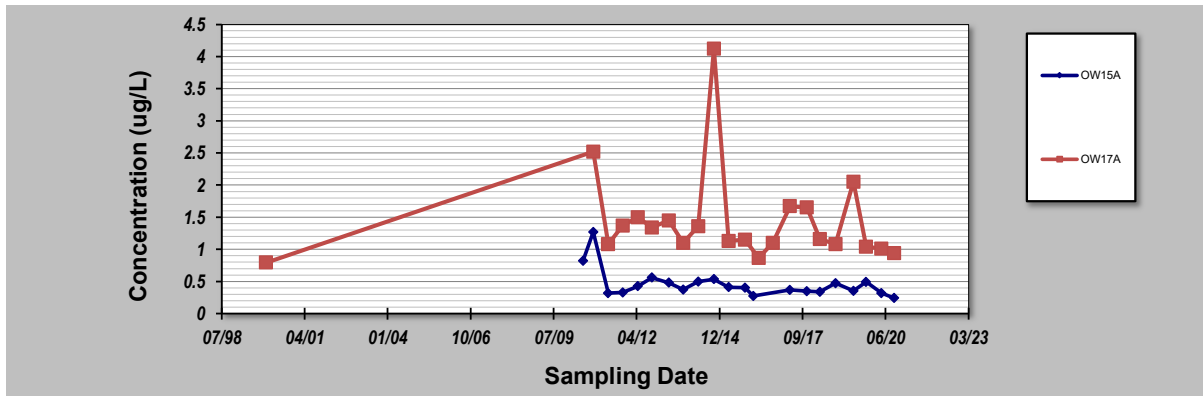
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GSI MANN-KENDALL TOOLKIT for Constituent Trend Analysis

Evaluation Date: **19-Jul-21**
 Facility Name: **NFSS**
 Conducted By: **J. STATEN**

Job ID: **2020 ESP**
 Constituent: **TOTAL URANIUM**
 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	Feb-16	0.274						
18	Apr-16		0.867					
19	Sep-16		1.1					
20	Oct-16							
21	Apr-17	0.367	1.67					
22	Nov-17	0.348	1.65					
23	Apr-18	0.337	1.16					
24	May-18							
25	Oct-18	0.472	1.08					
26	May-19	0.353	2.05					
27	Oct-19	0.493	1.04					
28	May-20	0.32	1.01					
29	Oct-20	0.242	0.939					
30								
Coefficient of Variation:		0.49	0.50					
Mann-Kendall Statistic (S):		-75	-41					
Confidence Factor:		98.8%	86.9%					
Concentration Trend:		Decreasing	Stable					



Notes:

- At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
- 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.
- 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.

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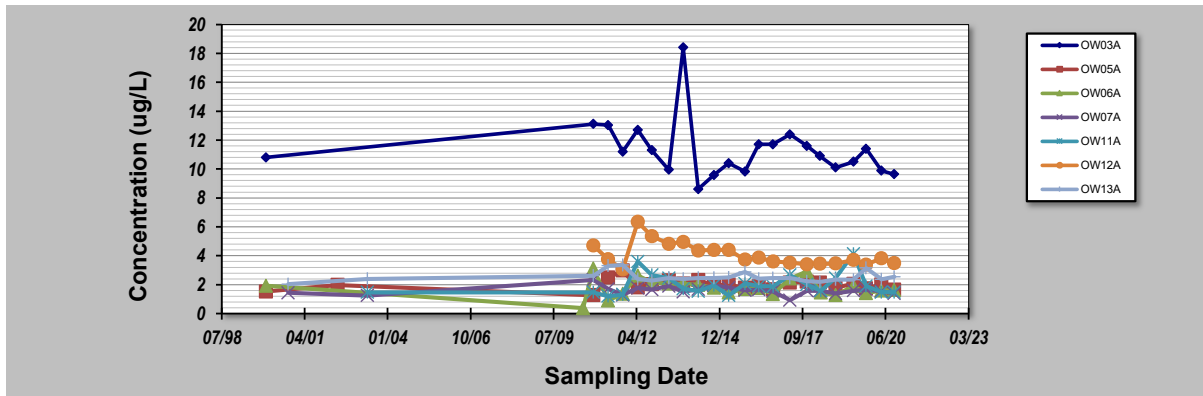
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GSI MANN-KENDALL TOOLKIT for Constituent Trend Analysis

Evaluation Date: **19-Jul-21**
Facility Name: **NFSS**
Conducted By: **J. STATEN**

Job ID: **2020 ESP**
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				1.44			2.04
3	May-02		1.98					
4	May-03				1.25	1.47		2.4
5	Jun-10			0.38				
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	May-19	10.5	2.06	1.89	1.58	4.14	3.71	2.35
27	Oct-19	11.4	1.74	1.42	1.67	1.9	3.39	3.15
28	May-20	9.88	2.01	1.59	1.54	1.48	3.83	2.37
29	Oct-20	9.64	1.65	1.64	1.39	1.48	3.5	2.54
30								
Coefficient of Variation:		0.18	0.17	0.34	0.17	0.37	0.20	0.13
Mann-Kendall Statistic (S):		-58	-29	-35	-48	31	-98	-14
Confidence Factor:		94.6%	76.8%	81.3%	89.1%	79.9%	99.9%	63.3%
Concentration Trend:		Prob. Decreasing	Stable	Stable	Stable	No Trend	Decreasing	Stable



Notes:

- At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
- 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.
- 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.

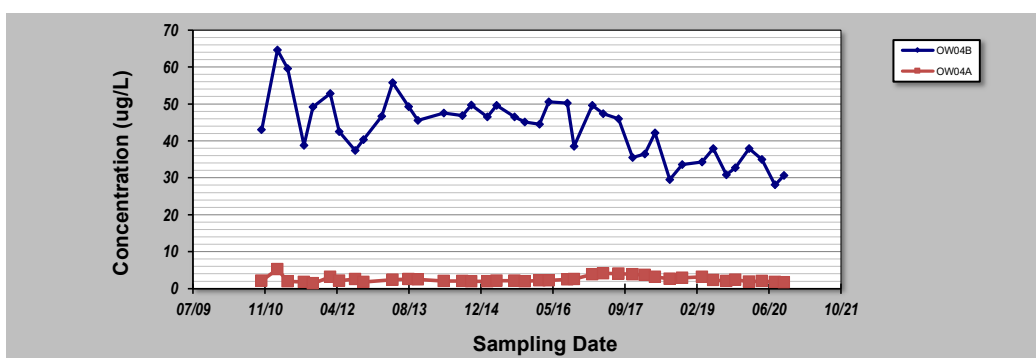
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GSI MANN-KENDALL TOOLKIT for Constituent Trend Analysis

Evaluation Date: 19-Jul-21	Job ID: 2020 ESP
Facility Name: NFSS	Constituent: TOTAL URANIUM
Conducted By: J. STATEN	Concentration Units: ug/L

Sampling Point ID:		OW04B	OW04A				
Sampling Event	Sampling Date	TOTAL URANIUM CONCENTRATION (ug/L)					
1	Oct-10	43.04	2.17				
2	Feb-11	64.64	5.27				
3	Apr-11	59.58	1.93				
4	Aug-11	38.74	1.79				
5	Oct-11	49.22	1.4				
6	Feb-12	52.85	3.15				
7	Apr-12	42.5	2.11				
8	Aug-12	37.4	2.54				
9	Oct-12	40.3	1.82				
10	Feb-13	46.7					
11	Apr-13	55.8	2.38				
12	Aug-13	49.3	2.6				
13	Oct-13	45.5	2.44				
14	Apr-14	47.5	2.03				
15	Aug-14	46.8	2.05				
16	Oct-14	49.7	1.92				
17	Feb-15	46.5	1.99				
18	Apr-15	49.6	2.1				
19	Aug-15	46.5	2.11				
20	Oct-15	45.1	1.93				
21	Feb-16	44.5	2.26				
22	Apr-16	50.6	2.24				
23	Aug-16	50.2	2.45				
24	Oct-16	38.5	2.61				
25	Feb-17	49.6	3.89				
26	Apr-17	47.4	4.11				
27	Aug-17	46	4				
28	Nov-17	35.5	3.83				
29	Feb-18	36.4	3.68				
30	Apr-18	42.2	3.17				
31	Aug-18	29.5	2.66				
32	Oct-18	33.6	2.9				
33	Mar-19	34.3	3.19				
34	May-19	37.9	2.28				
35	Aug-19	30.8	2.03				
36	Oct-19	32.7	2.4				
37	Feb-20	37.9	1.87				
38	May-20	35	2.05				
39	Aug-20	28.1	1.76				
40	Oct-20	30.6	1.7				
Coefficient of Variation:		0.16	0.33				
Mann-Kendall Statistic (S):		-144	165				
Confidence Factor:		99.0%	99.8%				
Concentration Trend:		Decreasing	Increasing				



Notes:

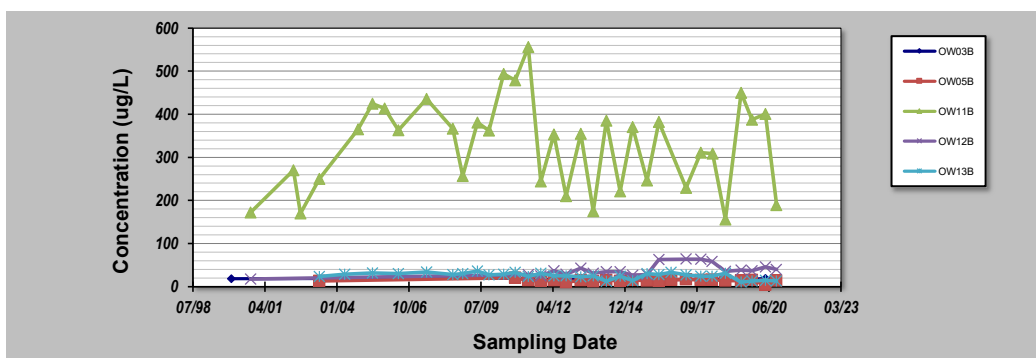
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- Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

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GSI MANN-KENDALL TOOLKIT for Constituent Trend Analysis

Evaluation Date: **19-Jul-21** Job ID: **2020 ESP**
 Facility Name: **NFSS** Constituent: **TOTAL URANIUM**
 Conducted By: **J. STATEN** 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			172	17.9			
3	May-02			270				
4	Aug-02			170				
5	May-03		13.4	250		23.5		
6	Apr-04					28.5		
7	Nov-04			365				
8	May-05			424.69		31.4		
9	Nov-05			413.16				
10	May-06			363.13		30.22		
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	13.2	382	62.8	27.8		
29	Sep-16	16.4				33.3		
30	Oct-16		15.5					
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	30.6		
36	May-19	15.2	13.6	450	38.2	10.8		
37	Oct-19	16.8	15.5	387	36.5	13		
38	May-20	18.9	3.94	401	45.7	14.8		
39	Oct-20	16.2	14	189	39.6	12.9		
40								
Coefficient of Variation:		0.12	0.22	0.32	0.35	0.28		
Mann-Kendall Statistic (S):		-35	15	-7	82	-164		
Confidence Factor:		82.9%	65.2%	53.5%	99.6%	99.8%		
Concentration Trend:		Stable	No Trend	Stable	Increasing	Decreasing		



Notes:

- At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
- 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.
- 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.

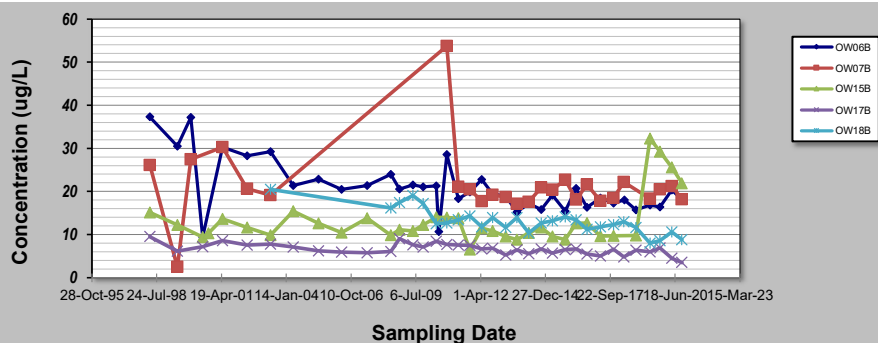
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GSI MANN-KENDALL TOOLKIT for Constituent Trend Analysis

Evaluation Date: 19-Jul-21	Job ID: 2020 ESP
Facility Name: NFSS	Constituent: TOTAL URANIUM
Conducted By: J. STATEN	Concentration Units: ug/L

Sampling Point ID:	OW06B	OW07B	OW15B	OW17B	OW18B		
Sampling Event	Sampling Date	TOTAL URANIUM CONCENTRATION (ug/L)					
1	Apr-98	37.3	26.12	15.14	9.52		
2	Jun-99	30.49	2.47	12.26	6.11		
3	Jan-00	37.2	27.44				
4	Jul-00	9.43		9.43	7.17		
5	Oct-00			10.3			
6	May-01	30.28	30.27	13.64	8.62		
7	May-02	28.3	20.6	11.6	7.52		
8	May-03	29.2	19.1	9.82	7.79	20.5	
9	Apr-04	21.39		15.42	7.07		
10	May-05	22.85		12.62	6.21		
11	May-06	20.48		10.42	5.93		
12	Jun-07	21.37		13.77	5.74		
13	Jun-08	23.93		9.83	6.08	16.17	
14	Oct-08	20.53		11.13	9.06	17.45	
15	May-09	21.49		10.83	7.65	19.03	
16	Oct-09	21.04		12.23	7.07	17.19	
17	May-10	21.28		13.98	8.47	12.5	
18	Jun-10	10.64					
19	Oct-10	28.59	53.75	13.93	7.66	12.68	
20	Apr-11	18.31	21.05	13.75	7.57	13.43	
21	Oct-11	19.85	20.45	6.5	7.44	14.3	
22	Apr-12	22.8	17.7	11.5	6.69	11.8	
23	Oct-12	19.4	19.2	10.8	6.8	13.9	
24	Apr-13	18.9	18.7	9.59	5.25	11.6	
25	Oct-13	15.2	17.1	8.84	6.4	13.9	
26	Apr-14	17.2	17.6	10.4	5.57	10.4	
27	Oct-14	15.8	20.9	11.6	6.64	12.7	
28	Apr-15	19.1	20.4	9.55	5.69	13.2	
29	Oct-15	15.4	22.7	8.83	6.53	14.1	
30	Apr-16	20.7	18.1	12.6	6.62	13.4	
31	Sep-16	16.3	21.6	12.7	5.48	11.2	
32	Apr-17	18.5	17.8	9.66	5.04	11.8	
33	Nov-17	17.3	18.5	9.72	6.56	12.3	
34	Apr-18		22.2		4.83	13	
35	May-18	18					
36	Oct-18	15.7		9.74	6.39	11.6	
37	May-19	16.8	18.3	32.3	5.96	8.02	
38	Oct-19	16.4	20.5	29.2	6.87	8.58	
39	May-20	20.3	21.2	25.6	4.5	10.6	
40	Oct-20	18.1	18.2	21.9	3.52	8.81	
Coefficient of Variation:	0.29	0.38	0.43	0.19	0.23		
Mann-Kendall Statistic (S):	-359	-45	7	-285	-202		
Confidence Factor:	>99.9%	83.2%	53.3%	>99.9%	>99.9%		
Concentration Trend:	Decreasing	Stable	No Trend	Decreasing	Decreasing		



Notes:

- At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
- 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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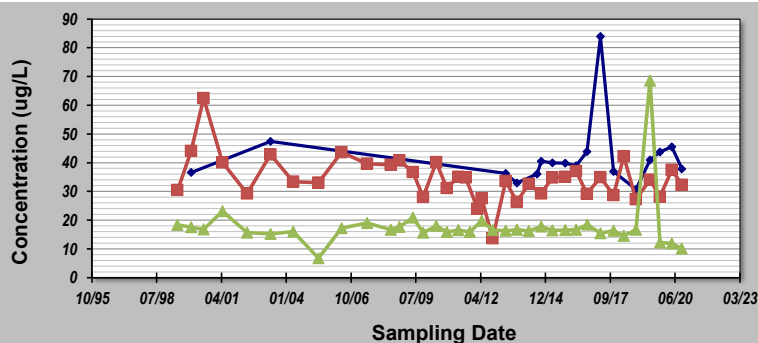
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GSI MANN-KENDALL TOOLKIT for Constituent Trend Analysis

Evaluation Date: 19-Jul-21	Job ID: 2020 ESP
Facility Name: NFSS	Constituent: TOTAL URANIUM
Conducted By: J. STATEN	Concentration Units: ug/L

Sampling Point ID:	A43	A45	A50				
Sampling Event	Sampling Date	TOTAL URANIUM CONCENTRATION (ug/L)					
1	Jun-99		30.53	18.36			
2	Jan-00	36.6	44.1	17.6			
3	Jul-00		62.46	16.75			
4	May-01		40.09	23.09			
5	May-02		29.3	15.7			
6	May-03	47.4	42.8	15.2			
7	Apr-04		33.42	16.04			
8	May-05		33.02	6.77			
9	May-06		43.66	17.25			
10	Jun-07		39.62	18.98			
11	Jun-08		39.27	16.67			
12	Oct-08		40.78	17.67			
13	May-09		36.73	20.93			
14	Oct-09		27.99	15.65			
15	May-10		40.14	18.06			
16	Oct-10		31.2	15.94			
17	Apr-11		35.1	16.55			
18	Aug-11		34.81				
19	Oct-11			15.94			
20	Feb-12		23.92				
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		32.6	16.2			
26	Aug-14	36					
27	Oct-14	40.5	29.2	17.8			
28	Apr-15	40	34.8	16.5			
29	Oct-15	39.8	35	16.6			
30	Apr-16	38.9	37	16.7			
31	Sep-16	43.9	29.1				
32	Oct-16			18.4			
33	Apr-17	83.9	34.9	15.4			
34	Nov-17	36.9	28.7	16.3			
35	Apr-18		42.2	14.6			
36	Oct-18	30.7	27.2	16.7			
37	May-19	40.9	34	68.6			
38	Oct-19	43.7	28.1	12.2			
39	May-20	45.5	37.5	11.9			
40	Oct-20	37.8	32.3	10.1			
Coefficient of Variation:	0.30	0.23	0.51				
Mann-Kendall Statistic (S):	17	-177	-51				
Confidence Factor:	78.2%	99.4%	76.9%				
Concentration Trend:	No Trend	Decreasing	Stable				



Notes:

- At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
- 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.
- 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.

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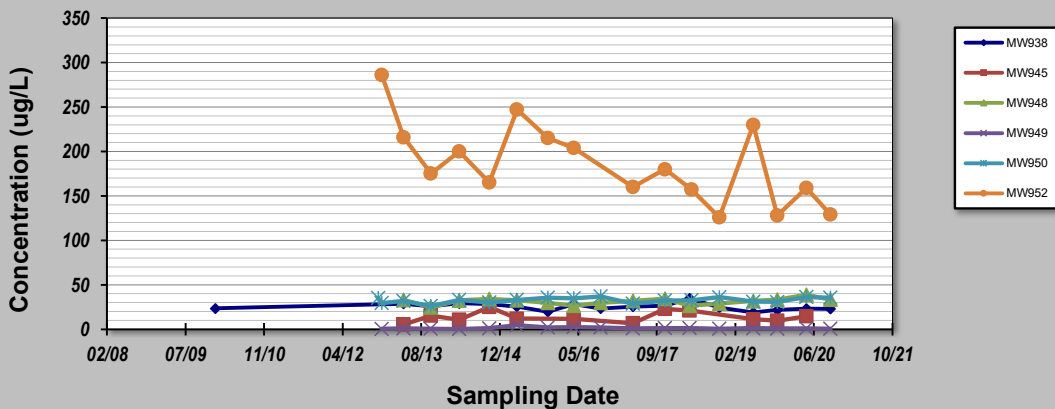
GSI MANN-KENDALL TOOLKIT

for Constituent Trend Analysis

Evaluation Date: **19-Jul-21**
 Facility Name: **NFSS**
 Conducted By: **J. STATEN**

Job ID: **2020 ESP**
 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	Dec-09							
2	Jan-10	23.42						
3	Nov-12					35		
4	Dec-12				0.363	29.4	286	
5	Feb-13							
6	Apr-13	28.7	5.25	33.1	0.803	31.8	216	
7	Aug-13							
8	Oct-13	25.9	15.3	24.6	0.469	26.3	175	
9	Apr-14	29.2	10.7	32.4	0.289	33.1	200	
10	Oct-14	28.3	25.2	33.9	1.12	30.1	165	
11	Apr-15	25.3	11.9	32.7	4.44	32.9	247	
12	Oct-15	19.7		29.7	2.1	35.4	215	
13	Apr-16	28.1	11.6	26.6	2.25	34.9	204	
14	Sep-16	23.3		29.7	2.04	36.9		
15	Oct-16							
16	Apr-17	25.5	6.55	31.9	1.02	28.7	160	
17	Nov-17	26.3	22.9	34.5	1.27	32.2	180	
18	Apr-18	34.7	21.2	26.6	1.14			
19	May-18					32.6	157	
20	Oct-18	24.4		29.1	0.506	36	126	
21	May-19	18.8	11.2	31.7	1.08	31	230	
22	Oct-19	21.6	9.71	33.4	0.721	30.6	128	
23	May-20	23.1	14.6	38.9	0.922	36.2	159	
24	Oct-20	22.8		33.3	0.424	35.4	129	
25								
Coefficient of Variation:		0.15	0.46	0.11	0.83	0.09	0.24	
Mann-Kendall Statistic (S):		-46	2	20	-8	32	-60	
Confidence Factor:		96.8%	52.7%	80.1%	61.2%	87.8%	99.7%	
Concentration Trend:		Decreasing	No Trend	No Trend	Stable	No Trend	Decreasing	



Notes:

- At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
- 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.
- 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.

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GSI MANN-KENDALL TOOLKIT

for Constituent Trend Analysis

Evaluation Date: **19-Jul-21**

Facility Name: **NFSS**

Conducted By: **J. STATEN**

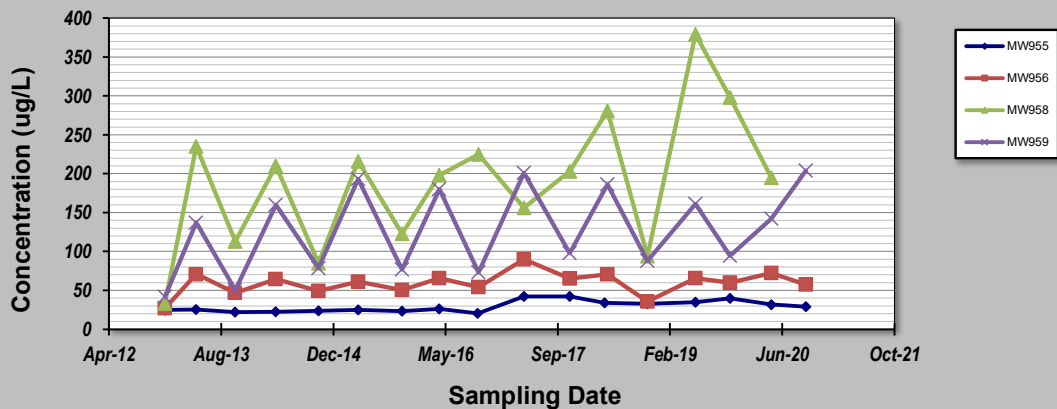
Job ID: **2020 ESP**

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	65.2	203	97.6		
18	Apr-18	33.8					
19	May-18		70.6	281	186		
20	Oct-18	32.8	35.5	94	88		
21	May-19	34.7	65.8	379	161		
22	Oct-19	39.6	59.8	298	94.3		
23	May-20	31.7	72.4	195	142		
24	Oct-20	29	57.4		204		
25							
Coefficient of Variation:		0.24	0.25	0.46	0.43		
Mann-Kendall Statistic (S):		54	32	36	44		
Confidence Factor:		98.6%	89.8%	94.2%	96.2%		
Concentration Trend:		Increasing	No Trend	Prob. Increasing	Increasing		



Notes:

- At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
- 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.
- 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.

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GSI MANN-KENDALL TOOLKIT

for Constituent Trend Analysis

Evaluation Date: **19-Jul-21**

Facility Name: **NFSS**

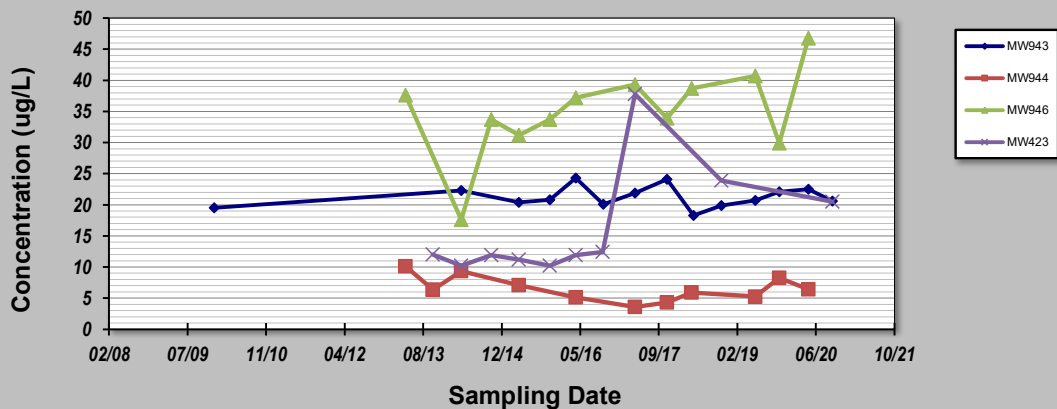
Conducted By: **J. STATEN**

Job ID: **2020 ESP**

Constituent: **TOTAL URANIUM**

Concentration Units: **ug/L**

Sampling Point ID:		MW943	MW944	MW946	MW423			
Sampling Event	Sampling Date	TOTAL URANIUM CONCENTRATION (ug/L)						
1	Dec-09	19.5						
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	May-19	20.7	5.25	40.7				
22	Oct-19	22.1	8.27	29.9				
23	May-20	22.5	6.39	46.8				
24	Oct-20	20.6			20.5			
25								
Coefficient of Variation:		0.08	0.31	0.20	0.55			
Mann-Kendall Statistic (S):		7	-11	27	21			
Confidence Factor:		62.6%	77.7%	96.3%	96.4%			
Concentration Trend:		No Trend	Stable	Increasing	Increasing			



Notes:

- At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
- 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.
- 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.

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GSI MANN-KENDALL TOOLKIT

for Constituent Trend Analysis

Evaluation Date: **19-Jul-21**

Facility Name: **NFSS**

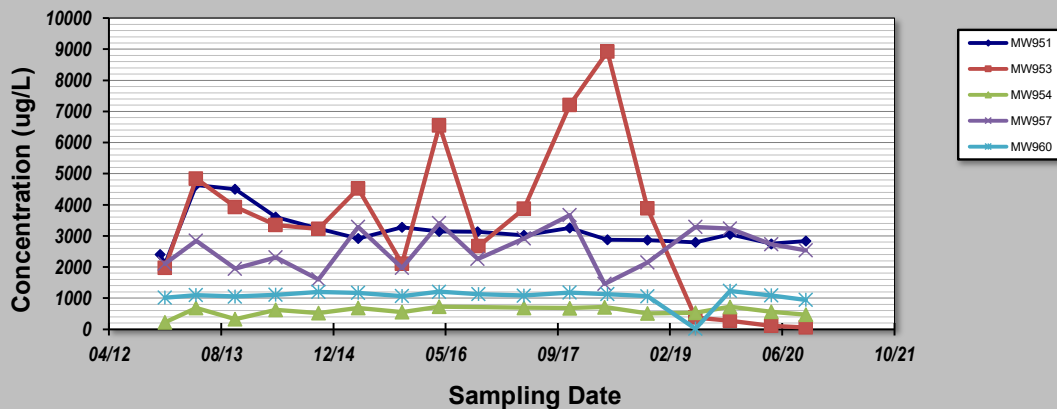
Conducted By: **J. STATEN**

Job ID: **2020 ESP**

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	2400						
4	Dec-12	2090	1970	218	2100	1010		
5	Feb-13							
6	Apr-13	4631	4843	687	2846	1097		
7	Aug-13							
8	Oct-13	4502	3929	322	1944	1049		
9	Apr-14	3601	3351	620	2310	1109		
10	Oct-14	3231	3221	523	1600	1201		
11	Apr-15	2917	4523	682	3290	1165		
12	Oct-15	3280	2106	548	1967	1063		
13	Apr-16	3145	6547	724	3410	1204		
14	Sep-16	3130			2260			
15	Oct-16		2671			1124		
16	Apr-17	3018	3875	689	2913	1080		
17	Nov-17	3257	7207	680	3666	1177		
18	Apr-18			711	1459			
19	May-18	2879	8927			1126		
20	Oct-18	2861	3884	508	2141	1060		
21	May-19	2791	376	532	3290	16.1		
22	Oct-19	3052	277	720	3234	1232		
23	May-20	2747	110	561	2734	1090		
24	Oct-20	2832	56.6	469	2537	943		
25								
Coefficient of Variation:		0.20	0.75	0.26	0.26	0.26		
Mann-Kendall Statistic (S):		-55	-36	14	23	0		
Confidence Factor:		98.0%	92.4%	71.8%	81.5%	48.4%		
Concentration Trend:		Decreasing	Prob. Decreasing	No Trend	No Trend	Stable		



Notes:

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- 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.

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